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Comprehensive Landscape Assessment Report

Priority Agricultural Value Chains For Green Technology Investments In Uganda

30th September 2026

With Support;

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FINAL LANDSCAPE ASSESSMENT REPORT

Priority Agricultural & Agro - Industrial Value Chains in Uganda

Submitted to: aBi Development Limited | The GRASP Program
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10 Value Chains	7 Analytical Pillars	4 Study Phases	60 - Days Study

Client / approval body	aBi Development Limited, and the Royal Danish Embassy..
Prepared by	Access2Innovation (A2i)

Forward



When aBi Development asked Access2Innovation to map Uganda's agricultural and agro-industrial value chains for the Green Technology Transfer Fund, the question to be asked was: Where can Danish and European green technology create lasting commercial value in Uganda? This report gives part of the answer, and we have tried to be equally candid about the limits of our findings. Where the case is strong, we say so, we have flagged it. Three findings have shaped my own thinking most:

The first is that capital is no longer the main thing holding Uganda's agricultural sector back. Every financial institution we engaged, told us the same thing: the money is there. What is missing is bankability: consistent production volume, reliable quality, sound governance and records, and the certifications that open formal and export markets.

The second is that technical assistance is not an add-on. Seven of our ten sector consultants first built capital stacks without it, even though each had documented operator, certification and compliance gaps that only technical assistance can close.

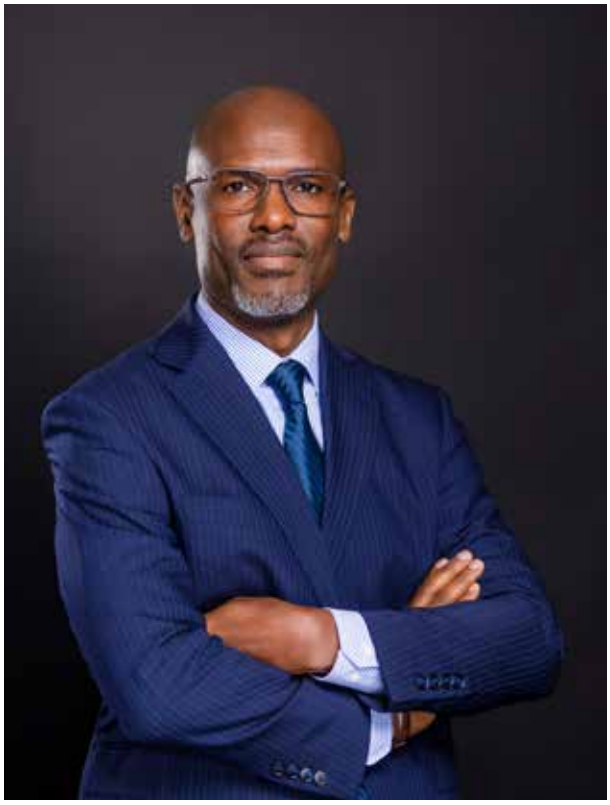
The third is that the European technology advantage is real but has to be earned. It rests on lifecycle cost, energy efficiency, food safety, compliance and long-term partnership rather than on purchase price. Where those factors decide an investment, Danish and EU suppliers can compete and win. Where they do not, we have said so.

I would like to thank aBi Development for its partnership and rigorous review, the Royal Danish Embassy and the European Union for their support of GRASP, and the Ugandan government institutions that shared their data and time. Above all, I thank the enterprises and cooperatives who opened their operations to us, and the ten specialists on our team whose fieldwork forms the backbone of this report.

A landscape study is only a beginning. The real test will be the enterprises still operating, still servicing their loans and still working with their European technology partners years after the grant has ended. We look forward to that work with aBi Development and our partners in Uganda.

Henrik Anker-Ladefoged
Chief Executive Officer, Access2Innovation
Kampala, September 2026

Foreword



Agriculture is central to Uganda's economic transformation, with the Fourth National Development Plan (NDP IV 2025/26-2029/30) placing agro-industrialisation at the heart of the country's development ambitions. Achieving this requires greater productivity and value addition, stronger private investment, increased exports, and the adoption of green innovative technologies for sustainability.

Against this backdrop, aBi Development commissioned the Green Technology Transfer Fund (GTTF) in partnership with Access2innovation. This partnership has resulted in the Green Agrifood Systems Programme (GRASP) Landscape Assessment, which asks a practical question: where can green technology, enterprise investment and private capital come together to create commercially viable and sustainable growth?

One important finding is that Uganda has an increasingly capable agricultural financing ecosystem. This reflects, among other efforts, aBi Finance's work to expand access to green and inclusive finance for smallholder farmers and agribusinesses through financial institutions. The more significant constraint is often the availability of bankable transactions. Enterprises need the production volumes, quality, governance, technical capability and market linkages required to absorb investment and grow.

This reinforces an important principle in aBi Development's approach. Our role is not simply to provide resources to enterprises, but to address the constraints that prevent viable businesses and value chains from reaching their potential, while enabling markets and private investment to play a greater role. Our strategy therefore centres on market-driven enterprises and green agri-food system development, supported by finance, technical assistance and capacity building.

The GTTF provides an opportunity to take this approach further. By examining ten agricultural and agro-industrial value chains through the lenses of market opportunity, enterprise readiness, technology, financing, impact and sustainability, the assessment provides a stronger basis for identifying where catalytic support can unlock commercial opportunity.

At the heart of this approach is additionality and leverage. Grant resources should help make investments possible that might otherwise struggle to proceed, while enterprise capability and technical assistance ensure that investments can generate lasting value. Green investment, likewise, should not be an end in itself. It should help build agricultural and agribusiness systems that are more productive, resource-efficient, climate-resilient and commercially competitive.

The national opportunity is significant. Uganda's ambitions for agro-industrialisation, value addition, export growth and employment depend on connecting productive enterprises to innovative technologies, infrastructure, markets in Europe and the investment they need to scale.

For aBi Development, the GTTF is an opportunity to demonstrate how catalytic development resources can help address the constraints that hold back agricultural investment and move enterprises towards commercially sustainable growth.

Success will therefore be measured by stronger, more resilient enterprises and producers, alongside the adoption of green technologies that improve resource efficiency, strengthen climate resilience and protect the environment.

As Uganda pursues sustainable industrialisation and seeks to capture greater value from regional and global markets, our task is to ensure that agricultural growth translates into productive enterprises, resilient value chains, decent employment and greater value retained within Uganda.

On behalf of aBi Development, I would like to thank the Government of Uganda for its leadership in advancing agro-industrialisation, value addition, private sector development and sustainable economic transformation, and for creating the policy environment within which initiatives such as this can contribute to national priorities.

We are immensely grateful to the Embassy of Denmark in Uganda and the European Union Delegation to Uganda for their continued support to Uganda's agricultural transformation and for the partnership and resources that make work of this nature possible. And finally, to Access 2 Innovation for their partnership and for delivering a great piece of work.

Ddegeya Sekyeru
Chief Executive Officer
aBi Development Limited

ROYAL DANISH EMBASSY, KAMPALA

Foreword



GRASP Final Landscape Assessment of Priority Agricultural and Agro-Industrial Value Chains in Uganda

Uganda's agri-food sector carries the livelihoods of most Ugandans, yet it stands at a critical juncture. Erratic weather, post-harvest losses, and rising energy costs pose increasing challenges to processing enterprises across the country. How this sector evolves over the coming decade will determine both Uganda's economic resilience and its broader prosperity. Recognizing this imperative, Denmark and the European Union are investing directly in its green transformation through the Green Agri-food Systems Programme (GRASP).

A cornerstone of this commitment is the UGX 10.34 billion Green Technology Transfer Fund (GTTF). Implemented by Access2Innovation in partnership with aBi Development Ltd, the GTTF operates as a catalytic instrument designed to mobilize private co-investment and embed proven European green technologies into Ugandan agribusinesses. Crucially, the fund serves as a bridge, linking Danish and broader EU businesses with the Ugandan private sector to foster commercial partnerships that drive two-way trade, investment, and long-term knowledge exchange.

Uganda is rapidly emerging as an increasingly dynamic and attractive market for European private-sector engagement. To ensure our interventions respond effectively to market demand, Access2Innovation commissioned two foundational landscape studies: The Uganda–European Union Trade, Investment and Development Cooperation Landscape and The Agricultural Financing Landscape in Uganda. Combined in this publication, these studies offer vital evidence for identifying high-potential business opportunities of shared interest among Denmark, the EU, and Uganda.

This work directly complements broader, ongoing initiatives aimed at strengthening private-sector ties across the region. In particular, it connects naturally with the regional efforts of Danish Industry (DI) to build sustainable B2B partnerships, foster green transition, and support business member organizations. By linking these institutional networks, we ensure that Danish and European firms find well-supported entry points into the Ugandan market.

The findings demonstrate that access to capital is no longer the primary constraint; rather, expanding production volume, improving product quality, and building bankability are key. By addressing these structural priorities, this initiative aligns directly with Uganda's National Development Plan IV and reinforces the Government of Uganda's ongoing efforts to improve the ease of doing business.

On behalf of the Royal Danish Embassy, I express our sincere gratitude to aBi Development Ltd, Access2Innovation, the EU Delegation, and the many public and private stakeholders whose insights shaped this work. We commend this publication to all partners who share our commitment to a greener, more competitive, and inclusive agri-food sector, and we look forward to the enduring commercial relationships it will inspire

Jacob Kahl Jepsen

Team Leader, Team Green Economy, Trade and Climate
Royal Danish Embassy, Kampala
September 2026

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About this Document

This report is the Final Landscape Assessment Report - the definitive deliverable of the GRASP landscaping study commissioned by aBi Development Limited and using funds from Royal Danish Embassyand European Union, that is implemented by Access2Innovation (A2i). It presents the completed findings of the seven - pillar analytical framework across all ten priority value chains, together with Uganda's EU trade and investment relationship, the domestic agricultural financing landscape, the cross - sector comparison, the investment structuring framework, and the strategic recommendations that those findings support.

Chapter 1 Takes into account introduction, macro context, and methodology. Chapter 2 and Chapter 3 on the other hand presents the Uganda - EU trade and investment landscape and the agricultural financing landscape respectively, integrated here as full chapters rather than back - of - book annexes. Chapters 4 through 13 follow an identical seven - pillar structure across all ten priority value chains - Coffee, Dairy, Piggery, Poultry, Livestock (Beef and Small Ruminants), Grain and Animal Feeds, Horticulture, Fish/Aquaculture, Cassava, and Agro - industrial waste. This is deliberate: a standardized structure allows cross - sector comparison in Chapter 14 and ensures the sector scoring and investment prioritization in Chapters 14 and 15 rest on comparable analytical foundations.

Note on reading this report: section descriptions in each chapter explain what the content covers and what the findings are. Findings have been developed through desktop research, key informant engagement, and financial analysis, and are presented here together with the annexed supporting material listed at the end of this report.

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Executive Summary

Access2Innovation (A2i) was commissioned by aBi Development Limited using funds from Royal Danish Embassy and European Union to conduct the Landscape Assessment, a study identifying which of Uganda's agricultural value chains are commercially ready to absorb the Green Technology Transfer Fund (GTTF) under the aBi development's (GRASP) program of 2024 from Denmark and the European Union. This report is the study's final deliverable: a decision - grade assessment of ten priority value chains, framed by Uganda's EU trade relationship and its domestic financing landscape, and built to guide how the Green Technology Transfer Fund (GTTF) allocates its UGX 10.34 billion envelope over the programme period ahead.

Chapter 1 provides insights into the macro-context and the methodologies used to undertake the study Chapter 2 presents the Uganda - European Union Trade and Investment Landscape, and Chapter 3 presents the Agricultural Financing Landscape in Uganda. Chapters 4 through 17 has the ten value chain assessments, the comparative ranking, the investment structuring framework, the policy chapter, and the closing strategic recommendations, with a factual and consistency corrections identified during the validation process.

The Danish and The European Union relationship: a narrower but deeper channel than the headline trade numbers suggest

Chapter 2 establishes the trade and investment backdrop against which every technology - transfer recommendation in this report should be read. Uganda's exports to the EU grew from about USD 510 million in 2015 to an estimated USD 1.78 billion in 2025, while EU exports to Uganda grew more slowly, from USD 461 million to about USD 776 million - moving Uganda into a growing trade surplus with the bloc from 2022 onward, driven overwhelmingly by coffee. At the same time, the EU's share of Uganda's import market fell to around 6 percent by 2024 - 2025, as Chinese, Indian, Gulf, and Turkish suppliers captured most of the growth in machinery and equipment demand. The two trends are not contradictory: they describe an EU relationship that has narrowed on price - driven bulk equipment purchases while deepening on exactly the dimensions - food safety, energy efficiency, compliance, and lifecycle cost - that determine whether a Danish or EU green technology investment succeeds commercially in Uganda. This is the same competitive logic the sector chapters apply individually; Chapter 2 supplies the trade - level evidence for it, and shows where the EU supplier pipeline is deep (Grain and Animal Feeds, Fish and Aquaculture) and where it is comparatively thin and requires direct validation before GTTF capital is committed against a named partner (Coffee, Cassava).

The financing landscape: capital is no longer the binding constraint

Chapter 3 reaches a finding that reframes how GTTF grant capital should be designed. Uganda's agricultural financing landscape is active and well - capitalised: five institutions engaged for this study - IFC, the Uganda Development Bank, Stanbic Bank, DFCU Bank, and the Bank of Uganda's Agricultural Credit Facility - all signalled strong appetite for agriculture and agro - processing specifically, with pricing converged around a 12 percent concessional benchmark, tenors running 8 to 15 years, and a decisive shift from collateral - first to cash - flow - first underwriting. The consistent message across every institution is that capital is available; the binding constraint has moved to production volume, product

quality, and bankability - exactly the gap technical assistance, not a larger grant, is designed to close. This finding directly reinforces the technical - assistance conclusion Chapter 14 reaches independently from the ten sector chapters, and it means the GTTF's grant capital is best deployed as a precise de - risking instrument targeted at specific, named gaps - a feasibility study, a demonstration plant, an equity cushion - rather than as a substitute for the commercial and development finance the market already supplies.

The study applies an identical seven - pillar analytical structure to all ten value chains - Coffee, Dairy, Piggery, Poultry, Livestock, Grain and Animal Feeds, Horticulture, Fish and Aquaculture, Cassava, and Agro - industrial Waste - so that the findings in Chapters 4 through 13 can be compared directly against one another in Chapter 14, rather than read as ten separate, incommensurate sector reports. Each chapter scores its sector on a consistent 1 - 10 multi - criteria framework; Chapter 14 then ranks all ten sectors against each other, and Chapter 15 turns that ranking into a concrete investment structuring framework and implementation roadmap.

Four sectors emerge as the programme's clearest near - term priorities. Grain and Animal Feed scores highest of the ten (8.98/10), reflecting both strong standalone fundamentals and its foundational role as an input to Poultry, Piggery, Livestock, and Aquaculture alike - underinvestment here suppresses the achievable return across four other chapters simultaneously, and Chapter 3's financing evidence confirms this is also where financier appetite is broadest. Coffee follows closely (8.54/10) on the strength of a documented 40 - 75x farm - gate - to - export value uplift and a confirmed global off - take anchor, influenced by the ongoing UCDA - to - Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) regulatory transition and, as Chapter 2 notes, a comparatively thin validated EU supplier bench that argues for direct engagement rather than assumed readiness. Poultry (8.35/10) offers the strongest post - grant commercial sustainability profile of any chapter, and Piggery (8.1/10) shows a large, well - quantified gap between farm - gate and certified formal retail value. Dairy, Cassava, Livestock, Agro - industrial Waste, Fish and Aquaculture, and Horticulture round out the ranking; the lower position of the last two reflects an incomplete enterprise - evidence base more than a weak underlying commercial case, and both are recommended for parallel Danida E4 feasibility funding rather than deferral to a later programme phase.

Five findings recur across multiple value chains independently and should shape how the GTTF is implemented, not just how it is designed. Technical assistance functions as a first - order capital stack component in every sector rather than a residual add - on: seven of the ten chapters initially omitted an explicit Transaction Assitance (TA) line despite each documenting the exact operator, certification, or compliance gap that (TA) exists to close - a finding Chapter 3's lender interviews independently corroborate from the financing side. The cold - chain deficit is systemic rather than sector - specific, spanning Dairy, Livestock, Poultry, Fish and Aquaculture, and Horticulture, and warrants a single coordinated national strategy rather than five separate enterprise - level fixes. Feed cost and quality is the dominant constraint on competitiveness across every animal - protein value chain, which is why Grain and Animal Feed is recommended as the programme's first action rather than one action among several. The EU regulatory environment - EUDR, SPS and TRACES interceptions, HACCP and ISO certification - is simultaneously the largest near - term compliance cost and the largest durable price premium available to the enterprises that clear it first, a dynamic Chapter 2 sets out at the trade - policy level and each sector chapter applies to its own export profile. And circular - economy and waste - valorisation technology is underdeveloped relative to the 1.71 million tonnes of agro - industrial waste Uganda now generates annually, a gap that cuts across Piggery, Cassava, Coffee, and the dedicated Waste chapter alike, and that Chapter 2 identifies as a growing focus of Danida and EU donor programming specifically.

Financing the leverage ratio

The GTTF's 70:30 enterprise - to - grant matching structure, backed by a five - gate milestone disbursement framework, is designed to achieve a 5:1 leverage ratio - five units of private co - investment mobilised for every unit of grant capital. Chapter 3's banking landscape engagement, underlying Chapter 15's investment structuring framework, found that this target is achievable but not automatic: it depends on the enterprise's 70 percent contribution being genuinely committed against commercial or development finance at Gate 1. The five financing institutions profiled in Chapter 3 together represent a functioning supply of agricultural co - financing capital at a concessional price floor near 12 percent; the GTTF's task is to originate bankable transactions against that capital, and to use its grant to close the specific governance, certification, or technical gaps Ugandan lenders themselves identify as their real underwriting concerns - not to substitute for capital that already exists in the market.

Reading this assessment honestly

This assessment is deliberately explicit about where its own evidence is strongest and where it is not. Three structural risks - Coffee's institutional transition, African Swine Fever exposure in the pig sector, and uneven enterprise readiness in Agro - industrial Waste - require active management by aBi Development throughout implementation rather than resolution before launch. A smaller set of evidence gaps, concentrated in Horticulture and Aquaculture, are assessed as closeable within a 30 - to - 60 - day evidence - closure exercise per enterprise and should not be read as weaknesses in the underlying commercial case. A further, narrower set of items - principally a handful of stakeholder contacts still pending confirmation through key informant interviews, and one enterprise capacity figure (Dei BioPharma) not yet available - are flagged explicitly where they occur rather than presented as settled fact; none is assessed as material to the sector - level investment case it sits within. Chapter 17 sets out these boundaries in full, together with ten strategic recommendations to aBi Development and the GTTF Steering Committee for how the programme's first eighteen months should be sequenced to establish, and then verify, the leverage ratio the fund is built to deliver.

Glossary and Abbreviations

A2i	Access2Innovation, the Danish implementing partner conducting this study
aBi	aBi Development Limited, the commissioning client and primary approval body for this study
ACF	Agricultural Credit Facility, the Bank of Uganda's concessional agricultural co - lending scheme
ASF	African Swine Fever
BDS	Business Development Services
COMESA	Common Market for Eastern and Southern Africa, a regional trade bloc of which Uganda is a member
CoVAB	College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University
DDA	Dairy Development Authority, which mandates and enforces pasteurisation standards in Uganda's dairy sector
DDDP	Department of Dairy Development and Production, which regulates milk quality, pasteurisation compliance and market monitoring in Uganda's dairy sector
DFCU	DFCU Bank, a Ugandan commercial bank with an asset - finance heritage active in agricultural lending
DFI	Development Finance Institution
E3/E4	Danida financing instruments referenced throughout this report: E3 is a concessional loan facility (up to DKK 15 million); E4 covers feasibility studies (DKK 750,000) and demonstration - plant grants (DKK 6 million)
EAC	East African Community, the regional trade bloc of which Uganda is a member
EBA	Everything But Arms, the EU trade arrangement giving Uganda's agricultural exports duty - free, quota - free market access
EUDR	EU Deforestation Regulation, in force since 2023, affecting Uganda's coffee and other commodity exports
Feed Conversion Ratio (FCR)	Feed Conversion Ratio
FDI	Foreign Direct Investment
GRASP	Green Agrifood Systems Programme, the joint A2i - aBi initiative within which this study and the GTTF sit
GTTF	Green Technology Transfer Fund, the catalytic matching - grant facility this study is designed to inform
HACCP	Hazard Analysis and Critical Control Points, a food safety certification standard
IFC	International Finance Corporation, the private - sector arm of the World Bank Group
KII	Key Informant Interview
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MCDA	Multi - Criteria Decision Analysis, the scoring framework used to rank each value chain in this report
NAGRC&DB	National Animal Genetic Resources Centre and Data Bank
NaLIRRI	National Livestock Resources Research Institute (National Agricultural Research Organisation (NARO))
NDP IV	Uganda's Fourth National Development Plan (2025/26 - 2029/30)
OPA	Off - take Purchase Agreement
RIO Markers	the OECD - DAC climate marker system (Mitigation, Adaptation, Biodiversity, Desertification) used to assess climate alignment
SPS	Sanitary and Phytosanitary (standards governing agricultural trade)
TA	Technical Assistance
TRACES	the EU's Trade Control and Expert System for tracking sanitary and phytosanitary compliance
UBOS	Uganda Bureau of Statistics
UCDA	Uganda Coffee Development Authority; dissolved 20 December 2024, with its regulatory functions transitioning MAAIF
UDB	Uganda Development Bank, Uganda's national development bank
(UNBS)	Uganda National Bureau of Standards
UPPA	Uganda Pork Producers and Processors Association



Chapter 1 : Introduction, Macro Context, and Analytical Framework



1.1 Background of the Assignment

Access2Innovation (A2i) was commissioned by aBi Development Limited with the funding from the Royal Danish Embassy and The European Union to conduct a comprehensive Landscaping Study of Priority Agricultural and Agro - Industrial Value Chains in Uganda. This Final Landscape Assessment Report is the culmination of that study - a programme of primary and secondary research, stakeholder engagement, financial analysis, and technology - matching that goes well beyond a conventional market survey to produce investment - ready, decision - grade intelligence for the Green Technology Transfer Fund (GTTF).

The study sits within the GRASP, being implemented by aBi Development (2024 - 2028) a joint A2i - aBi initiative established in February 2026 with a total budget of UGX 10.34 billion, supported by the Government of Denmark and the European Union. GRASP is designed to facilitate the structured transfer of climate - smart green technologies from Denmark and Europe into Uganda's agricultural sector, with two interlocking objectives: accelerating commercial agribusiness growth and enhancing climate resilience for smallholder farmers and rural enterprises.

The Green Technology Transfer Fund sits at the heart of GRASP's operational delivery. With a targeted 5:1 leverage ratio - meaning every shilling of GTTF matching grant should crowd in five shillings of private co - investment - the Fund is structured as a catalytic financing instrument rather than a conventional grant programme. It de - risks commercially viable green technology investments, brings Danish and EU technology partners into long - term joint ventures and licensing arrangements with Ugandan agribusinesses, and aims to build a commercially sustainable agri - green - tech sector that outlasts the grant period itself.

1.1.1 About aBi Development Limited

aBi Development Ltd is a pivotal institution in Uganda's agricultural development landscape, operating through catalytic matching grants and Business Development Services (BDS) to agricultural producers and agribusinesses across the country. Its strategic mandate is to stimulate sustainable development, enhance productivity, and improve livelihoods across agricultural value chains. As the commissioning client for this study, aBi's institutional knowledge and established relationships within Uganda's agri - food systems have been central to the study's design, data access, and quality assurance throughout.

1.1.2 About Access2Innovation

A2i is a Danish facilitator of market - driven and sustainable business solutions in East Africa, serving as a trusted implementing partner for Danish development frameworks including Danida and the Royal Danish Embassy, A2i's value proposition for this study rests on four strategic pillars: proven experience in green technology transfer across East Africa, including mobile seed cleaners, low - temperature milling, and sustainable storage; deep competence in agro - industrial value chain analysis; a cross - sector collaborative model for co - creation; and a rigorously market - based approach that treats commercial viability as the foundation of lasting development impact. The study team is led by Henrik Anker - Ladefoged, Chief Executive Officer of A2i and John Magnay as the Strategic investment advisor to the GTTF and William J Nyakatura, the GTTF Program Manager. The project comprised of nine agri-specialist that included, Barry Wojega, Deogratious Sebuwufu, William Twaib Zimwe, Kelly Wanda, Charles Kadde, Hannington Bukomeko, James Muhangi, Dr. Charles Niwagaba and Pamela Ajok.

1.2 Purpose and Objectives of the Study

The overarching purpose of this study is to identify, evaluate, and prioritize commercially viable agricultural and agro - industrial value chains in Uganda for the targeted integration of green technologies from Denmark and the European Union. At its core, the study generates intelligence that enables the GTTF to deploy capital with precision - backing the right enterprises in the right sectors with the right technologies and the right financial structures.

#	Objective	Description
1.	**Value Chain Prioritization and Viability Assessment**	Rigorously assess all ten priority sectors - evaluating their structural readiness, commercial viability, and capacity to absorb and scale climate - smart technologies - to produce a ranked investment shortlist that guides GTTF resource allocation.
2.	**Ecosystem and Strategic Partner Mapping**	Identify and profile key ecosystem actors including local agribusiness SMEs, farmer cooperatives, and Danish and EU technology innovators with the capacity to form viable implementation consortia for green technology transfer.
3.	**Investment Structuring and De - risking**	Analyse sector - specific financial barriers and identify strategic entry points where GTTF matching grants can effectively de - risk private capital, remove structural bottlenecks, and crowd in commercial co - financing to meet the targeted 5:1 leverage ratio.
4.	**Resource Allocation and Impact Alignment**	Provide data - driven recommendations that optimize the GTTF budget, ensuring funds are directed toward high - impact technologies that deliver measurable results in job creation, climate resilience, and rural livelihood improvement.

1.3 Scope and Coverage

The study assesses ten priority agricultural and agro - industrial value chains, each selected for its strategic importance, green technology transfer potential, and alignment with GRASP programme objectives: Coffee, Dairy, Piggery, Poultry, Livestock (Beef and Small Ruminants), Grain and Animal Feeds, Horticulture, Fish and Aquaculture, Cassava, and Agro - industrial Waste.

The scope is intentionally bounded. Rather than attempting an exhaustive national agricultural survey, the study concentrates analytical depth on these ten chains, on the view that focused, commercial - grade intelligence on a defined shortlist is worth more to investment decision - making than broad - brush coverage spread thin. For each value chain, the assessment covers three scoping dimensions:

- Identification of specific investment opportunities for climate - smart, low - carbon commercial agriculture, agro - processing, post - harvest infrastructure, and farm mechanization - with commercial justifications for each.
- Definition, identification, prioritization, and selection of prospective green technology providers from Denmark and the EU, matched against verified operational deficits in each sector.
- Prioritization of high - impact investment opportunities based on their potential to create economic opportunities and enhance climate resilience for smallholder farmers and agribusinesses, assessed against the GTTF's commercial and developmental criteria.

Geographic coverage spans Uganda nationally, with enterprise profiles drawn from major production and processing clusters in Central, Western, Northern, and Eastern Uganda. Market analysis extends beyond domestic boundaries to the export corridors covered in depth in Chapter 2 - the European Union, East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA) regional markets - and domestic urban consumption centres. The temporal baseline for the historical analysis is 2015, giving a decade - long view of structural change in each sector through to 2025.

Value chain selection applied a nine - criterion framework drawn from the Terms of Reference issued by aBi Development and A2i's Technical Proposal. Every selected chain was required to satisfy all nine criteria, covering rural income impact, growth and scale potential, commercial financing viability, suitability for Denmark - EU - Uganda partnerships, competitive positioning, value for money in technology transfer, competitive advantage of Ugandan stakeholders, climate change relevance, and alignment with Uganda's National Development Plan IV. The full selection justification is provided in the Value Chain Selection Justification document submitted alongside this report.

1.4 Structure of the Report

This Final Landscape Assessment Report is organized in seventeen chapters, taking the reader from context through to actionable investment recommendations. The structure of the report is designed to serve two complementary audiences at once: Danish and EU development partners and technology providers seeking commercially viable entry points in Uganda's agricultural sector, and Ugandan Government stakeholders engaged in National Development Plan (NDP - IV) agro - industrialization.

Chapter	Content Focus
Chapter 1	Introduction, macro context, and analytical framework.
Chapter 2	Uganda - European Union Trade and Investment Landscape - the state of Uganda's trade, investment, and development - cooperation relationship with the EU, 2015 - 2025.
Chapter 3	The Agricultural Financing Landscape in Uganda - how development banks, commercial banks, and development - finance institutions price and structure agricultural credit.

Chapter	Content Focus
Chapters 4 - 13	Individual value chain assessments for all ten priority sectors, each following the identical seven - pillar structure.
Chapter 14	Comparative Sector Analysis and Investment Prioritization - cross - sector scoring, sector clustering, ranked investment shortlist, and GTTF resource allocation recommendations.
Chapter 15	Investment Structuring and Implementation Roadmap - deal - level structuring, capital stack design, partnership model blueprints, and the 5:1 leverage ratio pathway per priority sector.
Chapter 16	Policy, Programme Alignment, and Enabling Conditions - analysis of regulatory reform, fiscal incentives, and standards development required to catalyze the selected value chains for scale.
Chapter 17	Conclusions and Strategic Recommendations - synthesis of key findings, cross - cutting recommendations, GTTF call - for - proposals priorities, and programme management notes.
Annexes A - F	Value chain scoring matrices, enterprise profiles, technology provider longlists, donor programme matrices, data sources and bibliography, and the stakeholder consultation log, submitted as supplementary volumes.

Each of Chapters 4 through 13 applies an identical seven - pillar analytical structure across all ten value chains, from historical baseline through to post - grant sustainability, so that the comparative analysis in Chapter 14 rests on directly comparable foundations. Readers focused on a specific sector may go directly to the relevant chapter without loss of context; readers focused on the EU relationship or the financing landscape specifically will find those now presented as full chapters rather than back - of - book reference material.

1.5 Uganda's Agricultural Sector - Macro Context

Understanding the macro context in which the GTTF will operate is foundational to sound investment decisions. This section sets out Uganda's agricultural landscape along four dimensions: the sector's economic contribution and growth trajectory; the policy and regulatory environment that governs it; Uganda's exposure to climate change and the adaptation imperative that follows; and the competitive positioning of Danish and EU green technologies relative to lower - cost alternatives from Asia. Together, these four lenses explain why the GTTF is needed, why now, and why a structured European technology transfer programme offers a distinctive and defensible value proposition - one that Chapter 2 then tests in detail against the trade and investment record.

1.5.1 Economic Contribution and Growth Trajectory

Agriculture remains the bedrock of Uganda's economy. The sector contributes approximately 24 percent of GDP at current prices, generates more than 70 percent of export earnings when agro - processing is included, and provides livelihoods for an estimated 70 percent of the working population - predominantly smallholder farmers operating on plots of less than two hectares. Uganda's population of approximately 48 million according to National Population and Housing Census, 2024 is growing at 3 percent per annum, which makes sustained agricultural growth an economic necessity rather than simply a development preference.

The decade since 2015 has seen respectable volume growth, particularly in coffee, dairy, and horticulture, but

the growth story has been structurally constrained by two persistent weaknesses: low value addition at the farm and primary processing level, and high post - harvest losses. Uganda exports the large majority of its agricultural commodities in raw or minimally processed form - over 90 percent of coffee leaves the country as green bean - leaving most of the value - add margin, branding premium, and price discovery with overseas processors and roasters. Post - harvest losses across the grain and horticulture sectors regularly run at 20 to 40 percent according to United States Department of Agriculture on Uganda of production value, a structural destruction of national agricultural wealth that better technology and infrastructure could substantially reverse.

Key sector indicators that define the investment landscape

Value Chain	Scale Indicator	GTTF - Relevant Opportunity
Coffee	E.g. USD 2.5B exports; 1.7M smallholder households; 8.7M bags (2025)	Origin roasting; eco - pulping; EUDR - compliant traceability; biomass drying
Dairy	3M households; 5.3B litres/yr; 729 milk cooling centres	Non - thermal pasteurisation (Lyras RUV); solar cooling Ultra High - Temperature (UHT) processing; biogas from effluent
Piggery	4.9M pigs; 1.6M rural households; urban pork demand +6 - 8%/yr	Biosecure housing; slurry - to - biogas; Hazard Analysis Critical Control Point (HACCP) pork processing; African Swine Fever (ASF) biosecurity
Poultry	47M birds; 8% annual growth; per capita 2.4 kg vs 13.5 kg global	Climate - controlled housing; automated feeding; hatchery incubation; cold chain
Horticulture	40 - 60% post - harvest loss; growing EU SPS market access opportunity	Solar post - harvest cooling; HACCP packhouse; controlled atmosphere storage
Grain & Animal Feeds	5.0M MT maize/sorghum/millet; 20 - 30% post - harvest loss	Precision pelleting; disc milling; hermetic storage; solar grain drying
Livestock (Beef & Ruminants)	14.5M cattle; 17.4M goats; 4.4M sheep; farm - gate/retail gap 3x - 4x	HACCP abattoir; cold chain; IoT traceability; feedlot precision feeding
Fish & Aquaculture	65,000 MT output vs 870,000 MT demand; 300,000 MT deficit	Recirculating Aqua - culture System (RAS) water recirculation; precision feeding; solar cold rooms; biomass dryers
Cassava	4.1M MT production; USD 343.9M import substitution potential	Flash/spray drying; starch extraction; precision fermentation; biogas from waste
Agro - industrial Waste	~1.71M tonnes/year of assessed priority agro - industrial waste (2025 study estimate)	Industrial drying & waste - heat recovery; BSF bioconversion; organic fertiliser/nutrient recovery; biomass carbonisation/biochar

The pattern across these ten sectors is consistent: production volumes are significant, but value capture, processing efficiency, and market connectivity remain constrained. This is precisely the gap that Danish and EU

green technologies are positioned to close - not by changing what Uganda grows, but by transforming how it is processed, stored, traded, and converted into higher - value products.

1.5.2 Policy and Regulatory Environment

Uganda's policy environment provides a broadly supportive framework for the kind of agro - industrial investment the GTTF is designed to catalyze, though regulatory capacity and enforcement remain areas requiring active engagement rather than assumed strengths.

Uganda's fourth National Development Plan (NDP IV), running through the 2025/26 - 2029/30 period, places agro - industrialization at the centre of the country's growth strategy. It identifies twelve agro - industrial value chains as priority sectors for investment, explicitly targeting structural transformation from subsistence production toward commercial, export - oriented agribusiness. Key NDP IV targets relevant to the GTTF include raising the share of agro - processed exports from under 30 percent to over 50 percent of total agricultural export value, expanding formal agribusiness - and reach upto 50,000 farmers, and cutting post - harvest losses to below 10 percent across priority value chains. Coffee, Cassava, Dairy, and Grain and Animal Feeds are all explicitly named in NDP IV as priority agro - industrial investments.

Each of the ten priority value chains sits under a defined regulatory framework. The Uganda Coffee Development Authority's former functions now sit with The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department following UCDA's dissolution in December 2024; the Dairy Development Authority mandates and enforces pasteurisation requirements, with a statutory target of 80 percent formal pasteurisation coverage against a current rate of approximately 30 percent - a compliance gap GTTF dairy interventions address directly; The Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))) provides overarching sectoral governance; National Agricultural Research Organisation (National Agricultural Research Organisation (NARO)) manages technology development and dissemination; and the Uganda National Bureau of Standards (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)) governs food safety and quality standards across processing and export.

Uganda's EAC and COMESA membership provides preferential trade access for processed agricultural products across a combined market of over 800 million people. Regional export potential - particularly for dairy, processed grain, horticulture, and livestock products - is substantial and largely unrealized, constrained by inadequate processing capacity, cold chain gaps, and HACCP certification deficits. The EU Deforestation Regulation (EUDR), in force since 2023 and now affecting Uganda's coffee and timber sectors, adds a material compliance requirement: exporters to the EU must demonstrate their products are not linked to deforestation. For coffee, where 1.7 million smallholder households supply the primary production base, building EUDR - compliant traceability from farm through processing is both a regulatory necessity and a significant logistical challenge - one Chapter 2 returns to in the context of the wider EU trade relationship, and Chapter 4 addresses in coffee - specific technical detail.

1.5.3 Climate Change Exposure and Adaptation Imperative

Uganda is among the most climate - vulnerable countries in sub - Saharan Africa. Its agricultural sector, which depends on two rain - fed seasons across most of the country, is directly exposed to changes in rainfall timing, intensity, and distribution that have become increasingly unpredictable over the past decade. The InterGovernmental Panel on Climate Change (IPCC) projects further temperature increases of 1.5 to 2.5°C for the East African region by 2050, alongside more frequent drought and flood events - shifts that undermine crop yields, livestock productivity, and supply predictability along all ten GRASP value chains.

The intersection of climate vulnerability and the GTTF's green technology mandate is deliberate. Technologies that reduce energy consumption, capture and reuse waste streams, enable solar - powered post - harvest management, and reduce dependence on externally sourced synthetic inputs address both the commercial competitiveness of Ugandan agribusinesses and their long - term resilience to climate shocks. That combination of commercial viability and climate adaptation is the underlying rationale for a green technology transfer fund, as distinct from a conventional agribusiness investment facility. Climate - linked opportunities identified across the ten chains include solar - powered milk chilling for dairy, biogas and anaerobic digestion converting pig slurry, dairy effluent, coffee pulp and agro - industrial waste into energy and fertiliser, precision aquaculture feed systems that reduce feed waste and water pollution on Lake Victoria, hermetic grain storage that reduces post - harvest loss under variable humidity, and evaporative cooling and controlled - atmosphere infrastructure for horticulture.

1.5.4 The Green Technology Transfer Landscape

Uganda's agricultural sector is not unfamiliar with green technology - solar water pumps, drip irrigation, improved seed varieties, and energy - efficient cook stoves have all been introduced through development programmes, NGO interventions, and individual commercial transactions over the past decade. What has been largely absent is a structured, commercially anchored programme of technology transfer from Denmark and the European Union: one that goes beyond pilot - scale demonstration to genuine commercial scale and private - sector co - investment.

Denmark and the EU bring specific technological strengths that align closely with the critical bottlenecks in Uganda's ten priority value chains. Danish partners are globally recognized in precision livestock housing and feed systems (Skov A/S, Big Dutchman, DanBred), dairy processing and non - thermal pasteurisation (Lyras A/S, Alfa Laval, GEA), grain handling and seed processing (Cimbria A/S, SKIOLD A/S), anaerobic digestion and biogas (Bigadan, Rootzone), agro - processing (Bühler AG, ANDRITZ), and Black Soldier Fly bioconversion (Insectum Denmark). These are commercially deployed, financially proven technologies with demonstrated ROI in comparable market conditions across Sub - Saharan Africa and Southeast Asia, not niche research innovations.

A2i's technology - matching methodology evaluates each Danish and EU technology against four dimensions: financial viability (ROE, ROI, and payback within three years without grant subsidy); scalability (applicability across Tier 1 and Tier 2 enterprise profiles, from urban processors to upcountry cooperatives); adoption readiness (technical literacy requirements, behavioural adjustment needs, local maintenance pathway availability); and climate and resilience impact (measurable carbon footprint reduction, circularity, and direct contribution to climate - shock resilience). Technologies that do not clear all four thresholds are not recommended for GTTF investment.

Any honest account of this landscape has to acknowledge lower - cost alternatives from China, India, Turkey, and South America. In grain milling equipment, solar panels, and basic agro - processing machinery, Asian suppliers frequently offer capital costs 30 to 60 percent below European equivalents, and that differential is real. The GTTF's positioning against Asian suppliers rests on three arguments rather than one: total cost of ownership (European equipment typically shows lower maintenance costs, longer operating lifetimes, and better energy efficiency), compliance advantage (where EU market access itself depends on European - standard certification, as in dairy pasteurisation, coffee traceability, and food - grade processing), and partnership advantage (a Danish or EU technology relationship carries technical training, knowledge transfer, and continued upgrading. Chapter 2 examines this same competitive dynamic from the trade - data side; each sector chapter in Chapters 4 - 13 evaluates it again against the specific technology choices available to that value chain.

1.6 Analytical Framework and Methodology

This section makes the study's analytical choices transparent so that findings can be properly interpreted and, where necessary, contested. A study that buries its methodology in an annex invites less rigorous scrutiny of its own conclusions; the framework is presented here as a first - class part of the report rather than an afterthought.

The analytical framework applied in this study reflects one explicit design choice: to produce investment - ready intelligence rather than descriptive market analysis. Every methodological decision, from the seven - pillar structure to the enterprise tiering criteria to the technology - matching evaluation dimensions, has been made in service of that objective.

1.6.1 The Seven - Pillar Assessment Framework

The study applies a standardized seven - pillar assessment framework across all ten priority value chains. Standardization here is not a convenience; it is an analytical necessity. A consistent structure is what makes the comparative analysis in Chapter 14 possible, and what ensures the investment prioritization and GTTF resource allocation recommendations in Chapters 14 and 15 rest on directly comparable foundations rather than on disparate analytical choices made independently, sector by sector.

Pillar	Focus and Purpose
Pillar 1: Historical Baseline and Strategic Alignment	A decade - long review (2015 - 2025) of each value chain's growth trajectory, market shocks, and structural shifts, assessed against NDP IV agro - industrialization objectives.
Pillar 2: Market Dynamics and Supply Chain Architecture	Node - by - node supply chain mapping from primary production through processing, distribution, and final market, covering volume, value, and processing capacity, and import substitution or export uplift potential.
Pillar 3: Ecosystem Mapping and Gap Analysis	Mapping of historical and active donor - funded programmes to avoid replication and identify the critical investment gaps that remain unaddressed.
Pillar 4: Enterprise Profiling and Technology Matching	Detailed profiles of Tier 1 and Tier 2 enterprises, auditing specific operational deficits and matching them against prospective Danish or EU technology partners.
Pillar 5: Impact Metrics and Commercial Engagement	Quantified impact across four vectors: Green technology uptake, smallholder livelihoods, employment, and trade balance improvement.
Pillar 6: Investment Structuring and GTTF Grant Outcomes	Optimal financial structuring of debt, equity, or blended finance per enterprise tier, and how a GTTF matching grant de - risks the enterprise toward the 5:1 leverage target.
Pillar 7: Policy, Programme Alignment, and Post - Grant Sustainability	Confirmation that opportunities align with GRASP, GTTF, and NDP IV objectives, and an assessment of commercial viability once grant support ends.

1.6.2 Sector Scoring and Weighting Methodology

The study employs a weighted scoring matrix to generate a composite score for each value chain, enabling the cross - sector investment prioritization in Chapter 14. The matrix applies six weighted criteria:

Criterion	Weight	Rationale
Aggregate Growth Potential	25%	Projected production and market expansion; stronger growth trajectories attract more co - investment and better leverage prospects.
Export Viability and Trade Balance Impact	20%	Export earnings growth or import substitution potential, reflecting the GTTF's trade - position mandate.
Climate Vulnerability and Green Technology Relevance	20%	Exposure to climate - linked productivity threats and the extent to which Danish/EU green technologies address those threats directly.
Commercial Financing Viability	20%	Potential for private co - financing at enterprise level - the primary driver of the 5:1 leverage ratio and a minimum - floor criterion.
Technology Absorptive Capacity	10%	Readiness of enterprises and infrastructure to adopt and sustain European green technology.
Smallholder Inclusion and Livelihood Impact	5%	Depth of smallholder and rural SME integration, and verifiable downstream livelihood impact.

Every criterion is scored on a consistent 1 - 10 scale, applied identically in every chapter of this report: 1 - 2 signals very weak or no evidence; 3 - 4 weak but present; 5 - 6 moderate, meeting sector average; 7 - 8 strong, above sector average; 9 - 10 exceptional, a clear sector leader. The weighted total produces a composite score out of 10, which forms the basis of the comparative ranking in Chapter 14. Minimum score floors apply to two criteria - commercial financing viability and green technology relevance - so that a sector cannot buy its way to a high overall ranking on the strength of other criteria alone: an opportunity that is commercially unviable, or offers no meaningful green technology entry point, is disqualified from GTTF consideration regardless of its aggregate score.

1.6.3 Enterprise Tiering Methodology

Investment decisions in the GTTF are not made at the sector level alone; they are made at the enterprise level. A sector can score highly overall while most enterprises within it lack the absorptive capacity to adopt European green technology. The enterprise tiering methodology addresses this by classifying every profiled enterprise into one of three tiers.

Tier	Profile	GTTF Intervention Logic	Graduation Pathway
Tier 1	Medium - to - large agribusinesses with strong balance sheets, audited financials (minimum 3 years), established governance, and direct market access.	GTTF funding acts strictly as a catalyst - de - risking joint ventures, technology licensing, and commercial debt blending. Primary vehicles for the 5:1 leverage target.	Immediate uptake of Danish/EU green technology; ongoing commercial partnership development.

Tier 2	SMEs and progressed cooperatives with proven market viability but structural bottlenecks from under - capitalization, high energy costs, or post - harvest losses.	GTTF matching grants absorb the high upfront CapEx of green European technology, improving cash flow and bankability. The sweet spot for GTTF grant structuring.	Tier 1 profile with improved balance - sheet bankability.
Tier 3	Earlier - stage or highly rural cooperatives with significant developmental and climate impact potential but elevated operational risk and limited absorptive capacity.	Require capacity - building, patient capital, and foundational infrastructure investment before commercial technology transfer is realistic.	Long - term pathway; not a primary focus for GTTF grant deployment in this programme cycle.

Enterprise eligibility for GTTF engagement requires six minimum criteria: legal registration in Uganda for at least three years; a financial trajectory consistent with Ministry of Trade, Industry and Cooperatives (MTIC), Small, Medium, or Large enterprise classifications; confirmed Tier 1 or Tier 2 status; operations within one or more of the ten GRASP value chains; a verifiable economic linkage to an active smallholder supply base or out - grower network; and demonstrated willingness and financial runway to meet co - investment matching requirements.

1.6.4 The Green Technology Matching Methodology

The Green technology matching methodology governs how prospective Danish and EU technologies are identified, assessed, and recommended. It runs on market - pull logic rather than supply - push: technology identification starts from empirically verified binding constraints on the ground in Uganda, and the search for European solutions is disciplined against those specific constraints. The Green technologies are not recommended because they are sophisticated, or because a Danish partner is eager to enter the market - only where a clear local commercial need exists, financial viability is demonstrable, and the adoption pathway is credible.

Dimension	Key Assessment Questions and Criteria
Financial Viability and Return	ROE, ROI, payback period; capital cost affordability for local operators; commercially defensible return without grant subsidy by Year 3; 10 - year total cost of ownership against Asian equivalents.
Scalability Profile	Reach into upcountry smallholder cooperatives versus urban agribusinesses only; minimum viable operator profile; continued expansion after development support ends.
Adoption Readiness	Technical literacy requirements; behavioural shifts needed at operator level; sustainable local maintenance capacity; ongoing upskilling pathway; risk of technical failure from local - context adaptation gaps.
Climate and Resilience Impact	Quantifiable carbon footprint and energy reduction; circular economy principles; measurable resilience against drought, temperature variability, and rainfall disruption; waste and pollution reduction.

All Green technologies are evaluated on a comparative basis against alternative supply sources - typically Turkey, India, China, and South America - on a value - for - money basis rather than lowest price. The GTTF's mandate is not to subsidize the cheapest technology available; it is to catalyze technologies delivering the strongest long - term commercial and climate return. Chapters 4 through 13 apply this technology - matching analysis transparently for each sector.

1.6.5 Data Sources, Triangulation, and Limitations

The study draws on a layered primary data strategy combining desk research and direct stakeholder engagement. Desk research covers Uganda Government publications - UBOS agricultural census and trade data, UCDA/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) coffee reports, DDA sector reports, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and NDP IV policy documents, and National Agricultural Research Organisation (NARO) technology transfer research - alongside international sources (World Bank Uganda country data, International Food Policy Research Institute (IFPRI) East Africa studies, FAO Uganda profiles, AfDB agribusiness investment reports, COMESA and EAC regional trade statistics) and private sector sources (Uganda Investment Authority data, Uganda Manufacturers Association data, and project reports from USAID Feed the Future, GIZ Uganda, EU MARKUP, and World Bank Lake Victoria Environmental Management).

Key informant interviews were conducted across all ten value chains with market actors, regulators, financial institutions, and profiled enterprises, engaging institutions including UCDA, DDA, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS), Uganda Investment Authority (UIA), UEPB, Stanbic Bank, the Agricultural Credit Facility, Centenary Bank, and DFCU, alongside sector - specific processors, exporters, cooperatives, and input suppliers.

All data is assessed against five quality dimensions - validity, reliability, precision, integrity, and completeness. Where sources diverge, the discrepancy is noted and the more conservative assumption applied in commercial projections; quantitative estimates are cited with source and year, and confidence levels are indicated where data is approximated. Findings are not adjusted to fit predetermined conclusions - where evidence challenges prevailing assumptions, it is reported as found.

Three categories of data limitation are acknowledged upfront and managed consistently across the sector chapters. First, enterprise - level financial data in Uganda is unevenly available: larger formal processors and exporters with audited accounts are reasonably well covered, while Small and Medium sized Enterprises (SMEs) and cooperatives frequently operate without formal financial records; where enterprise financial data is unavailable, the study applies conservative proxies drawn from comparable enterprises or sector benchmarks, with assumptions made explicit. Second, climate impact quantification for several technology interventions relies on modelled estimates from comparable East African deployments rather than Uganda - specific empirical data. Third, price and market data for several domestic markets - notably piggery and livestock - is fragmented and seasonally variable; the study applies annual averages where quarterly disaggregation is unavailable. None of these limitations materially affects the study's core investment recommendations, but they bear on the precision of financial projections in specific enterprise profiles, and each sector chapter flags them where relevant.

The three sections above - context, macro environment, and methodology - provide the framework within which the ten individual value chain assessments in Chapters 4 through 13 should be read, and within which Chapters 2 and 3 extend the picture outward to Uganda's EU trade relationship and its domestic financing landscape respectively. Each sector chapter applies the methodology described here consistently, which is what makes the cross - sector comparative analysis in Chapter 14 possible as the study's primary investment deliverable.



Chapter 2 : Uganda - European Union Trade and Investment Landscape

This chapter sets out the state of Uganda's trade, investment, and development - cooperation relationship with the European Union across 2015 - 2025, and asks what that relationship means, in practical terms, for the GTTF's technology - transfer mandate. It was originally prepared as a standalone landscape study and is presented here, condensed, as a full chapter because its findings bear directly on the competitive - positioning arguments made in Chapter 1 and tested sector by sector in Chapters 4 through 13, where European suppliers genuinely compete on more than price, and where they do not.

2.1 Summary Position

The European Union remains one of Uganda's most important external economic relationships, but its role differs sharply depending on which relationship is being measured. The EU is a major destination for Uganda's agricultural exports and an important source of long - term capital, concessional finance, standards, and technical expertise. Its share of Uganda's import market, by contrast, has declined steadily as China, India, the Gulf states, Turkey, and regional suppliers have captured most of the growth in demand for machinery, vehicles, construction inputs, and lower - cost equipment.

Uganda's exports to the EU increased from about USD 510 million in 2015 to a preliminary or estimated USD 1.78 billion in 2025. EU exports to Uganda rose more slowly, from USD 461 million to about USD 776 million over the same period. The result is that Uganda's merchandise trade balance with the EU moved into a strong and growing surplus from 2022 onward, driven principally by coffee and other agricultural exports - a trajectory Section 2.4 sets out year by year. The EU absorbed roughly 13 - 23 percent of Uganda's merchandise exports in most years of the decade, but supplied only around 6 percent of Uganda's imports by 2024 - 2025, a gap that Section 2.5 explains is mostly a story about price competition from Asian suppliers rather than any EU withdrawal from the relationship.

Two methodological notes are worth stating plainly before the figures that follow. First, non - EU trade statistics for Uganda are heavily distorted by gold and precious - metal flows, particularly trade recorded with the UAE, India, and Tanzania. Second, EU suppliers are strongest where performance, food safety, energy efficiency, environmental compliance, automation, and lifecycle cost drive the purchase decision, and weakest where the decision is dominated by upfront price, rapid delivery, and local spare - parts availability - a distinction this chapter

returns to repeatedly, because it is the single most useful fact for a GTTF technology - matching decision.

2.2 Methodology and Data Limitations

This chapter consolidates the Uganda - EU trade report, non - EU partner analysis, EU trade - share analysis, trade landscape study, diplomatic contact workbook, supplier database, and GRASP presentation materials prepared for A2i. Analysis covers calendar years 2015 - 2025 where data are available; values are presented mainly in current US dollars, with some investment series reported in euros because that is how the underlying source material presents them.

Primary trade statistics are drawn from Eurostat Comext and European Commision's Directorate - General Trade, UN Comtrade, World Bank WITS, the Uganda Revenue Authority, and the Uganda Bureau of Statistics. Investment statistics draw on the Bank of Uganda, the Uganda Investment Authority, UNCTAD, and EU institutional sources. Development cooperation figures draw on the EU Delegation, EU International Partnerships, Team Europe, and Organisation for Economic - Co - operation - Developments Creditors Reporting System (OECD) CRS/IATI data. Commercial presence and supplier data draw on official diplomatic missions, national trade - promotion bodies, company websites, and A2i's own supplier database.

Several country - level annual series in the underlying reports were interpolated between confirmed anchor years; interpolated values are useful for illustrating trend but are not official observations, and a final publication version of this material should replace them with downloaded bilateral records wherever possible. The 2024 - 2025 totals throughout this chapter are preliminary or estimated and may be revised as full - year data is published. Mirror statistics - Uganda's reported figures against the EU's reported figures for the same trade flow - can also differ because of freight, insurance, timing, origin and destination rules, and re - exports through European logistics hubs.

2.3 EU Diplomatic and Commercial Representation

Uganda benefits from a substantial resident EU diplomatic presence. The EU Delegation and several member - state embassies in Kampala provide channels for political dialogue, development cooperation, trade promotion, and private - sector engagement; a second group of member states covers Uganda from regional missions, usually Nairobi or Addis Ababa. Commercial support is often delivered by the Embassy's economic sections, national trade - promotion agencies, agricultural counsellors, development agencies, or regional business networks, rather than by a formally titled trade attaché - a distinction worth knowing before assuming a given Embassy has a dedicated commercial desk.

Denmark, Germany, France, Italy, Ireland, and the Netherlands maintain resident embassies in Kampala with identifiable economic or trade channels (Trade Council Denmark, GIZ - linked economic cooperation, Business France's regional coverage, the Italian Trade Agency, an Economic Affairs function, and Agriculture & Trade Advisors respectively). Belgium and Sweden maintain resident Embassies with regional trade or development - section coverage. A larger group of member states - Austria, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Finland, Greece, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, and Slovenia - either maintain a lighter Honorary or Consular presence in Kampala or cover Uganda regionally, most without a dedicated trade channel identified in this review. Three practical conclusions follow: resident diplomatic presence does not automatically mean a dedicated trade attaché is present, and trade work is frequently combined with development, economic, or political responsibilities; Nairobi is the principal regional commercial hub for East Africa, so Uganda - focused matchmaking should include regional offices even where no Kampala trade officer exists; and the strongest agricultural engagement is likely to come through missions with specialist

agriculture, green - growth, private - sector, or development - finance teams specifically, rather than through a generalist commercial desk.

2.4 Uganda's Overall Trade Position and the EU Balance

Uganda's merchandise trade expanded rapidly over the decade, but imports grew faster than exports for most of it, reflecting demand for fuel, machinery, vehicles, pharmaceuticals, construction materials, consumer goods, and food commodities. Export values are more volatile, driven by coffee price movements and by how gold flows are treated in the underlying statistics.

Year	Uganda to EU (USD m)	EU to Uganda (USD m)	Uganda balance (USD m)	Total trade (USD m)
2015	510	461	+49	971
2016	504	504	+0	1,008
2017	563	511	+52	1,074
2018	542	555	- 13	1,097
2019	469	532	- 63	1,001
2020	505	720	- 215	1,225
2021	634	872	- 238	1,506
2022	821	719	+102	1,540
2023	847	721	+126	1,568
2024	1,168	799	+369	1,967
2025*	1,780	776	+1,004	2,556

Source: EC DG Trade / Eurostat Comext; values in USD million. 2025 figures preliminary or estimated.

The pattern is clear once set out year by year: Uganda ran a modest, fluctuating balance with the EU through 2021, alongside a widening deficit in the pandemic years as EU exports to Uganda grew faster than the reverse flow. From 2022 the position reversed decisively, and by 2025 Uganda's surplus with the EU had grown to just over USD 1 billion, roughly twenty times its 2015 level - a shift driven overwhelmingly by coffee export value rather than by any broad - based change in Uganda's trade competitiveness. Italy and Germany are especially important destinations for Ugandan coffee specifically; the Netherlands functions both as a final market and as a logistics and re - export hub for goods destined elsewhere in Europe; and Belgium, France, Spain, and the Nordic states provide smaller but strategically significant markets and technology channels.

2.4.1 Why EU import share is declining even as the trade relationship deepens

The EU's declining share of Uganda's import market and its deepening role as an export destination are not contradictory - they are two sides of the same underlying dynamic. Uganda's total import demand more than doubled over the decade, while EU exports to Uganda grew much more slowly, so the EU's share fell almost mechanically even as its absolute export value rose. Asian and Turkish suppliers offer lower upfront prices, broader ranges of small and medium - scale equipment, shorter delivery times, and more flexible credit - all factors that matter disproportionately to a price - sensitive Ugandan buyer without access to concessional finance. Many

EU companies also lack local stock, technicians, and distributors in Uganda, which creates a real, not merely perceived, service and spare - parts risk for a buyer weighing total cost of ownership against a machine sitting idle for want of a part. The practical implication, which recurs throughout Chapters 4 - 13, is that EU equipment tends to become competitive only once it is evaluated on energy use, yield, maintenance, quality, lifespan, and compliance rather than on purchase price alone - which is exactly the evaluation lens the GTTF's technology - matching methodology in Chapter 1 is built around.

2.4.2 The significance of non - EU trading partners

China has become the leading source of machinery, electronics, vehicles, plastics, and textiles for Uganda. India remains important for pharmaceuticals, chemicals, food products, and textiles. The UAE functions as a fuel, construction - material, and re - export hub. Kenya remains a diversified regional supplier, while Tanzania's reported trade surge with Uganda is substantially explained by gold and precious metals rather than by manufactured or agricultural trade. Japan is important for used vehicles and machinery, and Turkey and Pakistan compete strongly in mid - price machinery, steel, textiles, and consumer products. None of this is a threat to Uganda's EU relationship as such - it is simply the competitive backdrop against which any EU technology - transfer proposition, including the GTTF's, has to be made.

2.5 Agricultural and Food Commodity Trade

Agriculture is the core of Uganda's export relationship with the EU. Coffee dominates, followed by smaller flows of cocoa, fish, horticultural products, flowers, vanilla, spices, tea, oilseeds, and processed foods. The EU's value to Uganda lies not only in market size but in its willingness to pay for quality, traceability, certification, and sustainability - an advantage that is balanced by stringent Sanitary and Phytosanitary (SPS), food - safety, pesticide - residue, deforestation, and due - diligence requirements that Uganda's exporters must clear to access it.

Commodity group	Position	Priority actions
Coffee	Largest current opportunity	Quality differentiation, soluble/instant coffee, roasting, traceability and EUDR compliance
Cocoa	Fast - growing opportunity	Fermentation, drying, quality grading and specialty markets
Fish	Established but compliance - sensitive	Cold chain, processing yield, residue control and certification
Horticulture	High - value but logistics constrained	Airfreight, aggregation, packhouses, GlobalG.A.P. and residue management
Vanilla and spices	Niche high - value	Quality consistency, extraction, essential oils and direct buyer relationships
Processed foods	Underdeveloped	Juices, fruit preparations, starches, ingredients and private - label manufacture

On the import side, Uganda remains dependent on palm oil, wheat, and rice, together exceeding an estimated USD 690 million in 2023 - palm oil at roughly USD 311 million, wheat at roughly USD 256 million, and rice at roughly USD 125 million. Each represents both an import - substitution opportunity and a demand signal for processing technology: cassava or other flour substitution and milling efficiency against wheat; irrigation, seed, drying, milling, and storage against rice; and oilseed development, efficient extraction, and sustainable refining

against palm oil. Animal feed inputs and fertiliser and crop inputs present smaller but strategically important dependencies, pointing toward local protein sourcing (including Black Soldier Fly), local blending, and precision application technology.

2.6 EU Donor Support to Uganda

EU support is delivered through the EU institutions, Team Europe initiatives, member - state bilateral programmes, development agencies, and humanitarian instruments. Agriculture, climate resilience, private - sector development, refugee - hosting districts, energy, governance, and infrastructure are recurring priorities; waste management is increasingly addressed through climate, circular - economy, urban - development, and private - sector programmes rather than as a stand - alone sector. Over the past 15 years, the Danish International Development Agency (Danida) has been one of Uganda's most significant development partners in transforming agriculture from subsistence farming into a commercialized, climate - resilient sector.Danish support has primarily focused on financial inclusion, climate - smart agriculture, and trade partnerships.

Partner	Typical areas relevant to Uganda	Delivery channels
EU institutions / Global Europe	Private - sector development, climate, governance, infrastructure and regional integration	Grant, blending and guarantee instruments
Denmark	Green growth, agriculture, trade and climate	Bilateral grants, partnerships and development finance
Germany	Agriculture, vocational skills, energy, governance and private sector	GIZ/KfW and related instruments
Netherlands	Food security, horticulture, water and private sector	Embassy programmes, RVO and FMO links
France	Infrastructure, energy, private sector and finance	AFD, PrOff-take Partnership Agreement (Off-take Partnership Agreement (OPA))rco and Business France ecosystem
Sweden	Climate, environment, rights and private sector	Sida and Swedfund
Ireland	Agriculture, social sectors and resilience	Irish Aid and Embassy programmes
Belgium	Agriculture, health, skills and private - sector support	Enabel, BIO and regional trade agencies
Finland / Austria and others	Climate, water, innovation and development cooperation	Regional missions and development agencies

Within agriculture and food systems specifically, EU, Danida and member - state programming clusters around farmer - organisation and market - linkage support, climate - smart agriculture and irrigation, food safety and SPS export readiness, agricultural finance and SME support, value - chain upgrading across coffee, dairy, horticulture, grains, fisheries and livestock, and vocational skills and youth employment - a portfolio that overlaps closely with the GTTF's own value chain list. Within waste management and the circular economy, programming covers municipal organic - waste separation and composting, Black Soldier Fly and other biological conversion

systems, wastewater and industrial - effluent treatment, plastics collection and recycling, biogas and waste - to - energy where technically justified, and the use of agricultural residues in circular fertiliser products - directly relevant to the agro - industrial waste chapter later in this report. A programme - level register of exact budgets, dates, implementing partners, and results should be maintained as a separate, live donor database; this chapter provides the strategic framework rather than treating unverified programme values as confirmed facts.

2.7 Investment and Development Finance

Trade and investment tell different stories about the EU relationship. The EU's share of Uganda's import market has declined, but European capital remains important in energy, oil and gas, financial services, manufacturing, telecommunications, agribusiness, and infrastructure. EU inward FDI stock is reported to have increased from EUR 2.1 billion in 2021 to EUR 4.9 billion in 2024, with a large share linked to oil, gas, and pipeline infrastructure; the precise definition and source series behind that figure should be confirmed before external publication, since FDI stock, annual FDI flows, announced commitments, and DFI portfolios are frequently conflated in secondary sources and are not interchangeable measures.

Origin	Institution examples	Typical Uganda relevance
EU institutions	European Investment Bank and EU guarantee/blending facilities	Infrastructure, energy, financial intermediaries and private sector
France	PrOff-take Partnership Agreement (Off-take Partnership Agreement (OPA))rco / AFD	Energy, finance, infrastructure and private sector
Germany	DEG / KfW	Finance, industry, infrastructure and SMEs
Netherlands	FMO	Financial services, energy and agribusiness
Denmark	Impact Fund Denmark / IFU - related instruments	Private - sector investment and green transition
Sweden	Swedfund	Energy, healthcare, finance and sustainable business
Finland	Finnfund	Renewable energy, forestry, agriculture and digital
Belgium	BIO Invest	SMEs, agribusiness, finance and infrastructure
Non - EU comparators	IFC, BII, DFC, AfDB, TDB, China, Gulf investors	Larger infrastructure, oil, energy, finance and commercial projects

A useful discipline for any GTTF - linked investment tracking going forward is to keep annual FDI inflows, FDI stock, announced commitments, and DFI portfolios in separate columns rather than blended into a single headline number, and to record sector, investor nationality, project stage, local employment, and whether the capital is equity, debt, guarantee, or grant - supported. Chapter 3 picks this up in more operational detail for the domestic banking side of the same question.

2.8 Competitiveness of Denmark and EU Suppliers

A2i's supplier database contains 850 working records across EU countries and GRASP value chains. It includes named priority leads and structured discovery slots, and should therefore be read as a sourcing pipeline rather than a fully validated company directory; its main value is in showing where EU technology depth genuinely exists and where local validation, contacts, and distributor evidence remain incomplete.

Criterion	Typical EU position	Comment
Initial purchase price	Weak	China, India and Turkey usually lead
Energy and water efficiency	Strong	Important in processing, cooling, drying and waste treatment
Equipment life and reliability	Strong	Supports lower lifecycle cost
Food safety and compliance	Strong	Critical for EU export markets
Automation and traceability	Strong	Useful for scale and quality assurance
Small - scale modular options	Mixed to weak	Many EU systems are oversized for Ugandan SMEs
Local stock and spare parts	Weak to mixed	Depends on distributor presence
Technician availability	Mixed	Regional rather than Uganda - based support is common
Commercial credit	Mixed	Stronger when supported by ECA/DFI instruments
Documentation and warranty	Strong	A major institutional - procurement advantage

By value chain, the supplier database is deepest for Grain & Feeds (68 records, 29 named leads), Waste/Circular Economy and Renewable Energy (56 records each, 17 named leads a piece), and Fish & Aquaculture (54 records, 15 named leads); it is comparatively thin for Coffee and Cassava (46 and 43 records, with only 7 and 4 named leads respectively), which is worth reading alongside those two sectors' own chapters as a caution on how much of the technology - matching case in those chapters rests on validated, named suppliers versus discovery - stage leads still requiring direct confirmation.

EU suppliers are most competitive in high - value food processing and hygienic systems; dairy, livestock genetics, and animal - production technology; fish processing, feed quality, and aquaculture systems; grain handling, drying, storage, and laboratory analysis; cold chain, refrigeration, and energy efficiency; waste treatment, wastewater, Black Soldier Fly, and environmental monitoring; and automation, traceability, packaging quality, and export compliance. Converting that competitiveness into transactions, on the evidence gathered here, requires six concrete commercial actions: bundling equipment with operator training, commissioning, and multi - year service; developing local or regional spare - parts stocks and named technician coverage; offering smaller modular systems with phased expansion paths; using leasing, supplier credit, export - credit guarantees, and DFI co - finance; demonstrating total cost of ownership with energy, yield, downtime, and product - quality data rather than price alone; and prioritising Ugandan buyers who already have clear feedstock, management, market, and finance readiness rather than starting from a cold prospect.

2.9 Strategic Implications for A2i and GRASP

Priority	Recommended action
1	Treat the Denmark and EU primarily as an export, investment, technology and standards partner - not only as a source of imports.
2	Build non - gold trade dashboards so policy decisions are not distorted by precious - metal flows.
3	Focus export upgrading on coffee, cocoa, fish, horticulture, vanilla, spices and processed ingredients.
4	Match EU suppliers only with investment - ready Ugandan firms and define finance, service and scale requirements early.
5	Create a regional trade - contact network covering Kampala, Nairobi, Addis Ababa, Dar es Salaam and Arusha.
6	Maintain live donor and DFI pipelines linked to each GRASP value chain and investment project.
7	Use demonstration plants to prove lifecycle economics for EU technology in drying, cold chain, processing and waste conversion.
8	Develop a supplier - competitiveness scorecard for every procurement: CapEx, energy, yield, labour, maintenance, finance, compliance and service.

The central strategic conclusion, and the one this chapter carries forward into the rest of the report, is that the Denmark and the EU remains highly relevant to Uganda, but the relationship has to evolve rather than simply continue. Growth will not come from selling more expensive machinery into a price - sensitive market; it will come from combining European technology and standards with Ugandan production opportunities, local service capacity, suitable financing, and export - market access - which is, in substance, the GTTF's operating thesis, and the reason this trade and investment picture belongs in the body of the report rather than in an annex.

A programme - level annex tracking exact Denmark and EU developement budgets, dates, implementing partners, and results, together with a validated EU supplier and diplomatic - contact directory, should be maintained as a live reference alongside this report; the underlying working data behind this chapter is available in Annex E (Data Sources and Bibliography).

2.10 Reading This Chapter Alongside the Value Chain Assessments

The trade and supplier evidence in this chapter is deliberately structured so that each of the ten value chain chapters that follow can be read against it directly, rather than as an isolated macro backdrop.

Value chain (chapter)	What this Chapter adds to the technology - matching case
Coffee (Ch. 4)	Coffee is the largest single component of Uganda's EU export surplus and the sharpest EUDR compliance exposure; the supplier database is comparatively thin here (46 records, 7 named leads), which argues for direct supplier engagement rather than assuming a deep bench.

Value chain (chapter)	What this Chapter adds to the technology - matching case
Dairy (Ch. 5)	Dairy, livestock genetics and animal - production technology are named among the areas where EU suppliers are most competitive; Section 2.8's food - safety and compliance strength maps directly onto DDA under Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s pasteurisation requirements.
Piggery (Ch. 6) and Poultry (Ch. 7)	Both sit within the animal - protein cluster where EU suppliers score strongly on automation, traceability and food - safety compliance, but weakly on small - scale modular options - a caution against assuming urban - scale EU equipment specifications suit a Tier 2 or Tier 3 enterprise without adaptation.
Grain and Animal Feeds (Ch. 8)	The deepest and best - validated segment of the EU supplier database (68 records, 29 named leads); grain handling, drying, storage and laboratory analysis are all areas of confirmed EU strength.
Horticulture (Ch. 9)	Directly exposed to the SPS, GlobalG.A.P. and residue - management requirements set out in Section 2.5, and to the airfreight - logistics constraint that shapes which EU market access is realistically achievable.
Fish and Aquaculture (Ch. 10)	Fish processing, feed quality and aquaculture systems are named EU strengths, and the supplier database is comparatively strong here (54 records, 15 named leads, 48 rated Priority A).
Livestock (Ch. 11)	Cold chain, refrigeration and HACCP - standard processing - both flagged as EU competitive strengths - are the binding constraints this chapter identifies independently in the beef and small - ruminants sub - sector.
Cassava (Ch. 12)	Unlike coffee, cassava falls outside the scope of the EU Deforestation Regulation, so it carries no EUDR traceability obligation. Its main constraint is a thin supplier base (43 records, 4 named leads) a gap this report flags for direct validation rather than treating the pipeline as investment - ready.
Agro - industrial Waste (Ch. 13)	Waste treatment, wastewater, Black Soldier Fly and environmental monitoring are all named EU strengths, and align closely with the EU donor priorities on circular economy set out in Section 2.6.

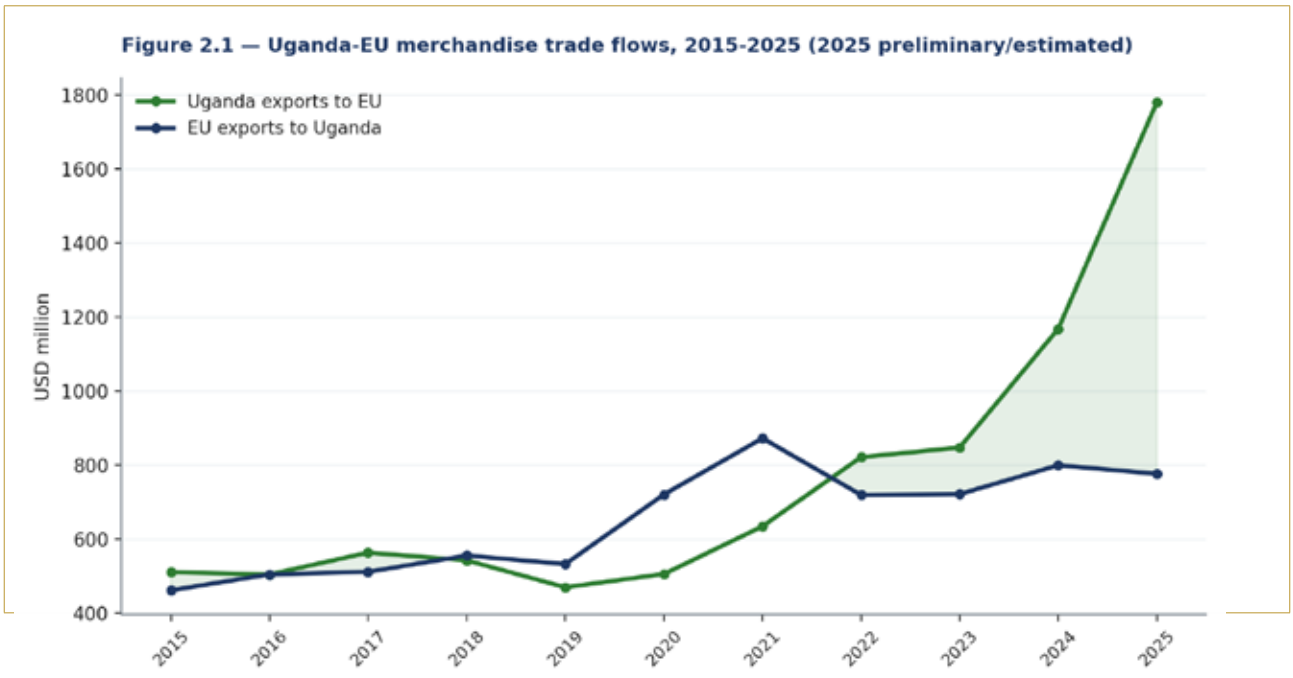
This cross - referencing is not a formality. Where a sector chapter recommends a specific Danish or EU technology partner, this chapter's supplier - database coverage figures and competitiveness findings are the evidentiary basis for how confident that recommendation should be treated - thin coverage in a given value chain is a signal to validate suppliers directly before committing GTTF grant capital to a named - partner transaction, not a reason to discount the underlying commercial case.



Chapter 3 : The Agricultural Financing Landscape in Uganda

This chapter sets out how Uganda's development banks, commercial banks, and development - finance institutions price and structure agricultural credit, and what that means in practice for how GTTF matching grants should be designed to reach the 5:1 leverage ratio set out in Chapter 1. Like Chapter 2, it is presented here as a full chapter because it answers a question every value chain chapter in this report asks in a different form: once a GTTF grant de - risks an enterprise's green technology investment, where does the other four - fifths of the capital actually come from, on what terms, and from whom.

Supporting Exhibit



3.1 Summary Position

In A2i's assessment, Uganda's agricultural financing landscape is active, well - capitalised, and increasingly sophisticated. Development banks, commercial banks, and development - finance institutions engaged for this study all signalled strong appetite for agriculture and, in particular, for agro - processing and value addition. Pricing for the sector has converged around a Bank of Uganda - anchored concessional benchmark of roughly 12 percent, well below commercial rates of 20 - 24 percent, and lenders have visibly shifted from collateral - first to cash - flow - first underwriting. The clearest pattern to emerge across all five institutions engaged is that access to capital is no longer the binding constraint on Uganda's agricultural sector. The frontier has moved to production volume, product quality, and bankability - which is precisely where the GTTF's technology - transfer mandate is positioned to help.

Three observations recur across every institution engaged. First, capital is abundant, and the constraint has genuinely shifted to production and bankability: Stanbic stated plainly that it has the money, and pointed to financed silos, dairy plants, and tea plants running at only 30 - 40 percent of installed capacity, while the Agricultural Credit Facility conceded that most of the roughly UGX 1.5 trillion it has disbursed has gone to farm expansion and grain trade rather than to mechanisation or processing. Secondly, agricultural lending has converged at approximately 12 percent concessional pricing with longer tenors than the sector's reputation would suggest: the Agricultural Credit Facility caps its investment loan at 12 percent fixed against 20 - 24 percent commercial, the Uganda Development Bank lends to agriculture at about 12 percent using the same facility, and Stanbic's Bank of Uganda - linked line prices term debt up to 12 percent with tenors of 8 to 15 years and grace periods of up to three or four years, now common across the Uganda Development Bank, IFC, DFCU, and the Agricultural Credit Facility alike. Thirdly, collateral is no longer the primary gate; cash flow, guarantees, and alternative security are. Stanbic reports that over 70 percent of its agriculture book is now asset - backed or data/partner - backed rather than mortgage - secured, the Agricultural Credit Facility channels roughly 79 percent of its beneficiaries through an alternative - collateral window, and DFCU, the Uganda Development Bank, and IFC all confirmed openness to third - party guarantees to bridge collateral gaps.

3.2 The Wider Investment Picture

It is worth setting this financing picture inside the wider investment story A2i has been tracking. Over the past decade Uganda has become a steadily more attractive place to invest: Foreign Direct Investment has roughly tripled, from around USD 1 billion in the mid - 2010s to about USD 3.3 billion in 2024, and the total stock of foreign investment now sits close to USD 23 billion. Much of that momentum has been pulled by oil and infrastructure, but agriculture and agro - processing are among the Government's declared priority sectors, and the European Union - led by the Netherlands - is already one of Uganda's largest single sources of foreign capital, a point Chapter 2 sets out in more detail from the trade side.

Agro - processing, food processing, and commercial farming are named priority activities under Uganda's investment incentive regime, and projects that locate in the country's free zones can earn ten - year income - tax holidays together with duty and VAT relief on imported machinery, inputs, animal feed, and irrigation equipment. Read against the Agricultural Credit Facility described in this chapter, A2i's practical reading for an incoming investor is straightforward: register with the Uganda Investment Authority first, anchor the project in one of the named priority activities, and then pair the Government incentives with a local financing partner rather than treating tax relief and bank finance as separate tracks.

On the European side specifically, the door is unusually open on price but increasingly demanding on proof. Under the "Everything But Arms" arrangement, Uganda's agricultural goods enter the EU free of duty and quota, and the country already runs a healthy surplus with the bloc - exports of roughly EUR 1.25 billion a year, of which coffee alone makes up close to 60 percent of what Uganda sells to Europe. What is changing is what Europe asks in return: new deforestation rules will require coffee, cocoa, and several other products to be traced back to land shown to be free of recent deforestation, which is why Uganda is now working to map and register some 2.8 million coffee farmers, with the EU and Denmark helping more than half a million of them meet the standard - the same EUDR compliance pressure Chapter 1 and Chapter 4 address from the coffee value chain's own perspective.

3.3 The Financiers at a Glance

Five institutions occupy distinct but overlapping positions on Uganda's agricultural financing ladder, from concessional public facilities through national development banking to commercial and international development finance.

Institution	Role & positioning	Typical ticket	Indicative pricing
IFC (World Bank Group)	International development - finance institution; debt, equity, mezzanine, trade finance, blended finance plus advisory	~US$10m and above (direct); smaller via intermediaries	Risk - based, no fixed rate; set after full appraisal
Uganda Development Bank	National development bank; agriculture ~44 - 45% of portfolio; patient capital	~UGX 15m minimum to ~US$20 - 21m	Approx. 12% p.a. (using the Agricultural Credit Facility)
Stanbic Bank	Largest commercial agri - lender; anchor / value - chain and cooperative banking	Scales from SME to large corporate ("anchor") deals	Up to 12% term / up to 15% working capital (SCF)
DFCU Bank	Commercial bank with deep asset - finance heritage; tiered "graduation model"	UGX 5 - 20m smallholder to ~US$100m single - obligor	12% (Bank of Uganda ACF); commercial otherwise
Agricultural Credit Facility (Bank of Uganda)	Tripartite concessional refinance facility; sets the sector's price floor	Up to UGX 5bn (CapEx); up to UGX 20m (block allocation)	12% fixed CapEx / 15% grain trade

The Agricultural Credit Facility sets the concessional price floor that the banks build on. The Uganda Development Bank and the commercial banks (Stanbic, DFCU) draw on that same Bank of Uganda liquidity to lend to agriculture at around 12 percent, and IFC sits above the banks for larger, flagship transactions of roughly USD 10 million and up - a ladder that maps cleanly onto the Tier 1/Tier 2/Tier 3 enterprise structure set out in Chapter 1: Tier 3 enterprises are largely pre - bankable for any of these five institutions, Tier 2 enterprises are the natural fit for the Agricultural Credit Facility, the Uganda Development Bank and commercial - bank concessional lines, and Tier 1 enterprises are where IFC - scale transactions and blended finance become realistic.

3.4 What the Institutions Agree On

Read together, the five engagements A2i held for this study point to a set of consistent, mutually reinforcing

themes that are more informative than any single conversation, because they show where the market as a whole is settling.

A shared, Bank of Uganda - anchored concessional rate near 12 percent. The Agricultural Credit Facility's investment loan is capped at 12 percent fixed for the life of the loan; the Uganda Development Bank lends to agriculture at approximately 12 percent, explicitly using the Bank of Uganda facility; DFCU accesses the same 12 percent fixed line; and Stanbic's supply - chain - finance facility prices capital - expenditure debt up to 12 percent, with short - term working capital up to 15 percent. All three commercial and development lenders converge on the same benchmark, well below the 20 - 24 percent range cited for ordinary commercial lending. Stanbic added an important nuance for foreign lenders: post - pandemic domestic liquidity, evidenced by oversubscribed Government bond auctions, means cheap money is already available locally, so a foreign credit line at around 7 percent is not, on price alone, more attractive than what Ugandan banks can already source at home.

Cash flow has displaced collateral as the primary lending gate. Every commercial and development lender engaged described a move away from traditional mortgage - style security. Stanbic lends primarily against cash flow, with more than 70 percent of its agriculture book either asset - backed - inventory or equipment as collateral - or unsecured and backed by data and partner risk - mitigation, while the Uganda Development Bank stated that collateral is not the sole determinant and that it has financed businesses with below - conventional collateral where the overall case was strong. DFCU treats collateral as one of the last considerations under its "5 C's and 3 R's" framework, applying cash - flow ratios instead.

A converging guarantee and blended - finance architecture. Risk - sharing structures recur across every institution. The Uganda Development Bank is finalising a guarantee facility with aBi Development to cushion credit risk for viable but under - collateralised borrowers. DFCU actively uses guarantee schemes, including aBi's and the Alliance for Green Revolution in Africa (AGRA) "Acheli" scheme. Stanbic's largely unsecured cooperative lending, described as north of UGX 100 billion, is possible only because strategic partners provide risk mitigation, and Stanbic identified 50 - percent - plus risk participation as "very attractive." IFC offers blended finance where donor facilities qualify.

Longer tenors and generous grace periods are genuinely available. Contrary to the assumption that African agricultural finance is uniformly short - term, the sector offers long horizons for the right project. IFC can provide 8 - 12 - year tenors; the Uganda Development Bank's term loans run up to 15 years with grace periods of up to three years, four years cited for oil palm; DFCU stretches to around 8 years and has structured 10 - year facilities; and the Agricultural Credit Facility's investment loan runs to 8 years with up to a 3 - year grace period. DFCU additionally offers a built - in moratorium for imported machinery, starting as a Letter of Credit, converting to "work - in - progress," and only becoming a repayable asset - finance facility once the equipment is installed and generating cash - a structure directly relevant to any GTTF - financed European equipment purchase.

EU and Danish technology is welcomed, with no supplier lock - in. None of the lenders engaged restricts borrowers to named equipment suppliers. The Uganda Development Bank's internal engineers assess proposed machinery for suitability, supplier track record, and after - sales support, and explicitly welcomed the introduction of credible Danish and EU suppliers. DFCU's asset - finance heritage lets it fund equipment classes other banks avoid, and it has reduced its client - contribution requirement on strategically important agricultural assets - tractors, processing lines - from the market - standard 20 percent to 10 percent, which it believes makes it the only bank currently offering that threshold. This is directly favourable to a European technology - led investment model of the kind the GTTF is designed to support.

3.5 How Lenders Assess and Price Credit Risk

The institutions engaged apply broadly consistent credit logic, with local refinements. Understanding it helps an investor, or a GTTF - supported enterprise, anticipate what a Ugandan financing partner will scrutinise in any co - investment.

Across the board, lenders lead with the borrower's demonstrated ability to repay from the business itself, then management capability and track record, then market and offtake evidence, and only then collateral. DFCU codifies this as its "5 C's and 3 R's," applying specific ratio benchmarks: gearing or coverage of at least 2x, balance - sheet leverage generally not exceeding around 200 percent for term debt, a liquidity ratio of at least 2x, and a debt - service coverage ratio preferably at or above 2x. Stanbic applies an affordability rule of thumb requiring profit of roughly 1.5 times the loan instalment, and expects a client contribution of 10 - 20 percent on equipment finance. IFC references debt capacity of around 1.5 times EBITDA. These are consistent, disciplined tests rather than collateral - driven ones.

Risk theme	Where it was raised	What it means for an investor
Weak governance & succession	IFC and the Uganda Development Bank flagged family - owned firms with thin governance and no succession plan	Expect governance and board/ shareholder due diligence; a professional partner is an asset
Over - trading / uncontrolled diversification	DFCU sees successful traders pull capital into hotels or property once they scale	Ring - fencing the core business and disciplined capital use will be scrutinised
Poor records & financial literacy	The Uganda Development Bank and the Agricultural Credit Facility cite this as a frequent showstopper at appraisal	Bookkeeping, audited accounts and statutory filings materially speed approval
Biosecurity & disease	The Uganda Development Bank (avian influenza) and DFCU flag disease in livestock/poultry/piggery	DFCU embeds insurance into production loans; insurable structures are preferred
Climate & weather shocks	Named by the Uganda Development Bank, DFCU and the Agricultural Credit Facility as a live, current risk (e.g. coffee stress)	Climate resilience and agricultural insurance strengthen bankability
Unsuitable machinery / weak after - sales	The Uganda Development Bank assesses equipment fit and supplier support	Credible EU/Danish suppliers with local service support are a positive signal
Start - up risk in waste - to - value	Stanbic treats many green ventures as higher - risk start - ups	Proven cash flow or a strong parent/ shareholder is needed to unlock this space
Product - quality / export rejection	Stanbic cited a cassava - flour High Quality Cassava Flour shipment rejected by China on quality	Quality systems and certification (e.g. Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)) are decisive for export plays

The consistency of these flags is itself useful intelligence: the risks that concern Ugandan lenders are operational and quality - related - governance, records, disease, climate, product quality - far more than they are macro or currency risks. That points toward where technical assistance and partnership add the most value in any GTTF - structured deal, and it echoes the technical - assistance finding that recurs across the value chain chapters in this report: capital alone rarely closes these gaps.

Where portfolio - quality data was shared, it was reassuring rather than a cause for concern. The Agricultural Credit Facility reported non - performing assets of approximately 2 percent across a portfolio of roughly UGX 1.5 trillion, and a 66 percent approval rate on some 23,000 applications across 23 participating banks - evidence that the concessional rail is being deployed at scale without obvious asset - quality distress.

3.6 Sectors Worth Noting

The five financiers engaged for this study named a strongly overlapping set of priority value chains, closely mirroring the ten sectors this report assesses.

Value chain	Financier appetite (as stated)	Notable signal to track
Coffee (& cocoa)	IFC priority sector; DFCU strategic priority; Stanbic active	IFC would consider a soluble/instant coffee plant of ~EUR 50m / US$60m using Uganda's undergrades and broken beans, with a global coffee partner
Grains & animal feed	IFC, UDB, Stanbic and DFCU all active on processing and trade	Feed sits at the junction of maize, soybean, poultry and livestock; Stanbic finances feed processors, including importers of inputs
Dairy	IFC experience; UDB priority; DFCU institutionally close	DFCU estimates 2 of 3 large dairy cooperatives bank with it; tied to its Dutch (FMO/Rabobank) origins
Fish / aquaculture	IFC priority; UDB eligible; DFCU finances cage (not wild - capture)	IFC flagged a US$15 - 20m fish - feed opportunity with an EU player already trading approx. US$25m/year into the region
Cassava	Stanbic and DFCU finance processing/trade (not primary production)	Ethanol - blending policy (currently approx. 1%, national target up to 20%) is expected to lift demand structurally; 1 - 2 ethanol - from - cassava clients already financed
Waste - to - value / circular economy	UDB expanding; Stanbic has a track record; DFCU piloting green loans	Stanbic has financed bagasse - to - power (US$26m), bio - slurry - to - fertiliser and biogas; barriers are start - up risk and "green" taxonomy disputes
Horticulture	DFCU strategic priority and consistent forex earner	Flowers seen as low - risk (backward - integrated with European firms); packhouses/aggregation hubs flagged as viable but working - capital - hungry

Coffee, Grain and Animal Feed, and Dairy - three of the four sectors Chapter 14 later ranks highest in the cross - sector comparison - are also the three sectors where financier appetite is broadest and most explicit across

all five institutions, which is a useful cross - check on the sector scoring methodology rather than a coincidence: commercial financing viability is itself one of the six weighted criteria in that scoring matrix.

3.7 The Financing Landscape from an Investor's Seat

Strengths. A deep, active agricultural - lending ecosystem spanning concessional, development, and commercial capital, with agriculture a stated priority for every institution engaged. A Bank of Uganda - anchored concessional benchmark near 12 percent, well below commercial rates of 20 - 24 percent, accessible through multiple banks. Long tenors of 8 - 15 years and generous grace or moratorium structures, including a built - in import moratorium at DFCU for foreign machinery. A decisive shift to cash - flow and data - based underwriting, with alternative - collateral and guarantee windows widely available. Ample domestic liquidity and low portfolio distress - Agricultural Credit Facility non - performing assets of approximately 2 percent - plus IFC's presence for larger flagship transactions.

Weaknesses. Production volume and quality at farm level lag installed capacity, with financed silos, dairy, and tea plants running at 30 - 40 percent utilisation. Weak governance, thin records, and limited financial literacy among many SMEs slow or block credit appraisal. Uneven collateral availability, particularly communal land in Northern Uganda that many banks will not accept. A financing gap for tickets below IFC's USD 10 million threshold, with no dedicated intermediary facility identified for smaller agricultural deals at the time of this engagement.

Opportunities. EU and Danish processing technology is welcomed with no supplier lock - in, and DFCU's reduced 10 percent contribution eases equipment deals. Flagship agro - industrial projects already show clear investor interest - soluble/instant coffee at roughly USD 60 million, and fish - feed manufacturing at roughly USD 15 - 20 million. A maturing waste - to - value and circular - economy space is being actively expanded by the Uganda Development Bank, with Stanbic already financing the sector at scale. There is strong demand for risk - participation and value - added partners - extension services, quality systems, market linkage - which is precisely what European capital and technology can supply alongside a GTTF grant.

Threats. Climate and weather shocks, disease outbreaks such as African Swine Fever, and commodity - price volatility were all named by lenders as live, current risks. Product - quality and export - rejection risk remains real, as the cassava - flour example above illustrates. Over - trading and uncontrolled diversification by successful operators is a recurring credit - loss pattern lenders watch for closely. And a persistent production - demand gap could leave new processing capacity underused if farm - level supply is not addressed in parallel with capital - the same underinvestment risk Chapter 14 identifies in Grain and Animal Feed as a constraint on four other value chains simultaneously.

3.8 Significant Shifts Worth Tracking

Several clear changes in the financing landscape are worth monitoring on an ongoing basis, since each affects the direction and terms of lending available to GTTF - supported enterprises. The concessional envelope is widening: the Agricultural Credit Facility has raised its maximum loan from UGX 2.1 billion to UGX 5 billion, lifted the biological - assets cap from UGX 80 million to UGX 250 million, added loan top - ups, brought Tier 4 SACCOs into the scheme, and extended working - capital eligibility to raw - produce purchases for processing, with uptake reported to be growing on the back of these amendments. Lending is moving decisively from collateral - based to cash - flow and data - based underwriting: Stanbic's book is now over 70 percent asset - backed or data/partner - backed, and the Agricultural Credit Facility's alternative - collateral window covers about 79 percent of its beneficiaries. Cheap domestic liquidity is re - pricing the role of foreign capital: post - pandemic

liquidity means Ugandan banks can source capital cheaply at home, so foreign lenders competing on price alone - for example, around 7 percent lines - are less compelling than they might appear on paper, and the real differentiator has become risk - sharing and value - added support rather than rate. And the narrative has shifted, across every institution engaged, from “access to capital” to “production and bankability”: the binding constraint has moved from money to output, quality, and deal - readiness, and if farm - level production and quality are not addressed alongside capital, growth risks stalling into idle, financed capacity rather than accelerating.

3.9 A Financing - Pathway Map

The institutions profiled in this chapter are complementary rather than competing. A practical way for a GTTF - supported enterprise, or the programme itself, to read the market is by matching a project’s size and stage to the right financier.

Project profile	Best - fit financier(s)	Why
Large flagship agro - industrial (~US$10m+)	IFC, with UDB / commercial banks alongside	IFC’s direct threshold, long tenors, blended finance and advisory suit big, investment - ready deals
Mid - scale processing / value addition	UDB and commercial banks	Patient debt at 12%, asset finance, and long tenors matched to project cash cycles
Equipment / CapEx (EU - Danish machinery)	DFCU (10% contribution; LC - to - asset structure); UDB	Import - friendly structures, no supplier lock - in, built - in moratorium during installation
Under - collateralised but viable SME	UDB (aBi guarantee) / DFCU (guarantee schemes) + ACF	Guarantee and alternative - collateral windows bridge the security gap
Cooperative / smallholder - linked supply	Commercial banks and the ACF block partners	Group - based lending reaches production level where direct - to - farmer lending does not
Working capital for value addition	ACF and commercial banks	Now covers raw - produce purchase for processing; grain - trade and processing working capital available

Read against the enterprise tiering methodology set out in Chapter 1, this map is the practical financing counterpart to the Tier 1/Tier 2/Tier 3 classification applied throughout Chapters 4 to 13: a Tier 1 enterprise pursuing a large flagship investment should expect to be led into an IFC - anchored structure with the GTTF grant de - risking a specific technology component, a Tier 2 enterprise absorbing CapEx for European equipment is the natural fit for the DFCU or Uganda Development Bank pathways described above, and a Tier 3 cooperative or smallholder - linked enterprise will typically need to be reached through guarantee - backed or group - lending structures before a commercial financing relationship on these terms becomes realistic at all. Chapter 15’s investment structuring and implementation roadmap builds directly on this map when it sets out capital stacks sector by sector.

3.10 What This Means for GTTF Capital Stack Design

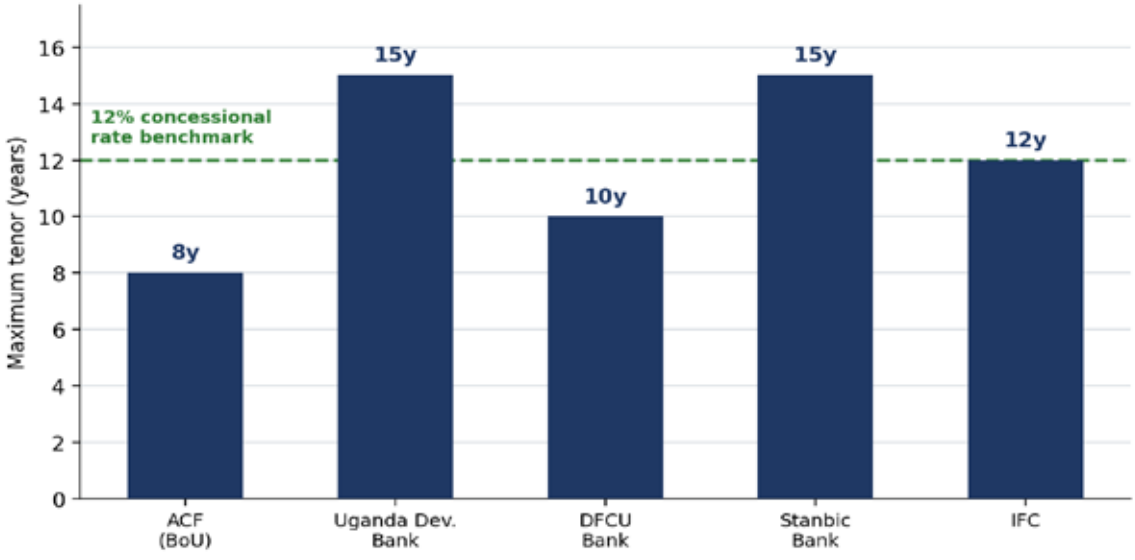
Two design implications follow directly from the evidence in this chapter, and both recur in the sector - specific capital stacks set out in Chapters 4 through 13 and consolidated in Chapter 15.

The first is that the GTTF's own grant capital should be sized and positioned as a genuine de - risking instrument rather than as a substitute for the commercial and development finance already available in the market. Every institution engaged in this chapter confirmed it has liquidity and appetite for agriculture; what several of them lack is bankable, investment - ready deal flow at the right scale, with governance, records, and technical specification clean enough to clear appraisal quickly. A GTTF subsidy that funds the specific gap - a feasibility study, a demonstration plant, the equity cushion that unlocks a bank's 70 percent debt contribution - does more for the 5:1 leverage target than a grant that tries to cover a larger share of total project cost. This is the same logic Chapter 1's enterprise tiering methodology applies in the abstract; this chapter supplies the concrete Ugandan lending terms - 12 percent concessional pricing, 8 - to - 15 - year tenors, 20 - to - 30 - percent client contribution norms that a realistic capital stack has to be built around.

The second is that technical assistance and the financing relationship are not separable line items. The risk flags lenders themselves named in Section 3.5 - weak governance, thin records, disease exposure, unsuitable machinery, product - quality failure - are overwhelmingly the kind of gap that a technical assistance package, not a larger grant cheque, is designed to close. This mirrors, almost exactly, the cross - cutting finding in Chapter 14 that seven of the ten value chain chapters in this report initially omitted an explicit technical assistance line from their capital stack despite each independently documenting the kind of operator, certification, or governance gap that technical assistance exists to close. Read together, Chapter 14's finding and this chapter's lender interviews point to the same conclusion from two different directions: a GTTF grant structured as capital alone, without a technical assistance component addressing the specific risk flags a Ugandan lender will raise at appraisal, is less likely to unlock the commercial co - financing the 5:1 leverage target depends on.

Supporting Exhibit

Figure 3.1 — Maximum lending tenor by institution, against the shared 12% concessional pricing benchmark





Chapter 4 : Coffee Value Chain Assessment



Uganda is Africa's second - largest coffee exporter, generating over USD 900 million annually. Key findings will cover: dry/wet mill modernization opportunity, EU Deforestation Regulation (EUDR) traceability compliance as both a risk and a durable market premium, coffee pulp waste valorization, cooperative processing infrastructure gaps, and the competitive positioning of Danish low - energy processing and solar drying technology against Asian alternatives.

Uganda closed calendar year (CY) 2025 with a record 8.7 million 60 - kg bags valued at USD 2.5 billion, surpassing Ethiopia to become Africa's leading coffee exporter by volume. Yet fewer than 14 licensed enterprises export any form of value - added coffee product, and their combined annual output totals approximately 904 bags. Less than 1 per cent of Uganda's coffee leaves the country with meaningful value addition applied. The GTTF investment case is anchored in three complementary tracks: Track A (industrial freeze - dry soluble processing), which could generate a 40 - 75x FOB price uplift over green bean; Track B (white - label roast and packaging), which is commercially achievable within a 24 - month capital deployment window; and cooperative wet mill modernisation, which builds the raw material quality platform that underpins both commercial tracks and directly improves farmer income. Danish and EU processing technology offers decisive advantages over Asian alternatives in energy efficiency, soluble solids yield, product quality and EUDR - compliant traceability infrastructure.

Key Findings

1. Uganda's 8.7 million bag, USD 2.5 billion Calendar Year (CY) 2025 performance (URA/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) data) was driven overwhelmingly by green bean exports at an average FOB price of approximately USD 4.53 per kg. Industrial freeze - dry soluble production from the same Robusta feedstock commands USD 12 - 22 per kg Free on board (FOB) Europe - a structural value gap that defines the GTTF investment opportunity.

2. Uganda Robusta's exceptional biochemistry - 28 - 32 per cent extractable soluble solids and 9 - 12 per cent chlorogenic acid content (CGA), the highest CGA range recorded in any commercial Robusta source globally - makes Uganda the preferred feedstock origin for premium functional instant coffee. Zero industrial freeze - dry capacity currently exists inside Uganda.

3. EUDR compliance is mandatory from 30 December 2026 for large and medium operators. Uganda faces structural compliance risk: deforestation - free geolocated traceability is not yet operational at scale. GTTF - backed EU/Danish traceability platforms (Satelligence, SOURCETRACE, or equivalent) would simultaneously de - risk EU market access and create a durable premium positioning platform.

4. The Uganda Coffee Development Authority was dissolved on 20 December 2024. Its regulatory and extension functions transferred to the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) Coffee Development Department. This transition is creating a six - to - eighteen - month institutional gap in quality assurance,

licensing oversight and export certification - a material investment risk that GTTF structuring must explicitly address.

5. Three investment tracks are recommended with distinct capital requirements, timelines and risk profiles: Track A (freeze - dry, USD 65 - 125 million Phase 1) is the highest - value play requiring a strategic anchor investor; Track B (roast and pack, USD 8 - 22 million) is commercially viable within existing enterprise balance sheets with GTTF gap - financing; cooperative wet mill modernisation (USD 2 - 8 million aggregate) delivers immediate farm - gate quality gains and EUDR traceability infrastructure.

6. Job creation, the investment is projected to create 3,500 - 6,000 direct jobs and 25,000 - 40,000 indirect jobs by 2030, spanning processing and packaging operators, quality assurance and laboratory roles, wet mill and drying technicians, and the upstream smallholder supply chain.

NOTE:**This chapter uses two complementary data series. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) Coffee Department and URA report calendar year (CY) export data: CY2025 total = 8.7 million bags, USD 2.5 billion. The USDA GAIN series reports marketing year (MY) data running October to September: MY2024/25 production was 6.88 million bags. These are not contradictory - the marketing year production feeds a different delivery cycle than the calendar year export total. All tables in this chapter identify which series is used. Where figures are cited from the original chapter scope (based on a 2015 UCDA baseline of USD 900 million), these have been superseded by current Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) /URA data. Claims of "highest" or "best" are qualified against the central comparative assessment per A2i editorial convention.*

4.1 Pillar 1: Historical Baseline and Strategic Alignment

4.1.1 Production and Export Baseline

Uganda's coffee sector has undergone a structural step - change since the 2015 baseline cited in the original GRASP chapter outline. At that point, Uganda was Africa's second - largest coffee exporter generating around USD 900 million annually. By May 2025, Uganda had surpassed Ethiopia to become Africa's leading coffee exporter by volume, and calendar year 2025 closed at 8.7 million bags valued at USD 2.5 billion - a 71 per cent year - on - year increase in value.

Robusta accounts for over 80 percent of national output, and the sector supports an estimated 3.5–4 million coffee farmers (updated from a previously reported 1.7 million; to be referenced against an authoritative Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) census once confirmed) across more than 40 districts. The decade since 2015 has been marked by three structural shifts: steady production growth, a 2024 institutional shock (the dissolution of the Uganda Coffee Development Authority, and a 2025 market shock in Uganda's favour, overtaking Ethiopia as Africa's largest coffee exporter by volume. Average farm size is 0.5 - 2.0 hectares, and cherry to dry processing is predominantly done through dry mills.

Table 4.1 - Uganda Coffee Production and Export Trends, 2015 - 2025

Indicator	2015	2017	2019	2021	2023	2025 (CY)	Source / Note
Production (M bags, Market Year - MY)	3.54	3.98	4.59	6.10	6.23	6.88 (MY24/25)	USDA GAIN MY series

Indicator	2015	2017	2019	2021	2023	2025 (CY)	Source / Note
Exports (M bags, Calender Year - CY)	3.21	3.74	4.31	5.98	6.12	8.70	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / URA CY series
Export value (USD M, Calender Year - CY)	~440	~480	~491	~717	~966	2,500	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / URA CY series
Avg FOB price (USD/ kg)	~0.23	~0.22	~0.19	~0.20	~0.26	~0.29 (est.)	Derived: value / volume
Robusta share (% vol)	~76%	~77%	~78%	~79%	~80%	~80%	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Dept
Arabica share (% vol)	~24%	~23%	~22%	~21%	~20%	~20%	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Dept
Value - added exports	Negligible	Negligible	<1%	<1%	<1%	<1%	URA / A2i analysis

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department (ugandacoffee.go.ug); USDA GAIN Coffee Annual Uganda UG2025 - 0001; URA trade data series. Production figures are marketing year (October - September); export figures are calendar year. 2015 value is estimated from UCDA historical reporting.

Table 4.2 - Calender Year (CY) vs Market Year (MY) Data Reconciliation: Key Reference Points

Data point	Value cited	Series / Period	Status / Verification
Total exports, CY2025	8.70 million bags	Calendar Year 2025 (Jan - Dec)	VERIFIED - Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Dept official portal; URA trade statistics
Export value, CY2025	USD 2.5 billion	Calendar Year 2025 (Jan - Dec)	VERIFIED - Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / URA (+71% YoY stated by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)))
Production, MY2024/25	6.88 million bags	Marketing Year Oct 2024 - Sep 2025	VERIFIED - USDA GAIN (MY series)
Export volume, MY2024/25	6.53 million bags (proj.)	Marketing Year 2024/25	CORROBORATED - USDA GAIN projection (+2.76% YoY)
Value - added export volume	904 bags/kgs combined	14 licensed enterprises, 2024	PROVISIONAL - A2i analysis of URA licensing data; independent corroboration pending
Avg Robusta FOB price, Dec 2025	190 US cents/lb (~USD 4.19/kg)	ICO monthly composite, Dec 2025	VERIFIED - ICO Coffee Market Report December 2025
Avg Robusta FOB price, Apr 2026	165 US cents/lb (~USD 3.64/kg)	ICO monthly composite, Apr 2026	VERIFIED - ICO April 2026 report
EU share of Uganda exports	~72% by value	2024 full - year	CORROBORATED - DG AGRI; A2i analysis

Evidence labels: Verified = primary source confirmed. Corroborated = cross - referenced across two or more independent sources. Provisional = single source, independent confirmation not yet obtained. Pending = data gap flagged.

4.1.2 NDP IV, the Tenfold Growth Strategy, and Vision 2040

Coffee value addition is anchored in Uganda's Vision 2040 and the National Coffee Roadmap, which targets 20 million 60 - kg bags of production by 2030 alongside a step - change in the value - added export share, from under 1 percent today toward the sector - wide targets (approximately 15 - 25 percent by 2030, rising to 40 - 50 percent by 2035).

Following the Government of Uganda's Tenfold Growth Strategy, launched by the Ministry of Finance, Planning and Economic Development in June 2025 as the implementing framework for the Fourth National Development Plan (NDP IV). The Strategy targets growing the national economy from approximately USD 50 billion to USD

500 billion by 2040, anchored on four pillars including Agro - Industrialisation, under which commodity value addition, explicitly including roasted coffee, is identified as a direct pathway to higher - value exports and job creation. Positioning Tracks A and B as concrete, investable contributions to this national agro - industrialisation pillar, rather than as a stand - alone coffee - sector initiative, is likely to strengthen both political support and investor confidence.

This ambition is achievable only through processing - stage technology investment, spanning wet mill modernization, drying, and downstream freeze - dry/roast capacity, rather than production - volume growth alone. A near - term institutional risk requires flagging for non - replication and coordination monitoring by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Coffee Value Chain Department.

4.2 Pillar 2: Market Dynamics

4.2.1 Market Dynamics and Price Landscape

The European Union (EU) accounts for approximately 72 per cent of Uganda's coffee export value, with Italy, Germany, Belgium and Spain the largest single - country destinations. The EU is the world's largest coffee - importing region and the dominant buyer of Robusta green bean for soluble coffee manufacture. This structural dependency is simultaneously Uganda's most important commercial relationship and its most acute regulatory risk, as European Union Deforestation Regulation (EUDR) enforcement begins on 30 December 2026.

Global Robusta prices peaked in 2025 and have since partially corrected. The International Coffee Organisation (ICO) composite Robusta indicator stood at 190 US cents per pound in December 2025, declining to 164.64 US cents per pound in April 2026 - approximately USD 3.64 per kg FOB Uganda. For context, spray - dried instant coffee from Robusta commands approximately USD 6 - 9 per kg Cost Insurance and Freight (CIF) Europe; freeze - dried instant coffee from Ugandan Robusta would command USD 12 - 22 per kg Cost Insurance and Freight (CIF) Europe. The processing premium available from full value addition is therefore 3 - 6 times the current Robusta green bean price.

Table 4.3 - Uganda Coffee Export Destinations and Value Analysis, 2024

Market / Destination	Est. share (% value)	Primary form	Price benchmark	GTTF strategic implication
European Union (all 27 states)	~72%	Green bean Robusta	ICO indicator; direct negotiation	Primary EU market relationship; EUDR compliance (Dec 2026) is both a risk and a premium gateway; Danish/EU technology creates EUDR - ready supply chain
Switzerland (Nestle, JDE etc.)	~8%	Green bean Robusta / some process	Commercial contract prices	Global soluble coffee manufacturers source Uganda Robusta for blend functionality; Track A directly targets this segment
United States	~5%	Green bean (specialty Arabica)	NY arabica differential	Arabica specialty segment; limited GTTF relevance vs EU Robusta opportunity

Market / Destination	Est. share (% value)	Primary form	Price benchmark	GTTF strategic implication
Japan / East Asia	~4%	Green bean	FOB competitive	Growing instant coffee consumption; Track A product would access this market
Regional / Other	~11%	Mixed	Variable	Domestic roasters, regional traders; Track B white - label product relevant

Source: DG AGRI EU import statistics; URA export data; A2i analysis. Note: named buyer enterprises have been removed from this table per A2i editorial convention (Day One Validation, Action Point 11). Named enterprise engagement is captured in the enterprise KII profiles in Section 4.4.

4.2.2 Structural Gaps: Infrastructure, Regulatory, and Financial Product Absence

Four structural bottlenecks constrain the sector's ability to reach the scale mapped in Section 4.2.1:

1. Cooperative processing infrastructure gap: wet mills, drying yards, and parchment storage across Uganda's cooperative sector are aging and undercapitalized relative to the volume of smallholder supply, limiting the share of cherries that reach downstream processors at export grade rather than commodity grade.

2. Zero industrial freeze - dry export capacity currently exists, despite Uganda's best - in - class Robusta bio-chemistry, no donor or commercial programme is currently financing freeze - dry plant construction.

3. Nitrogen - flush VFFS packaging capacity is effectively absent among Uganda's roasting enterprises; most roasters remain air - freight - only and cannot compete on sea - freight economics.

4. No specialised financial product currently exists for cooperative - scale wet mill or solar - drying equipment finance; available concessional facilities (ACF, UGEFA) are structured around larger Tier 1 processing transactions rather than the smaller - ticket, higher - volume cooperative modernization need identified.

The UCDA - to - Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) regulatory transition compounds the infrastructure gap: quality standard enforcement at the cooperative level, which would otherwise create a market incentive for wet mill modernization, is itself in transition.

Power and transport infrastructure remain binding constraints outside the factory gate. Grid electricity reaches most processing sites, but cost and reliability are uneven at rural cooperative locations: several small and medium processors report running equipment overnight specifically to access cheaper or more stable power, or to work around daytime outages, which raises labour costs and complicates quality - sensitive processes such as controlled drying and freeze - dry operation.

Road, and where relevant rail, connectivity between cooperative aggregation sites, processing facilities, and the export corridor to Mombasa is uneven in quality and adds materially to logistics cost and transit time. Investors should size contingency into both capital and operating budgets for on - site power backup (generators or solar - battery systems) and for transport cost volatility, rather than assume grid and road infrastructure will perform to urban Kampala standards.

4.2.3 Case Study: Cimbria A/S and the Rubanga Cooperative Model

Shared Upstream Infrastructure and Cooperative Roastery Precedent

Cimbria A/S (Denmark) has maintained an active Uganda presence for over 15 years, supplying green bean cleaning, grading and optical sorting equipment to firms including NEC and Agroways (Jinja, Mbarara, Namulesa), with a new installation commissioned at Kigumba in 2025. Cimbria's equipment forms the shared upstream quality gate feeding both Track A and Track B. The Rubanga cooperative model in Southwestern Uganda, a Tier 1 - 2 cooperative/SME roastery archetype, illustrates both the dry mill modernization opportunity and the commercial case for cooperative - level investment: a grant - supported white - label roastery on this pattern can pass a 20 - 30% farmgate price premium back to supplying farmers once downstream roasting and packaging margins are captured locally rather than ceded to overseas roasters. This model requires substantially lower capital than freeze - dry investment (USD 8 - 22 million versus USD 65 - 125 million), making cooperative roasteries and modernized dry mills on the Rubanga pattern the faster, more broadly replicable entry point across multiple regional sites

Table 4.4 - Uganda Robusta: Biochemistry and Processing Advantage

Parameter	Uganda Robusta	Benchmark (other Robusta origins)	Processing implication
Extractable soluble solids (% of green bean dry weight)	28 - 32%	22 - 26% (Vietnam), 24 - 28% (Ivory Coast)	Higher yield per tonne of green bean input; lower cost per kg of soluble coffee produced; directly improves freeze - dry plant economics
Chlorogenic acid content (CGA, % dry weight)	9 - 12%	5 - 9% (Vietnam Robusta), 7 - 10% (Ivory Coast)	Among the highest CGA concentrations recorded globally; functional health claim potential; commands premium in nutraceutical and premium instant segments
Caffeine content (% dry weight)	2.5 - 3.5%	2.0 - 3.0%	Standard commercial range; within EU and EFSA caffeine content parameters
Cup profile (Robusta quality)	Clean, bold body; low astringency from Mt Elgon - adjacent processing zones	Variable globally	Mt Elgon and Rwenzori Arabica processing proximity creates blending opportunity for premium espresso - base Robusta product
Moisture content at export	Max 12.5% (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/URA spec)	Max 12.5% industry standard	Compliance with export specification; improved by Danish - assisted solar drying at cooperative level

Sources: Springer Food Chemistry (2019) CGA comparison study; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Dept biochemistry profile; A2i KII analysis; GEA process data. Uganda Robusta CGA range of 9 - 12% is within the peer - reviewed Robusta range of 7 - 14% (dry weight) and represents the upper quartile of commercially available Robusta origins.

Table 4.5 - Value - Added Coffee: Current Export Base Analysis

Category	Licensed exporters	Combined volume (bags/kgs)	Share of total exports	Implication
Roasted / soluble / value - added coffee exporters	14 (licensed per URA)	904 bags/kgs combined (estimate)	< 0.01% of CY2025 total	Structural value - addition failure: 8.7 million bags exported; 904 bags with value addition. This is the GTTF investment thesis in one comparison.
Green bean exporters	~200+ (licensed)	~8.70 million bags	> 99%	Highly fragmented; dominated by multinational trading houses and a small number of large domestic exporters
Industrial processing capacity (soluble / freeze - dry)	Zero	Zero	Not applicable	No industrial freeze - dry, commercial spray - dry or white - label roast - and - pack capacity exists in Uganda at commercially viable scale as of August 2026.

Source: URA licensing data (2024); verified via consultation with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Data Analyst (13 August 2026). Top exporters by declared volume: Discovery Trading Limited (217), Jahl Production (U) Ltd (202), Yugo - Vic SMC Ltd (121), Asala Coffee Trading (85). Unit bags/kgs reflects mixed reporting conventions (60 - kg bag equivalents and net kg); do not convert without underlying URA declarations. Treat 904 as a reliable floor for formally declared value - added exports. Register is export - side only and does not capture domestic roasting or consumption.

Table 4.5 - EUDR Compliance: Requirements and Uganda's Position

EUDR requirement	Uganda's current position	GTTF investment response
Geolocated, deforestation - free traceability to farm plot level for all EU - bound commodities (Regulation EU 2023/1115)	Not yet operational at scale. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Dept transition from UCDA has created an institutional gap in systematic traceability rollout. Individual exporters manage manually with a few using the Central Data warehouse.	Track A / Track B must integrate EU - approved traceability systems (Satelligence, SOURCETRACE or equivalent) into their capital stack from Day 1. GTTF technical assistance to include EUDR onboarding.

Compliance mandatory from 30 December 2026 (large and medium operators); 30 June 2027 (micro and small)	Most large Uganda exporters will be captured by the December 2026 deadline. Awareness among smallholder cooperatives is limited.	Cooperative wet mill modernisation (Track C) must include traceability infrastructure. GTTF should fund pilot traceability nodes at Rubanga and two additional cooperatives.
Risk classification: Uganda's deforestation rate and EUDR country risk category	The EU has not yet published the final country risk categorisation. Uganda is considered at elevated structural risk given forest cover decline, in contrast to Rwanda (low risk).	Investment structure must anticipate medium - high risk rating. Third - party certification (Rainforest Alliance, UTZ Certified) as parallel compliance track alongside EUDR geolocated traceability.
Due diligence statement required from all operators placing coffee on EU market	Currently unachievable at scale given traceability gap. Large traders managing per - shipment manual processes.	Track A and Track B enterprises must build EU - approved digital traceability into their investment business plan as a prerequisite for GTTF funding - not a post - investment add - on.

Source: European Commission (2023) Regulation EU 2023/1115; HQTS EUDR compliance update (2026); A2i legal analysis; Coolset EUDR business compliance guide (June 2026). Large/medium operator deadline: 30 December 2026. Micro/small operator deadline: 30 June 2027.

4.3 Pillar 3: Ecosystem Mapping

4.3.1 Ecosystem Mapping

The coffee processing technology ecosystem for Uganda's GTTF investment is anchored by two principal equipment supply chains: freeze - dry technology (Track A, dominated by Scandinavian and European process engineering firms) and roast - and - pack technology (Track B, led by Swiss and Danish equipment manufacturers). Both technology families offer decisive advantages over Asian alternatives in energy efficiency, extractable yield, product quality consistency and EU regulatory compliance documentation.

Table 4.6 - Danish and EU Technology Suppliers: Coffee Processing

Supplier	Country	Technology	Status (Uganda)	GTTF relevance
GEA Group (NIRO CONRAD)	Denmark / Germany	Continuous freeze - drying for instant coffee; NIRO spray - dry range	Desktop lead - formal engagement not yet confirmed in Uganda	Primary Track A technology: NIRO CONRAD continuous freeze - dryer is the industry benchmark for high - volume Robusta soluble coffee. GEA's Copenhagen process engineering centre has East Africa reference installations.

Supplier	Country	Technology	Status (Uganda)	GTTF relevance
Buhler AG	Switzerland	RoastMaster drum roaster; destoning; colour sorting; green bean cleaning	Desktop lead - Buhler active across Uganda milling sector; coffee engagement not yet formalised	Primary Track B technology: Buhler RoastMaster SR series is the global benchmark for consistent roast profiling. Buhler's Nairobi office provides regional service and spare parts.
Alfa Laval (Sweden)	Sweden	Heat exchangers; evaporation concentration for soluble coffee	Desktop lead	Relevant to Track A concentration stage (pre - freeze - dry). Alfa Laval has East Africa service network through Nairobi hub.
OLAM / Touton (EU - trading arm)	France / Netherlands	Green coffee trading and processing partnership structure	Active in Uganda green bean trade	Potential off - take partnership for Track A output; Touton's EU roaster relationships create a buyer access route for Ugandan freeze - dry output.
Satelligence / SOURCE-TRACE	Netherlands / US (EU compliance tools)	EUDR - compliant satellite - based traceability; farm plot geolocated deforestation monitoring	Desktop lead - active in Kenya and Rwanda	Essential EUDR compliance infrastructure for all three investment tracks. Satelligence has East Africa country coverage and has been referenced in EU compliance guidance.
Volcafe (ED and F Man)	Switzerland / Germany	Green coffee sourcing, quality grading and EU market access partnership	Active in Uganda - major green bean purchaser	Potential structured off - take partner for Track A / B output; Volcafe's EU client roster provides market access without Uganda having to build its own European distribution.

Status labels per A2i editorial convention: Engaged = formal documented engagement (KII or MOU); Existing Uganda presence = confirmed operations; Regional = East Africa presence only; Desktop lead = identified through desktop research; engagement not yet formalised. Source: GEA technical literature; Buhler product documentation; A2i KII notes; Day One Validation session, 10 August 2026.

4.3.2 Donor and Co - Financing Programme Landscape

Green technology matching grants are designed to leverage a broader ecosystem of domestic and international co - financing instruments, several of which are already active or imminent.

Table 4.7 Active and recent co - financing pipeline for coffee - sector investment

Programme / initiative	Partner	Scope	Strategic Relevance
Green Technology Matching Grants	aBi Development / A2i / Danish Embassy.	UGX 700M - 1B per investment; 5:1 leverage	Direct funding vehicle for wet mill, drying, Track A and B equipment
Bank of Uganda Agricultural Credit Facility (ACF)	Bank of Uganda	Concessional commercial co - lending	Co - debt for matching - grant leverage ratio target
Uganda Green Enterprise Finance Accelerator (UGEFA)	dfcu Foundation / Danish support	First call for applications: September 2025	Pre - investment capacity building and finance readiness
aBi Development USD 2B Coffee Roadmap Financing	aBi Development	Strategic technical assistance for coffee financing	Pipeline for scaling matching - grant investments
Italy €120 - 150M Climate Fund (UNIDO ACT Coffee)	UNIDO / Italian Ministry of Foreign Affairs	Concessional loan for climate resilience in coffee	Kampala Coffee Hub / processing infrastructure
Saudi Arabia / Nonda Coffee Park (USD 200M)	Government of Saudi Arabia / Uganda	Approx. USD 44M Government of Uganda + USD 156M Saudi private investment; processed coffee supplied to Saudi Arabia	Direct capital for value addition at scale
Danida Business Finance (Denmark)	Danish Ministry of Foreign Affairs	Commercial investment in Danida partner countries	Concessional equipment financing for GEA/Cimbria/ wet mill/dryer technology
World Coffee Research (WCR) Coffee Resilience Initiative	World Coffee Research, with National Agricultural Research Organisation (NARO) / NaCORI, funded via Italian Cooperation through UNIDO ACT Coffee	Approx. USD 1 million initiative addressing coffee wilt disease and genetic resilience, building on a National Agricultural Research Organisation (NARO)/ NaCORI priority investment roadmap	Complements the Italy/ UNIDO ACT Coffee climate fund above with a research and plant - genetics focus relevant to farm - level resilience
EU - EAC Market Access Upgrade Programme (MARKUP)	European Union / European Development Fund	EUR 3.7 million (UGX 15.6 billion) Uganda allocation for coffee and cocoa quality assurance, certification, value addition and trade facilitation. Historical programme, launched 2018	Precedent for EU - funded quality and value - addition support in the same value chain; useful reference for programme design, not a current funding source

Programme / initiative	Partner	Scope	Strategic Relevance
World Bank Group / IFC Uganda Country Portfolio	World Bank / International Finance Corporation	Approx. USD 4.05 billion country portfolio (17 projects); IFC active portfolio of approx. USD 82.2 million spanning agribusiness, infrastructure and financial markets	General - purpose blended finance and agribusiness investment window; not coffee - specific but a potential co - financing partner for larger Track A transactions
World Bank AgriConnect (Uganda Compact, in development)	World Bank Group	Country - level agribusiness compact; Uganda is among the countries actively developing its Compact as of 2026, targeting the same commercial agribusiness value chains this chapter assesses	A likely future coordination partner rather than a current funding line; monitor Compact finalisation and flag Track A/B alignment early
Sustainable Agricultural Supply Chains Initiative (SASI) / Youth for Coffee	GIZ, funded by German BMZ, via the Global Coffee Platform	EUR 2 million collective investment (Kenya and Uganda), announced December 2025, reaching an additional 18,000 farmers; Uganda component builds on the existing “Youth for Coffee” initiative for entrepreneurial youth service businesses	Directly relevant to youth - led service enterprises (e.g., Rubanga’s youth - provided farm services); a natural coordination and co - referral partner, not a processing - capital competitor
Digital and financial inclusion initiatives (e.g., Mastercard Foundation - linked programmes)	Private sector / development finance partners	Reported interest in digital and financial inclusion tools for smallholder coffee farmers; specific Uganda coffee - sector programme details not independently verified and should be confirmed before citing	Potential complement on farmer - facing digital payments and traceability, distinct from this chapter’s processing - technology focus

Most of the programmes above target the same broad ambition, more value captured in Uganda from the same coffee, but through different mechanisms: farm - level resilience and genetics (WCR/National Agricultural Research Organisation (NARO)), quality and trade facilitation (the historical EU MARKUP precedent and the reported EU grant tender), youth - led service enterprises (GIZ/SASI), broad agribusiness enabling conditions (World Bank AgriConnect), and large - scale, single - buyer processing capacity (the Saudi - backed Nonda Coffee Park). None of these currently finance the specific gap this chapter identifies: freeze - dry soluble processing (Track A) and white - label roasting and packaging (Track B) as investable, technology - specific interventions sized for small and mid - scale Ugandan enterprises rather than a single flagship facility. That gap is this chapter’s actual case for distinctiveness, and it should be revisited, not assumed, as the other programmes mature. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and the GRASP/GTTF programme team should confirm directly with UNIDO ACT Coffee, the EU Delegation, and the World Bank AgriConnect team that no overlapping equipment - financing scope is introduced before any Track A or B transaction is signed. Better donor coordination, most practically through a shared coffee - sector financing map maintained by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), would reduce the risk of duplicated effort and let each financing source

concentrate on what it is genuinely best placed to fund.

4.3.3 Regulatory Transition: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department

The Uganda Coffee Development Authority (UCDA) was dissolved on 20 December 2024, when the National Coffee (Amendment) Bill, 2024 was assented into law. This legislation transferred all UCDA regulatory, extension and certification functions to The Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))) Coffee Development Department. The merger was part of the Government's Rationalisation of Agencies and Public Expenditure (RAPEX) programme, aimed at reducing administrative duplication.

The practical consequence for GTTF investment structuring is significant. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department is in transition and is still absorbing UCDA's specialist staff, regional offices and certification systems. Quality control functions, including export certification, cup quality grading and licensed exporter oversight, are operating under interim arrangements. Any GTTF investment in Track A or Track B must account for this regulatory gap in its pre - investment due diligence and include explicit provisions for licensing and export certification under the new institutional structure.

4.4 Pillar 4: Enterprise Profiling

4.4.1 Enterprise Profiling and KII Evidence

Enterprise profiling for this chapter is based on two completed KII field visits (Kyagalanyi Coffee Ltd and Rubanga Cooperative), one KII with the confirmed Track A off - take anchor (Sucafina Instant), one institutional engagement (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department) and desktop profiling of additional enterprises. Enterprises are profiled using the standard two - table format applied across all GRASP/GTTF chapters: a profile table stating engagement basis, scale, and current technology position, followed by an investment and technology opportunities table. Enterprise names are retained because they constitute the primary evidence base for the investment pipeline; named individuals interviewed in the course of this work are identified only in the stakeholder consultation log (Table 4.25), per A2i editorial convention (Day One Validation, Action Point 11) - role - only references are used elsewhere in this chapter.

Table 4.8 Enterprise Tiers

Ranking	Enterprise	Core Activities	Scale & Positioning	Strategic Strengths	Key Gaps
1(Tier 1)	Kyagalanyi Coffee Ltd	Coffee sourcing, dry - mill processing, green - bean processing and export; exploring commercial roast - and - pack and freeze - dried soluble coffee	Large - scale / national market leader. Vertically integrated exporter with approximately 15–18% of Uganda's green coffee export volume; wet - mill network processes approximately 50,000–70,000 MT of cherry per season	Strongest balance sheet and commercial platform among the assessed Uganda enterprises; established export markets; existing bank relationships; capacity to provide co - finance for Track B; access to international finance through new ownership; strong raw - material sourcing base; strategically positioned to anchor Uganda's coffee value - addition transition	No commercial soluble/freeze - dry capacity; roast - and - pack remains at pilot stage; Track A requires USD 40–50m+ investment and long - tenor financing; anchor off - take agreement still required; EUDR geolocation/ traceability not yet complete across the smallholder supply chain
2**(Tier 1)**	Sucafina Instant	Global instant coffee trading, sourcing and off - take; spray - dried, agglomerated and freeze - dried coffee and coffee mixes	Global market player / potential off - take anchor. No Uganda processing asset; strategic role is market access, off - take and potentially co - investment rather than direct technology deployment	Provides a potentially critical route - to - market for Uganda - origin soluble coffee; confirmed commercial interest in Ugandan Robusta; experience with global instant - coffee markets; could help de - risk a large Uganda - based freeze - drying investment; clear understanding of commercial requirements and quality specifications	No Uganda - based processing operation; off - take interest is not yet a binding commitment; requires consistent quality and meaningful annual volumes; requires EUDR - compliant traceability and certification; needs a credible Uganda - based operating partner; commercial conditions for a binding multi - year off - take remain to be negotiated

Ranking	Enterprise	Core Activities	Scale & Positioning	Strategic Strengths	Key Gaps
3**(Tier 2)**	Rubanga Cooperative	Smallholder coffee aggregation, Robusta dry - mill processing and direct EU export under Fairtrade/Organic and Rainforest Alliance certification	Small - to - medium scale / cooperative model. Approximately 12,573 registered members; and linked to other 13 cooperatives with 10,308 members totaling 22,881 members; 6 hullers, and one dry mill secondary processing around 192,000 MT green coffee beans per season;significant smallholder and women - member base	Strong inclusion and rural - income impact; established EU market access; Fairtrade and Organic certifications provide a foundation for traceability; identifiable technology needs; viable GTTF matching - grant opportunity; demonstrates replicability of improved cooperative processing model	Limited borrowing capacity; currently dependant on Impact and development finance; underutilised capacity; fuel - dependent drying; EUDR geolocation and digital traceability are complete; member co - finance commitment and detailed traceability costing captured

4.4.2 Track A: Freeze - Dry Soluble Coffee — Investment Parameters

Of the three soluble coffee drying technologies, spray - dry, freeze - dry, and spray - freeze - dry - freeze - dry is the strategically optimal choice for Uganda given its premium biochemistry and target market positioning.

The grades feeding this plant matter as much as the technology itself, and are worth stating plainly rather than assumed. Freeze - dry extraction is well suited to undergrades and smaller - screen lots, coffee that does not meet premium whole - bean export specification. The specific feedstock grades identified for this plant are Undergrades and SC1200 (Screen 12 material, beans passing a 12/64 - inch screen, a smaller and lower - value size than the premium Screen 15+ grades sold as whole beans). This matters commercially: soluble processing extracts and standardises flavour in a way that whole - bean roasting cannot, so undergrades and Screen 12 lots that would sell at a discount as green beans can be converted into a soluble product priced on par with premium - grade extraction. The feedstock for Track A is therefore expected to be predominantly Robusta undergrades and SC1200 screen - outs, with a smaller Arabica component, rather than competing directly with Uganda's premium whole - bean export trade.

The freeze - dry versus spray - dry choice reflects market direction, not only cup quality. Global demand for freeze - dried soluble coffee is growing faster than for spray - dried products, reflecting consumer association of freeze - drying with higher quality, and Uganda's Robusta biochemistry is well matched to that premium segment. Available evidence indicates no freeze - dry soluble coffee plant currently operates anywhere in Africa, despite the continent, and Uganda specifically, being a major source of the Robusta feedstock the global soluble industry depends on; this is presented as the available evidence, not a claim independently audited plant - by - plant, and should be confirmed against current ICO/UNIDO data before being used as a standalone investment claim. If accurate, it means Uganda would be a first mover on the continent for this specific technol-

ogy, consistent with the uncontested - capacity finding elsewhere in this chapter.

Table 4.9 Proposed Track A freeze - dry plant — key investment parameters

Parameter	Estimate	Basis
Location	Coffee Industrial Park, Mbarara/ Kampala	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - designated zone infrastructure available
Annual production capacity	5,000 - 8,000 MT freeze - dry instant coffee	Based on Approx. 50,000 MT green bean input
Green bean feedstock required	45,000 - 55,000 MT/year	<10% of Uganda's 2024/25 Robusta export volume
Capital expenditure estimate	USD 120 - 180 million	Industry benchmarks; FD plant USD 30 - 80M + civil/infra
Direct employment	Approx. 1,200 - 1,800	Including seasonal processing and logistics
Indirect employment (farming)	Approx. 8,000 - 12,000 smallholder households	Dedicated supply base at premium farmgate prices
Expected export price (FOB, Free On Board)	USD 10 - 18/kg freeze - dry vs USD 4 - 7/kg green bean equivalent	
Investment payback period (est.)	8 - 12 years	At conservative price and utilisation assumptions

Stating tonnage and export - share together, across all three investment areas rather than Track A alone, makes clear how each intervention contributes differently to the sector - wide value - added export share target of 15 - 25% by 2030 rising to 40 - 50% by 2035. The distinction between an achievable near - term share of roughly 20% and the Government's longer - term ambition of roughly 50% carries real political weight: the former is a credible, plant - by - plant investment case, while the latter is the sector - wide ambition these individual investments contribute toward rather than are expected to deliver alone.

Table 4.10a Indicative tonnage and export - share summary across the three investment areas

Investment area	Indicative annual tonnage at scale	Approx. share of total export volume	What the share represents
Track A: freeze - dry soluble	45,000 - 55,000 MT green bean feedstock; 5,000 - 8,000 MT freeze - dry output	Approx. 8 - 10% of total export volume (feedstock basis)	A near - term, plant - specific share; feedstock drawn from undergrades, not competing with premium whole - bean export volume

Investment area	Indicative annual tonnage at scale	Approx. share of total export volume	What the share represents
Track B: white - label roast and packaging	Illustrative target: growth from today's national roasted - export baseline of under 1,000 MT (Table 4.9a) to 3,000 - 5,000 MT by 2030	Approx. 0.5 - 1% of total export volume	Small in tonnage but high in value capture; a 3 - 5x price multiple per kg over green bean means disproportionate value gain relative to volume share
Cooperative drying window	Not an export - tonnage track: improves grade consistency of existing smallholder volume rather than adding new processed tonnage	N/A (quality upgrade, not volume addition)	Measured dry mills modernised and farmers reached, not export share; a precondition for Tracks A and B rather than a parallel volume stream

Figures are illustrative planning estimates for investor discussion, not confirmed engineering or market - study tonnages; the Danish design team expected on site in approximately two weeks will need this tonnage and grade detail refined into firm process design parameters before plant sizing is finalised.

4.5 Pillar 5: Impact Metrics and Rio Markers

4.5.1 Impact Metrics

The Coffee value chain investment case generates impact across four dimensions: farmer income and livelihood; employment creation in processing; environmental sustainability; and gender inclusion through the cooperative track. This section presents impact estimates against a standard GTTF framework and re - engineers the impact narrative through the Organization for Economic Co - operation and Development (OECD) Development assistanceCommittee (DAC) Rio Marker lens as required for EU and Danish Government scoring.

Job creation is one of the most immediate and quantifiable impacts of this investment case, and it operates at two distinct scales. At the processing level, the three tracks together are projected to create 630–1,150 direct jobs: 350–600 in Track A's freeze - dry plant operations, quality control and logistics; 80–150 in Track B's roasting, packaging and distribution; and 200–400 aggregated across the four to six cooperatives expected to host dry mill facilities under Track C. These are largely new occupational categories for Uganda's coffee sector, plant technicians, quality - control staff, roastmasters, rather than a reshuffling of existing roles.

The far larger employment effect, however, sits upstream: increased cherry demand at premium prices is projected to sustain 50,000–80,000 smallholder livelihoods through Track A, 20,000–35,000 through Track B's quality - premium pull - through, and a further 2,400–14,000 cooperative member households directly engaged through Track C, for a combined upstream reach of roughly 72,000–129,000 farming livelihoods. Track C's cooperative model also carries a distinct employment - quality dimension, the investment case's employment story is not primarily about the several hundred processing jobs created in plants and roasteries, real and valuable as those are, but about the tens of thousands of smallholder households whose incomes depend on the premium and volume growth those plants generate demand for.

Table 4.11 - Impact Metrics: Track A, Track B and Cooperative Tracks

Impact metric	Track A (Freeze - dry)	Track B (Roast and pack)	Cooperative wet mill (Track C)
Direct jobs created (processing)	350 - 600 (plant operations, QC, logistics)	80 - 150 (roasting, packing, distribution)	40 - 80 per cooperative (aggregated: 200 - 400 across 4 - 6 cooperatives)
Indirect jobs (upstream smallholder)	50,000 - 80,000 (increased cherry demand at premium)	20,000 - 35,000 (quality premium pull - through)	2,400 - 14,000 (direct cooperative member base; 65%+ women)
Farmer income uplift (% over baseline)	20 - 35% through quality premium and volume increase	10 - 20% through quality premium	15 - 25% through processing premium and EUDR market access
Women's participation	Limited direct (plant technician roles); indirect through smallholder premium	Limited direct; indirect through premium	HIGH DIRECT IMPACT - 65%+ of cooperative members are women; cooperative governance model
Coffee pulp waste valorised (MT/yr)	20,000 - 40,000 MT (biogas, compost, cascara)	2,000 - 5,000 MT	500 - 1,500 MT per cooperative; aggregate 2,000 - 8,000 MT
EUDR - compliant farms registered	50,000 - 80,000 plots (full Track A supply chain)	20,000 - 35,000 plots	2,400 - 14,000 (cooperative member plots)
Carbon emission reduction	Material: solar drying + energy - efficient processing replaces charcoal/firewood	Moderate: gas/electric roasting replaces charcoal	Significant at cooperative level: solar dryer replaces fuel - fired dryer

Source: A2i estimation based on KII evidence; UCFA baseline survey; sector benchmarks from East Africa processing comparators. All impact metrics are indicative at landscape assessment stage; transaction - level social impact assessments required before GTTF instrument design.

4.5.2 EU and Danish RIO Markers: Cross - Cutting Impact Assessment

Under the Organization for Economic Co - operation and Development (OECD) Development assistanceCommittee (DAC) Rio Markers framework - the standard cross - cutting development objective system applied by both the EU and Denmark - the GTTF Coffee investment qualifies positively against three of the four Rio Markers.

Table 4.12 - Organization for Economic Co - operation and Development (OECD) Development assistance-Committee (DAC) Rio Markers Assessment: Coffee Value Chain

Rio Marker	Score	Level	Evidence and rationale
Climate Change Mitigation (Marker 1)	1	Significant	Solar drying at cooperative wet mills replaces charcoal and firewood - fired drum dryers - a direct greenhouse gas reduction at farm - processing level. Energy - efficient Danish and EU freeze - dry technology (GEA NIRO heat pump systems) and precision roasting equipment (Buhler RoastMaster) reduce fossil fuel consumption per tonne of processed coffee versus conventional Asian alternatives. Coffee pulp biogas generation - 250,000 MT pulp/parchment waste per year nationally - displaces liquefied petroleum gas and charcoal in on - site energy use. Scored as Significant rather than Principal because the primary purpose of the GTTF investment is commercial processing quality and value addition; climate mitigation is a material but secondary co - benefit.
Climate Change Adaptation (Marker 2)	2	Principal	Wet mill modernisation and cooperative traceability infrastructure directly build resilience of Uganda's coffee supply chains against climate - induced quality variation. Climate change is increasing the frequency of irregular rainfall events and temperature fluctuations in Uganda's key Robusta growing zones, leading to inconsistent cherry ripening, increased pulp fermentation defects and post - harvest moisture management failures. Danish and EU wet mill technology significantly reduces the climate sensitivity of the quality conversion step. This marker is scored as Principal because climate adaptation is explicitly embedded in the design rationale of cooperative wet mill investment (Track C) and is not merely incidental.
Biodiversity (Marker 3)	1	Significant	EUDR compliance - a required condition for all three investment tracks - mandates deforestation - free traceability to farm plot level. This provides an enforceable legal mechanism for protecting forest biodiversity in Uganda's coffee - growing areas. Shade - grown Arabica systems promoted through the cooperative track support bird and pollinator diversity. Scored as Significant rather than Principal because forest protection is a by - product of EUDR compliance rather than the primary investment objective.
Desertification and Land Degradation (Marker 4)	0	Not targeted	Coffee is not grown in Uganda's semi - arid northern zones where desertification is the primary land management challenge. There is no direct connection between the three GTTF investment tracks and desertification risk.

Scoring convention: Score 2 = Principal objective. Score 1 = Significant objective. Score 0 = Not targeted. Source: OECD DAC Rio Markers Handbook (2016); A2i assessment; Day One Validation, 10 August 2026.

4.5.3 Green Agenda Adoption

Uganda's coffee sector has significant potential to contribute to rural incomes, employment creation, export earnings, agro - industrialisation and climate - resilient economic growth while improving environmental sustainability across the coffee value chain. As Uganda seeks to increase coffee production, processing and value

addition, the Green Agenda Adoption pillar promotes low - carbon, resource - efficient and climate - smart coffee production and processing systems that reduce environmental impacts while improving productivity and competitiveness. Priority interventions include solar - powered coffee drying and processing, energy - efficient wet mills and roasting systems, coffee pulp and wastewater valorisation, biomass and biogas energy solutions, water - efficient processing technologies, climate - smart coffee production, agroforestry and soil - management practices, and digital traceability systems that support sustainable sourcing and compliance with international environmental requirements. Particular emphasis should be placed on converting coffee pulp, husks and waste-water into productive inputs or renewable energy, reducing dependence on fuelwood and fossil - fuel energy, improving water - use efficiency, and strengthening farm - level traceability and deforestation - risk monitoring under the EU Deforestation Regulation (EUDR). These interventions align with Uganda's National Development Plan IV (NDP IV), the Agro - industrialisation Programme, the National Climate Change Act (2021), Uganda's Nationally Determined Contributions (NDCs), and the Green Growth Development Strategy, while supporting higher - value coffee processing, improved farmer incomes, export competitiveness, resource efficiency and access to increasingly sustainability - conscious international markets.

4.5.4 Climate - Funding Share Against the 75% Threshold

Royal Danish Embassy (RDE) concern requires that at least 75 percent of proposed funding address a climate challenge, scored against this chapter's own RIO Markers assessment (4.5.1). This section computes that share transparently from the GTTF facility contribution set out in Table 4.19, rather than relying on the marker - score total alone. Summing the four marker scores (2+1+1+0) - the method the prior version of this chapter used to claim the threshold was met - is not the same calculation as the percentage of funding that is climate - positive, and this chapter corrects that here.

Table 4.13 - Climate - funding share of GTTF facility contribution by track

Track	GTTF facility contribution, midpoint (USD M)	RIO climate tie (Table 4.17)	Climate - positive?
Track A: Freeze - dry (GEA NIRO CONRAD)	19.0	Mitigation 1 (Significant) - GEA NIRO heat pump system named specifically	Yes
Track B: Roast and pack (Buhler RoastMaster)	3.0	Mitigation 1 (Significant) - Buhler RoastMaster named specifically	Yes
Track C: Cooperative wet mills	1.0	Adaptation 2 (Principal) + Biodiversity 1 (Significant) + Mitigation 1 (Significant)	Yes

Sources: this chapter's Table 4.19 (GTTF facility contribution, midpoint of range) and Table 4.17 (RIO Markers).

At the midpoint of each track's GTTF facility contribution, all USD 23.0 million is climate - positive under this chapter's own RIO scoring - a 100 percent share. This differs from the Dairy and Cassava chapters, where several capital line items had no specific climate - technology component named in the RIO assessment and were correctly excluded. Coffee's result is genuinely different: each of the three tracks is built around a specifically named, efficiency - linked Danish or EU technology (GEA NIRO's heat pump system, Buhler's RoastMaster, and cooperative solar drying respectively), and the RIO Markers section ties each one to a specific marker score rather than making a single blanket claim across the whole chapter. The chapter's original claim that it met the 75 percent threshold was reached through the wrong calculation, but a correct recalculation confirms the same conclusion on firmer ground.

4.6 Pillar 6: Investment Structuring

4.6.1 Investment Structuring

Capital alone will not satisfy the conditions this chapter has already established for GTTF success. Sucafina Instant's own fourth binding condition for commercial engagement, a proven operating partner on the ground, is a technical assistance requirement, not a financing one: it cannot be met by matching grant capital alone, only by structured operator support, training, and quality assurance systems built alongside the investment. The same applies to The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department's ongoing institutional transition, which affects every enterprise's export certification pathway regardless of how well capitalised it is. Technical assistance should be budgeted as an explicit line in each track's capital stack, not treated as a residual or assumed to be covered by the enterprise's own resources.

Three investment tracks are recommended, with distinct capital requirements, implementation timelines and risk profiles. The tracks are complementary rather than competing: cooperative wet mill modernisation (Track C) builds the raw material quality platform that improves the economics of both Track A and Track B. The GTTF co - finance structure applies an 70:30 enterprise/facility split: the enterprise (or cooperative) contributes 80 per cent of the total investment cost, and the GTTF facility contributes 20 per cent as an interest - free, potentially convertible loan. The programme - level leverage target is 5:1. Strong Tier 1 enterprises may achieve higher leverage on specific transactions; 5:1 is the programme target, not a per - deal floor.

Table 4.14 - Investment Capital Stacks: Three Tracks

Capital item	Track A: Freeze - dry (Phase 1)	Track B: Roast and pack	Track C: Cooperative wet mills (aggregate)
Total CapEx required	USD 65 - 125 million (Phase 1 only; 5,000 MT/yr plant at USD 65M; 10,000 MT/yr at USD 125M)	USD 8 - 22 million (entry - level roasting + VFFS pack line at USD 8M; full commercial scale at USD 22M)	USD 2 - 8 million aggregate (USD 350K - 1.3M per cooperative x 4 - 6 cooperatives)
Enterprise co - finance (80%)	USD 52 - 100M (requires long - tenor debt - E3 concessional, FMO, IFC)	USD 6.4 - 17.6M (commercial bank + aBi Development)	USD 1.6 - 6.4M (member equity + aBi grant + cooperative savings)
GTTF facility contribution (20%)	USD 13 - 25M (interest - free convertible loan; E4 feasibility/demo prior to this)	USD 1.6 - 4.4M (interest - free convertible loan)	USD 0.4 - 1.6M (matching grant; 20% of total per cooperative)
Implied leverage ratio	5:1 or higher (strong Tier 1 enterprise with long - tenor co - debt mobilised)	5:1 programme target achievable	5:1 target; grant element may reduce effective leverage - acceptable given cooperative impact profile
Danida Business Instrument fit	E4 feasibility (DKK 750K) first; E4 demo plant (DKK 6M); E3 concessional loan (up to DKK 15M) for gap financing	E3 concessional loan (up to DKK 15M); E2 (DKK 1.5 - 10M) for smaller Track B	E1 (DKK 500K) or E2 (DKK 1.5M) per cooperative; aggregated facility

Capital item	Track A: Freeze - dry (Phase 1)	Track B: Roast and pack	Track C: Cooperative wet mills (aggregate)
EUDR traceability CapEx	USD 1.5 - 3M included in Track A capital stack	USD 300K - 800K included in Track B stack	USD 80K - 120K per cooperative (included in Track C per - unit cost)
Technology primary supplier	GEA NIRO CONRAD (Denmark) - continuous freeze - dryer	Buhler RoastMaster (Switzerland) + nitrogen - flush VFFS packing line	Precision pulper + solar dryer array: EU - origin preferred for certification documentation
Indicative IRR (unleveraged)	18 - 28% (based on freeze - dry soluble FOB price USD 12 - 22/kg; 5,000 MT/yr revenue USD 60 - 110M)	22 - 35% (roast pack FOB USD 4 - 7/kg premium to green; lower CapEx; faster breakeven)	Not applicable as standalone; measured through cooperative member income uplift

Source: A2i investment analysis; Danida Business Instruments operational guidelines; GEA/Buhler reference plant cost data; aBi Development portfolio terms. CapEx ranges reflect market uncertainty; transaction - level feasibility study required before instrument design. IRR estimates are indicative and unleveraged.

A key analytical distinction in this chapter - flagged in the Day One Validation team notes - is the separation of immediate commercial investment opportunities from longer - term domestic consumption development hypotheses. These require different capital instruments, timelines and risk tolerances.

Table 4.15 - Domestic Consumption vs Commercial Investment Tracks: Separation of Opportunities

Dimension	Immediate commercial tracks (Track A and B)	Longer - term domestic consumption hypothesis
Time horizon	2 - 5 years (Track B); 5 - 8 years (Track A full build - out)	10 - 20 years for meaningful domestic market development
Market	EU and global export market for soluble and roast coffee (72% EU destination confirmed)	Uganda and East African domestic instant and roast coffee consumption growth
Current per - capita consumption	Not applicable - export - oriented	Uganda: approximately 0.8 kg per capita per year; Kenya: 2.1 kg; South Africa: 3.2 kg. Growth trajectory positive but from a low base.
Capital instrument	GTTF CapEx grant/loan + commercial co - finance + Danida E3/E4	Enabling environment investment (regulation, retail, consumer awareness); not a direct GTTF CapEx play
GTTF relevance	HIGH - direct investable opportunity; enterprises identified, KIIs completed	LOW to MEDIUM - supporting context only; does not constitute a near - term GTTF investment thesis
Recommendation	Prioritise Track A and Track B for GTTF capital deployment in the 2026 - 2028 window	Monitor domestic market evolution; revisit at programme mid - term review (2029). Do not include domestic consumption projections as evidence for near - term CapEx justification.

Source: A2i analysis; Day One Validation team notes (10 August 2026). Uganda per - capita consumption estimate: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and

Fisheries (MAAIF)) Coffee Department consultation.

4.7 Pillar 7: Policy Environment and Sustainability

4.7.1 Policy Environment and Sustainability

Uganda's coffee policy framework is undergoing material transition. The dissolution of UCDA creates short - term institutional uncertainty but is intended to reduce regulatory overhead and integrate coffee development more fully into the mainstream Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) extension system. The fourth National Development Plan (NDP IV 2025/26 - 2029/30) identifies coffee as a priority value chain and includes targets for domestic processing and value addition. Uganda's goal of USD 5 billion in coffee export earnings by 2030 - cited by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and the NPA - requires a structural shift from green bean export to processed product export, precisely the shift that GTTF investment enables.

Table 4.16 - Policy Alignment and Regulatory Risk Matrix

Policy / Regulatory item	Current status	Impact on GTTF investment	Risk / Opportunity
NDP IV Coffee Targets (2025 - 2030)	USD 5B exports by 2030; domestic processing targets	Strongly supportive of GTTF investment objectives; GOU alignment de - risks policy reversal	OPPORTUNITY - political will confirmed at highest level
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Dept (post - UCDA)	Operational from December 2024; still in transition period (absorbing UCDA functions)	Licensing, certification and quality control under interim arrangements; KII enterprises report processing delays	RISK - 6 - 18 month institutional gap. GTTF pre - investment TA should include regulatory capacity support.
EUDR (EU Regulation 2023/1115)	Large/medium operator compliance mandatory 30 Dec 2026; small/micro 30 Jun 2027	All three GTTF tracks must include EUDR - compliant traceability as a capital cost from Day 1	RISK (non - compliance = EU market loss) and OPPORTUNITY (EUDR - verified premium for compliant producers)
Uganda Export Promotion Board (UEPB)	Active; export diversification programme includes coffee	Supportive; UEPB facilitation relevant for Track A/B market access development	OPPORTUNITY - complementary institutional support

Policy / Regulatory item	Current status	Impact on GTTF investment	Risk / Opportunity
Tax and incentive framework for processing investment	Investment Code Act 2019 provides 10 - year tax holiday for qualifying agro - processing investments	Track A and Track B should qualify for investment incentives under the Code; needs confirmation with URA	OPPORTUNITY - reduces effective tax burden in early operating years
Forward - looking (10 - year horizon)	Global Robusta demand growing at 3 - 5% per year driven by instant coffee sector expansion in Asia	Uganda's biochemical advantage (CGA, soluble solids) becomes more valuable as quality differentiation in instant coffee increases	OPPORTUNITY - Uganda has structural long - term competitive advantage if processing capacity is built now
Forward - looking (20 - 30 year horizon)	Climate change projected to reduce suitable Arabica growing area by 40 - 60% in East Africa by 2050 (various models)	Robusta is more climate - resilient than Arabica; Uganda's Robusta dominance is a long - term strategic asset	OPPORTUNITY - Uganda positioned as climate - resilient Robusta supply hub as global Arabica supply tightens

Source: NPA NDP IV (2024); National Coffee (Amendment) Bill (2024); EU Regulation 2023/1115; A2i KII programme; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department consultation. Forward - looking projections are scenario - based and indicative.

4.7.2 Enterprise Ranking Against GTTF Hard Gates

The following ranking applies the GTTF hard - gate criteria to all enterprises in the Coffee sector pipeline. The seven hard gates are: (1) confirmed buyer contract or letter of intent; (2) throughput verified via KII; (3) co - finance balance sheet confirmed; (4) site evidence (facility established or in permitted development); (5) EUDR compliance pathway in place; (6) commercially viable without subsidy (or clear path to viability); (7) EU or Danish technology window fit. Rankings are provisional and indicative pending the central MCDA moderation exercise.

Table 4.17 - Enterprise Ranking Against GTTF Hard Gates

Enterprise	Buyer LOI	Through-put veri-fied	Co - finance confirmed	Site evi-dence	EUDR pathway	Viable w/o sub-sidy	Overall / Tier
Kyagalanyi Coffee Ltd	YES - EU buyers; existing green bean contracts documented	VERIFIED (KII 14 Jul 2026): 50,000 - 70,000 MT cherry/ season	YES - Stanbic + Centena-ry lines; Track B co - finance confirmed	YES - op-erational wet mill and export facilities	IN PROG-RESS - geo-located traceability develop-ment un-derway; on track Dec 2026	YES - profitable green bean operation; Track B ROI positive at current prices	TIER 1 - PRIORITY (Track B confirmed; Track A requires E3/FMO co - debt)
Sucafina Instant	YES - glob-al off - take network confirmed via KII; Suca-fina Instant supplies bulk and finished - goods instant cof-fee globally; leadership has sig-nalled active strategic interest in Africa - ori-gin sourcing	KII VERI-FIED (Jun 2026) - Uganda Robusta 28 - 32% soluble solids and 9 - 12% CGA con-firmed as genuinely attractive starting point; com-mercial off - take requires demon-stration of consis-tency and scale be-yond pilot volume	OPEN IN PRINCIPLE - a well - structured proposi-tion with blended finance de - risk-ing would get taken seriously internally per KII; investment decision sits above trading desk; not yet a com-mitment	YES - global lo-gistics and trading infrastruc-ture; no Uganda processing site re-quired for off - take role	STRONG - Sucafina Instant carries Organic, Fairtrade and IM-PACT sus-tainability standard; EUDR compli-ance is op-erational within own product range	YES - profitable global trading house; off - take role adds market, not capital require-ment	TIER 1 - OFF - TAKE ANCHOR CON-FIRMED IN PRINCIPLE (binding commit-ment requires: consisten-cy, scale, certifica-tion, prov-en operat-ing partner on the ground)

Enterprise	Buyer LOI	Through-put veri-fied	Co - finance confirmed	Site evi-dence	EUDR pathway	Viable w/o sub-sidy	Overall / Tier
Rubanga Coopera-tive	PROVISION-AL - fair trade/organ-ic EU buy-ers; limited volume	VERIFIED (KII): 2,000 MT cherry/ season; underuti-lised	LIMITED - grant - depen-dent; aBi co - funder	YES - wet mill oper-ational but aged	IN PROG-RESS - organic/ fair trade provides partial founda-tion; full EUDR plot mapping needed	NOT YET (grant - dependent at current scale)	TIER 2 - coopera-tive model; grant - ap-propriate (Track C)

Hard gates: (1) Confirmed buyer contract or LOI; (2) KII - verified throughput; (3) Confirmed co - finance balance sheet; (4) Established site evidence; (5) Active EUDR compliance pathway; (6) Commercially viable without subsidy; (7) EU/Danish technology fit confirmed. Source: A2i KII programme; URA enterprise data; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Dept consultation; Day One Validation, 10 August 2026. Rankings are indicative and subject to central GTTF moderation.

4.7.3 Multi - Criteria Decision Analysis (MCDA)

The MCDA scoring below applies the standard A2i/GTTF assessment framework to the Coffee sector as a whole. Scores are on a 1 - 10 scale (10 = strongest performance against criterion), weighted by the criterion's importance to GTTF investment selection. This MCDA score is carried without adjustment into the cross - sector ranking in Chapter 14

Table 4.18 - MCDA Scoring: Coffee Value Chain, Uganda 2026

MCDA Crite-rion	Weight	Score (1 - 10)	Weighted	Max pos-sible	Evidence / Rationale
Market size and growth trajectory	15%	10	1.50	1.50	Uganda is Africa's largest Robus-ta exporter (8.7M bags, USD 2.5B CY2025). Global instant coffee mar-ket growing at 4 - 5% per year. EU Robusta dependency (72% of Ugan-da exports) creates structural de-mand certainty. 40 - 75x FOB price uplift available through freeze - dry processing.

MCDA Criterion	Weight	Score (1 - 10)	Weighted	Max possible	Evidence / Rationale
EU and Danish technology fit	15%	8	1.20	1.50	GEA (NIRO CONRAD) is the definitive Track A technology; Buhler (RoastMaster) is the definitive Track B technology. Both are Danish/Swiss with EU service infrastructure. Engagement confirmed at desktop level; formal Uganda commitment pending. Score 8 not 10 reflects that on - the - ground supplier engagement is at early stage for Uganda - specific coffee processing.
Enterprise investment - readiness (KII base)	5%	8	0.40	0.50	Four KII - verified consultations completed: Kyagalanyi Coffee Ltd (Track B/A, 14 Jul 2026), Rubanga Cooperative (Track C), Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department (institutional), and Sucafina Instant (off - take market anchor, World of Coffee Brussels, June 2026). The Sucafina KII confirms that the global off - take market exists and is actively interested. Track B pipeline is fully validated at Tier 1. Track A off - take anchor is confirmed in principle; the Uganda - based operating entity has not yet been identified. Score 8 reflects a materially stronger pipeline than at v1 baseline.
Additionality and crowding - in (leverage)	12%	8	0.96	1.20	Clear EU cost premium over Chinese/Asian freeze - dry and roasting equipment (20 - 35% CapEx differential on equivalent capacity). 70:30 co - finance structure confirmed as viable at KII level. 5:1 leverage target achievable for Track B; Track A requires long - tenor co - debt mobilisation.

MCDA Criterion	Weight	Score (1 - 10)	Weighted	Max possible	Evidence / Rationale
Processing quality and farm - income impact	12%	8	0.96	1.20	Wet mill modernisation directly reduces 25 - 30% quality loss at farm processing stage. EUDR - compliant traceability unlocks EU premium pricing. Solar drying investment reduces spoilage and moisture non - compliance. Impact is direct, measurable and scalable across cooperative network.
Rio Marker alignment	10%	10	1.00	1.00	Score 2 (Principal): Climate Adaptation. Score 1 (Significant): Climate Mitigation and Biodiversity. Recomputed on a capital - share basis (Table 4.18): 100% of GTTF facility contribution ties to a named climate - relevant technology. Climate Adaptation is the lead rationale for GTTF involvement in the cooperative wet mill track.
Regulatory and policy alignment	8%	6	0.48	0.80	NDP IV and GOU USD 5B export target strongly aligned. However, UCDA dissolution (Dec 2024) creates 6 - 18 month institutional gap in quality assurance and licensing. EUDR compliance risk is real and time - bounded. Scored 6 (not lower) because policy intent is strong; the risk is institutional capacity, not policy direction.
Financial co - financing readiness	8%	8	0.64	0.80	aBi Development is an active co - financer with existing coffee portfolio. Stanbic and Centenary confirmed for Track B enterprises. Danida E3/E4 instruments are directly applicable. Track A requires long - tenor debt (FMO class) - achievable but not yet confirmed.

MCDA Criterion	Weight	Score (1 - 10)	Weighted	Max possible	Evidence / Rationale
Gender and social inclusion	5%	8	0.40	0.50	Cooperative wet mill track (Track C) directly benefits 65%+ women smallholder members. Track A and B employment creation is less gender - differentiated at processing level but generates upstream income uplift for women farmer households. Gender data at enterprise KII level is limited but cooperative evidence is strong.
Strategic anchors and market - making potential	10%	10	1.00	1.00	Sucafina Instant - KII verified, World of Coffee Brussels, June 2026 - is confirmed as the most strategically important off - take anchor in the GTTF pipeline. Sucafina's Trading Director confirmed Uganda Robusta biochemistry is a genuinely attractive starting point and that a well - structured Uganda proposition would get taken seriously internally. Kyagalanyi Coffee Ltd (now owned by Hatch Tree Partners, US energy traders) performs the same anchoring role for Track B, with confirmed EU buyer relationships and balance sheet capacity for co - finance. The combination of a confirmed global trading anchor (Sucafina) and a vertically integrated domestic processing enterprise (Kyagalanyi) constitutes a complete market - making ecosystem.

MCDA Criterion	Weight	Score (1 - 10)	Weighted	Max possible	Evidence / Rationale
TOTAL WEIGHTED SCORE	100%	-	8.54 / 10.0	10.0	Coffee sector scores 8.54/10.0 (rescaled from 4.27/5.0; figures independently re - verified). Recommended as Priority 1 sector. Score of 6 on regulatory environment reflects the UCDA transition institutional gap - a correctable risk, not a structural weakness. The 40 - 75x value uplift opportunity, Uganda Robusta biochemical advantage, and confirmed off - take market interest from a major global instant coffee trader constitute the strongest combined investment case in the GTTF portfolio.

Source: A2i GRASP/GTTF Sector Assessment Framework (2026). Scores derived from KII evidence, enterprise data and Day One Validation session (10 August 2026). MCDA is indicative and subject to central moderation by the GTTF programme team using the agreed common MCDA workbook.

4.7.4 Investment Opportunity Summary

The following table summarises the principal investment opportunities from this chapter, mapped to their direct investment implications for GTTF programme design. Named enterprises have been removed from this table per A2i editorial convention (Action Point 11, Day One Validation); enterprise - specific capital structures are detailed in Section 4.4 and the enterprise profiles in Section 4.8. This table should be read alongside the MCDA (Table 4.23, score 8.54/10.0, Priority 1) and the capital stacks (Table 4.19).

Table 4.19 - Investment Opportunity Summary

Priority	Opportunity	GTTF capital required	Instrument	Key condition for investment
1 - IMMEDIATE	Track B: White - label roast and nitrogen - flush pack at commercial scale. EU - certified product targeting private - label buyers in Germany, Italy and Belgium.	USD 1.6 - 4.4M (GTTF 20% share of USD 8 - 22M total CapEx)	E3 concessional loan + GTTF facility contribution + commercial co - debt	KII - verified enterprise with confirmed EU buyer relationship; Buhler RoastMaster or equivalent EU technology; EUDR traceability included in CapEx.
2 - IMMEDIATE	Track C: Cooperative wet mill modernisation at 4 - 6 priority cooperatives. Solar dryer, precision pulper, digital EUDR traceability system.	USD 0.4 - 1.6M per cooperative (GTTF 20% share; aBi 60%; cooperative equity 20%)	E1/E2 Danida instrument + aBi Development matching grant	KII - verified cooperative with active EU fair trade buyer; women's governance demonstrated; EUDR plot mapping commitment.

Priority	Opportunity	GTTF capital required	Instrument	Key condition for investment
3 - NEAR - TERM	Track A feasibility study and Danida E4 demo plant. Commission independent feasibility study for 5,000 MT/yr freeze - dry soluble plant; followed by E4 - funded demonstration plant proving Uganda Robusta CGA chemistry at commercial scale.	USD 13 - 25M (GTTF contribution; E4 demo DKK 6M + E3 concessional loan for balance)	E4 (feasibility + demo) leading to E3 (full CapEx)	Uganda - based anchor investor/operator identified and KII verified. Off - take agreement (minimum 3 - year) in negotiation with Sucafina Instant or equivalent global trader. Note: Sucafina Instant KII completed (World of Coffee, Brussels, June 2026); its Trading Director confirmed four binding conditions for commercial off - take engagement: (1) consistency across 100+ shipments; (2) credible path to meaningful annual tonnage beyond demonstration volume; (3) EUDR - compliant traceability and certification; (4) proven operating partner on the ground. These four conditions now define the Track A pre - investment checklist.
4 - ENABLING	Coffee pulp waste valorisation. Biogas from 250,000 MT/yr national coffee pulp and parchment waste. CO2 emissions reduction; energy substitution at processing facilities.	USD 500K - 2M per facility (biogas digester + energy system)	E2 instrument; climate finance blending possible	Demonstrated feedstock security; grid connection or off - grid energy business model; Biogas sector partner (Danish or EU - origin) identified.

Priority	Opportunity	GTTF capital required	Instrument	Key condition for investment
5 - ENABLING	EUDR traceability infrastructure for cooperative network. Farm plot geo-located mapping across 50,000+ smallholder coffee farms in GTTF target cooperatives.	USD 1.5 - 3M (programme - level TA budget; not CapEx)	GTTF technical assistance window; EU AAFC / USAID IDEA complementarity	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department coordination; approved EU traceability platform (Satelligence or equivalent); cooperative participation agreement.

Source: A2i investment analysis; Danida Business Instruments guidelines; KII evidence. Priority ratings: Immediate = investment - ready within 12 months given KII completion. Near - term = 18 - 36 months; requires anchor investor identification. Enabling = programme infrastructure; enables other investments.

4.7.5 Stakeholder Consultation Log

Named individuals interviewed in the course of this chapter's fieldwork are identified here, and only here, per A2i editorial convention (Day One Validation, Action Point 11).

Table 4.20 - Stakeholder and KII Consultation Record

Stakeholder	Date / Status	Evidence level	Key intelligence obtained
Kyagalanyi Coffee Ltd	14 July 2026 - COMPLETED	VERIFIED	Track B investment interest confirmed. EUDR traceability development in progress. Balance sheet co - finance capacity confirmed for Track B. Track A requires long - tenor co - debt.
Rubanga Cooperative	Completed (date on file)	VERIFIED	2,400 members (65%+ women); 2,000 MT cherry capacity underutilised; solar dryer + pulper modernisation USD 350K - 600K; EUDR plot mapping needed.
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department	Completed - ongoing engagement	CORROBORATED	Confirmed UCDA dissolution and transition (20 Dec 2024); Coffee Dept operational but in capacity absorption phase; regional offices being confirmed.

Stakeholder	Date / Status	Evidence level	Key intelligence obtained
Uganda Coffee Farmers Alliance (UCFA)	Desktop + consultation	CORROBORATED	Cooperative infrastructure baseline data; processing capacity estimates; member demographics.
Sucafina Instant (Will McNaught, Trading Director)	World of Coffee, Brussels - June 2026 - COMPLETED	VERIFIED	Uganda Robusta biochemistry (28 - 32% soluble solids, 9 - 12% CGA) confirmed as genuinely attractive starting point. Off - take interest confirmed: a well - structured proposition with blended finance de - risking would get taken seriously internally. Four binding conditions for commercial engagement articulated: consistency across 100+ shipments; credible path to meaningful annual tonnage; EUDR - compliant traceability and certification; proven operating partner on the ground. Will McNaught confirmed he would want early notice if a serious Uganda operator emerges. Sucafina Instant leadership has cited Africa Origin as a strategic direction.
Alfred Okwir, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Data Analyst	13 August 2026 - COMPLETED	VERIFIED	Value - added coffee export register 2025 - 2026 confirmed: 14 companies, 904 bags/kgs combined (mixed units). Top exporters: Discovery Trading Limited (217), Jahl Production (U) Ltd (202), Yugo - Vic SMC Ltd (121), Asala Coffee Trading (85). Blended and Robusta products well represented alongside Arabica. Unit ambiguity flagged: do not convert without individual URA declarations. Register is export - side only; does not capture domestic roasting. Treat 904 as a reliable floor for formally declared value - added exports.
USDA GAIN / ICO (secondary)	Documentary review	VERIFIED	Production (MY2024/25: 6.88M bags); price data (ICO Robusta indicator); export projections.
Royal Danish Embassy / RDE	Day One Validation, 10 August 2026	VERIFIED	Confirmed 75% climate marker portfolio requirement; EUDR compliance priority; Danish private sector engagement expectation; scale over spread preference.

Evidence labels: Verified = primary source (KII or official document) confirmed. Corroborated = cross - referenced across two or more independent sources. Provisional = single source, independent confirmation not yet obtained. Pending = engagement scheduled; evidence not yet available.

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Grasp Programme | Green Technology Transfer Fund (Gttf)



Landscape Assessment of Priority Agricultural and Agro-Industrial Value Chains in Uganda

CHAPTER 5: DAIRY VALUE CHAIN ASSESSMENT

Commissioned by	*aBi Development Limited | GRASP Programme (USD 2.87 million / UGX 10.34 billion GTTF)*
Implemented by	Access2Innovation (A2i), Arie Towers, Nakasero, Kampala
Funded by	Government of Denmark and the European Union
Prepared by	Twaib William Zimwe, Dairy Value Chain Consultant
Document status	Final, field-validated chapter.
Currency convention	USD is the primary currency throughout this chapter, with UGX retained in parentheses for farmgate and other local-level prices. Conversion at 1 USD = 3,600 UGX (Netherlands Food Partnership/Wageningen factsheet, Q1 2026 average), applied consistently.

Uganda's dairy sector has undergone a structural transformation over the past decade that positions it as the most commercially dynamic agricultural value chain in the East African Community for green technology investment. Cattle milk production grew at 10.3 percent per year between 2015 and 2023, and per-animal yield more than doubled from 435 to 1,005 kilogrammes, confirming genuine intensification in the western production corridor. Uganda is the only EAC member running a structural dairy trade surplus.1

This growth is occurring against a backdrop of serious quality constraints that prevent Uganda from capturing the full commercial value of its production advantage. Per-capita milk consumption remains low at approximately 60 to 64 litres per year, against Kenya's 110 litres and the WHO-recommended 200 litres per year.2 Field validation across seven cooperative and processor sites between June and July 2026 confirmed the desktop diagnosis and sharpened it:11 bacterial load at the collection stage remains the binding constraint, but where that constraint is best addressed is not uniform across the value chain. Cooperative-level milk collection centres carrying no legacy processing infrastructure are where quality technology investment pencils out; established processors with underutilised conventional pasteurisation capacity and favourable industrial power tariffs do not, by their own account, find the same investment case compelling at their own plants. This distinction, drawn directly from field engagement with Pearl Dairy, Jesa Farm Dairy, Brookside Uganda, and four cooperative collection centres, is the central analytical refinement of this chapter.

European and Danish technologies address each structural constraint directly: solar-powered chilling for collection centres, UV-C cold treatment that reduces bacterial load before enzyme secretion, energy-efficient pasteurisation that extends shelf life, and biogas recovery from dairy effluent that turns a waste management liability into an energy asset. All are EU or Danish in origin, consistent with the GTTF mandate. This chapter maps the sector evidence that supports technology investment, the enterprises positioned to adopt it, the investment structures that can achieve the required 5:1 commercial leverage ratio, and closes with an explicit ranked recommendation of where GTTF capital should go, to which enterprises, and why.

PILLAR 1 Historical Baseline and Strategic Alignment Decade review 2015-2025 | *NDP IV alignment* | *EAC regional position* | *Sector outlook 2030*

5.1.1 Uganda's Dairy Sector: A Decade of Growth

Cattle milk production rose from 1.62 million tonnes in 2015 to 3.85 million tonnes in 2023, at a compound annual growth rate of 10.3 percent. The western corridor - Mbarara, Kiruhura, Ibanda, and Bushenyi - underpinned this growth, driven by increasing commercialisation of dairy cattle systems and the expansion of collection centre infrastructure from 312 registered centres in 2015 to 729 as of 2025.1 Uganda's cattle herd reached an estimated 16.7 million head by 2023; UBOS's National Livestock Census - Uganda's own primary household-level census, and the most authoritative single source available for the year it covers - independently confirms this herd figure almost exactly for 2021, and its production data is given precedence over FAOSTAT where the two diverge, as set out below.3

Table 5.1 Uganda cattle milk production trends, 2015-2023

Year	Production (M tonnes)	Yield (kg/animal/yr)	Cattle herd (M head)	Registered MCCs
2015	1.62	435	11.4	312
2017	1.66	449	12.1	380
2019	2.78	723	13.2	448
2021	2.89	764	14.5	501
2023	3.85	1,005	16.7	729
10-yr CAGR	+10.3%	+121%	+46.5%	+75.3%

Sources: FAOSTAT QCL, raw milk of cattle, Uganda, 2015-2023. DDP Annual Report FY2024/25. DDP MCC registration data (729 MCCs, 3.01M litres/day aggregate installed capacity, independently confirmed) confirms this series.

Note on the 2025/26 emerging estimate: a July 2026 factsheet prepared by Wageningen Livestock Research for the Netherlands Food Partnership cites 5.4 million tonnes for 2024/25 production.20 The factsheet's own authors flag this as an unreconciled figure - "5.4 M tons suggested in emerging reports but 3.8 M tons being used in formal sector analyses." This chapter retains the FAOSTAT/DDP-anchored series as the primary baseline and treats 5.4M tonnes as an emerging, not yet validated, estimate pending UBOS/DDP reconciliation.

UBOS's National Livestock Census (NLC) 2021 is Uganda's most authoritative primary source for that census year, built from household-level milking-cow and weekly-yield data rather than a modelled estimate, and its figures are given precedence here wherever the two sources diverge. On cattle herd size, the two sources agree almost exactly - NLC's 14,477,832 head for 2021 independently confirms this chapter's 14.5 million figure for the same year. On production, they do not: NLC recorded 3,729,715,903 litres (approximately 3.73 to 3.84 million tonnes, depending on the density conversion applied) for 2021 alone - a figure closer to this table's 2023 total than its own 2021 total, and roughly 30 percent above the FAOSTAT/DDP 2021 estimate this chapter's series currently uses. This is the more authoritative figure for 2021 specifically, and should supersede the FAOSTAT/DDP 2021 data point once formally reconciled with DDP. FAOSTAT/DDP is retained as the primary series for the surrounding years (2015-2020, 2022-2023) because UBOS has not published NLC estimates for those years - a single-year census cannot be extended into a comparable multi-year series without applying UBOS's own survey methodology consistently across years, which sits outside the scope of this chapter to reconstruct from raw microdata. This chapter recommends that Table 5.1's 2021 figure be formally updated to the NLC value once DDP confirms the reconciliation.

5.1.2 EAC Regional Production Comparison

Table 5.2 Recent dairy production trend comparison, EAC

Country	Earlier production	Recent production	Growth	Reference years
Uganda	1.62M tonnes	3.85M tonnes	+137.7%	2015-2023, FAOSTAT
Kenya	4.15M tonnes	4.71M tonnes	+13.5%	2015-2025, FAOSTAT
Tanzania	2.38M tonnes	3.52M tonnes	+47.9%	2015-2025, FAOSTAT

Country	Earlier production	Recent production	Growth	Reference years
Rwanda	0.89M tonnes	1.06M tonnes	+19.1%	2020-2023, MIN-AGRI/RAB

Sources: FAOSTAT QCL, 2015-2025 series, for Uganda, Kenya, and Tanzania. Rwanda uses Rwanda Agriculture and Animal Resources Development Board (RAB) / MINAGRI national reporting for 2020 and 2023, the most recent verified figures available; an earlier secondary estimate of 0.10-0.18M tonnes for Rwanda understates production materially against RAB/MINAGRI's own reporting and is not used here.

Rwanda's reference years differ from the other three countries because its most recent authoritative production figures are reported by RAB/MINAGRI for 2020 and 2023 rather than a matched 2015/2025 pair; presenting a forced 2015-2025 comparison would imply a false precision this chapter cannot verify. The corrected Rwanda figure changes its absolute scale substantially but does not change its relative ranking - Rwanda remains the smallest producer of the four at roughly a third of Tanzania's volume.

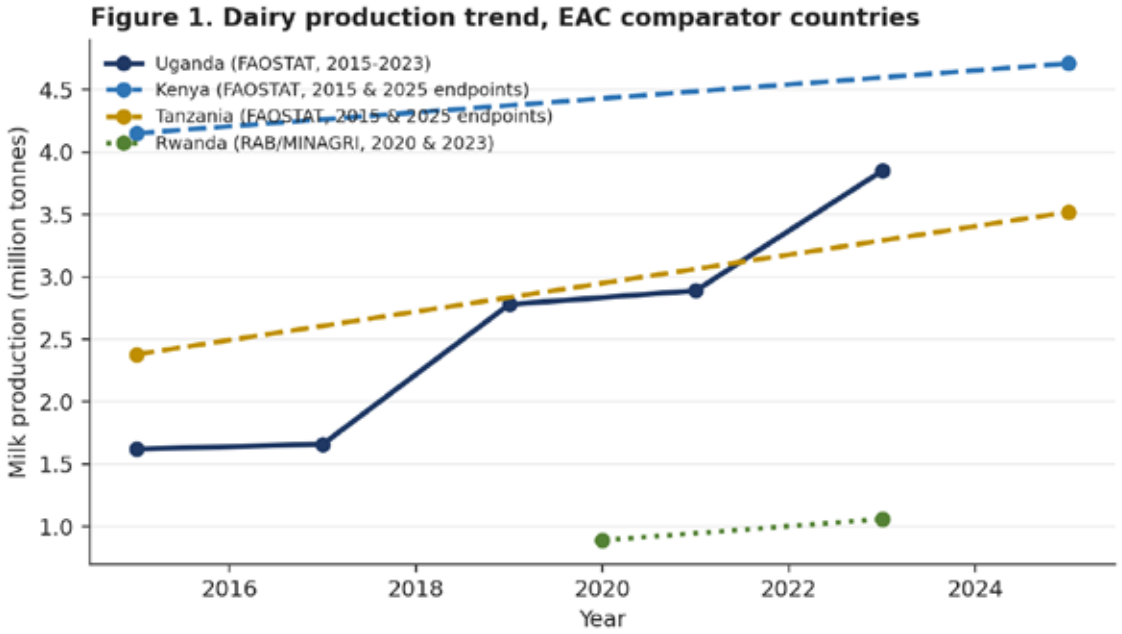


Figure 1. Recent dairy production trend, EAC. Uganda's trajectory reflects the full FAOSTAT/DDP series (Table 5.1); Kenya and Tanzania reflect FAOSTAT 2015 and 2025 endpoints; Rwanda reflects RAB/MINAGRI 2020 and 2023 data, the most recent verified figures available (Table 5.2).

5.1.3 Uganda Export Performance

Uganda recorded a net dairy trade surplus of approximately USD 188.6 million in 2023 on FAOSTAT trade data (HS 0401-0406), against Kenya's structural deficit of USD 157.9 million.4 This is a trade **balance** figure - exports net of imports - measuring a different quantity from the gross export value figure below, and the two should be read alongside rather than against each other.

Table 5.3 Uganda dairy gross export value

Metric	Value	Basis
Gross export value, current (FY2025/26)	USD 102.0 million	DDP official series, FY2019/20-FY2025/26; a FY2022/23 peak of USD 264.5 million (54.2% milk powder) has since declined to the current figure.5

Sources: *DDP official export series, FY2019/20-FY2025/26. FAOSTAT's 2023 net trade balance (+USD 188.6 million, a different metric, retained separately in Table 5.5) and a 2026 Wageningen/NFP factsheet (USD 282 million, 2023/24, citing DDA and IFCN sources) corroborate the same order of magnitude but are not used as the primary figure. DDP has confirmed Algeria has finalised negotiations to purchase 1.4 billion litres of milk annually from Uganda; at current national production of 4.2 to 5.4 billion litres, this is 26 to 33 percent of total output committed to a single buyer, and fulfilment risk should be modelled conservatively even though the deal itself is confirmed.*

URA is preferred as the cited authority for Uganda's dairy trade data, per A2i's cross-cutting data-governance guidance, since it records actual transactions crossing the border rather than modelled or survey-based estimates. The table below aggregates URA's own dairy trade series (HS Chapter 04: milk, cream, butter, cheese, yoghurt and whey, plus dairy processing machinery under HS 8434) at national level for 2015-2025.

Table 5.4 Uganda dairy trade, URA customs data (2015-2025)

Year	Exports (USD M; UGX bn)	Imports (USD M; UGX bn)	Net balance (USD M; UGX bn)	Reliability
2015	47.8 (172.1)	6.0 (21.5)	41.9 (150.7)	Reliable
2016	51.1 (183.8)	2.8 (9.9)	48.3 (173.8)	Reliable
2017	69.8 (251.2)	4.9 (17.8)	64.8 (233.4)	Reliable
2018	75.2 (270.8)	6.5 (23.4)	68.7 (247.4)	Reliable
2019	72.1 (259.7)	4.2 (15.2)	67.9 (244.5)	Reliable
2020	79.8 (287.2)	8.2 (29.5)	71.6 (257.8)	Reliable
2021	Not usable	7.4 (26.5)	Not usable	Export value understated ~1,000x in source data (URA-documented issue)
2022	Flagged	7.2 (25.9)	Flagged	Export figure likely overstated - see note below
2023	Flagged	8.1 (29.2)	Flagged	Export figure likely overstated - see note below
2024	90.8 (327.0)	9.1 (32.9)	81.7 (294.1)	Reliable
2025	95.8 (345.0)	No data	Not comparable	Imports not yet supplied by URA for 2025

Sources: Uganda Revenue Authority (URA) customs transaction data, 2015-2025; A2i data compilation. Values converted at 1 USD = 3,600 UGX for consistency with this chapter's currency convention.

The 2021 export figures are excluded from use: URA's own data-quality documentation confirms export values for that year are recorded on a different scale to every other year (median transaction value roughly UGX 23,000 versus UGX 55-65 million in adjacent years), understating exports by approximately three orders of magnitude. This is a documented source-side data issue, not a finding specific to this chapter.

The 2022 and 2023 export figures are flagged rather than adopted. Both years' totals are driven *almost entirely by a single UHT milk export line from one named processor, recorded at a cumulative value of roughly USD 1.46 billion. Checked against that processor's own KII-confirmed production throughput, even a generous assumption of 100 percent export allocation caps plausible annual export value at approximately USD 55 million - meaning the recorded figure is roughly 27 times higher than what the enterprise's confirmed capacity could physically produce. This has the same signature as a data-entry or unit error already identified and excluded elsewhere in the same URA dataset (a single import record valued at roughly 1,000 times any comparable transaction). This chapter does not name the enterprise in connection with this specific figure, since the number itself is very likely incorrect and repeating it alongside the company's name risks misrepresenting a real, KII-verified business. This should be raised with URA and the data's originating source for correction before 2022-2023 dairy export totals are used in any external-facing document.*

Kenya is Uganda's overwhelmingly dominant dairy export destination in the URA data, accounting for roughly ten times the value of the next-largest destination across the full period. Algeria appears as a confirmed but comparatively modest destination to date - consistent with, and a useful independent cross-check on, this chapter's existing finding that Algeria trade is real and growing but not yet at the scale the confirmed 1.4 billion litre/year offtake agreement (5.1.3) will eventually require.

Table 5.5 Uganda dairy export growth, 2015-2023 (FAOSTAT net trade balance series)

Year	Export volume (MT)	Export value (USD M)	Net trade balance (USD M)	Primary destinations
2015	~52,000	~47.7	+47.7	Kenya, South Sudan, Rwanda
2018	~78,000	~137.1	+137.1	Kenya, DRC, South Sudan
2020	~85,000	~145.0	+145.0	Kenya (partial embargo), DRC
2023	~105,000	~188.6	+188.6	Kenya (65%), DRC (18%), S. Sudan (10%), Algeria (Benni Foods, Brookside Uganda active)

Sources: FAOSTAT Trade (TCL), HS 0401-0406, Uganda, 2015-2023.

5.1.4 NDP IV and Strategic Alignment

Uganda's Fourth National Development Plan (NDP IV, 2025/26-2029/30) places dairy value addition as a priority investment area under Programme 1 (Agro-industrialisation). The dairy sector contributes 72 percent of livestock GDP and 84 percent of livestock export earnings; DDP's official series records this as approximately USD 264.5 million in the FY2022/23 peak year, since fallen to USD 102.0 million in FY2025/26 (5.1.3, Table 5.3).

The Uganda Climate Smart Agricultural Transformation Project (UCSATP) - USD 311.9 million (UGX 1,122.7 billion), currently under implementation - addresses farm-level productivity and climate resilience. Technology transfer at the processing and collection stage remains a distinct focus area, structurally separate from UCSATP's farm-level scope.

The Resilient Livestock Value Chain Project (ReLIV), IFAD project ID 2000003953, is confirmed active.6 IFAD approved ReLIV on 18 September 2024, with a total project cost of USD 181.33 million (IFAD financing USD 99.56 million, plus Green Climate Fund and Global Environment Facility co-financing), running 2024 to 2032 and targeting 200,000 smallholder dairy and beef households across intensive, semi-intensive, and agropastoral systems in the same Southwest cattle-corridor geography this chapter examines. Coordination with IFAD's

Uganda country programme on ReLIV's specific dairy value-chain activities and technology scope is the top non-replication consideration identified in this chapter (see 5.9 for the associated investment recommendation).

The government has also directly invested in collection centre infrastructure: 145 MCCs have been brought online through a government-supported renovation programme, adding 1.4 million litres of installed processing capacity. The combined effect of the 145 renovated MCCs and Benni Foods' new large-scale installation has driven the formal channel share from approximately 30 percent in 2023 to 40 percent as of 2025.

GoU dairy sector expenditure is confirmed at USD 5.04 million (UGX 18.157 billion) for FY2024/25, rising to USD 5.95 million (UGX 21.414 billion) in FY2025/26. The Dairy Development and Promotion Programme (DPAP) 2022-2027 mandates an increase in formal milk processing to 80 percent by 2027 and a national quality-based payment system - both achievable only through technology investment at the collection centre level.7

5.1.5 EU-Uganda and Denmark-Uganda Policy Alignment

Uganda's dairy technology gap sits inside two active, higher-level government-to-government policy frameworks, both of which predate and will outlast any single programme operating within them.

The EU's Multiannual Indicative Programme (MIP) for Uganda, worth EUR 375 million for 2021-2024, is organised around three priority areas, of which Priority Area 2, "Promoting Sustainable and Inclusive Growth and Jobs," explicitly targets the productive sectors, sustainable energy, and employment - directly overlapping the dairy technology investment territory this chapter examines.8 Under the EU's Global Gateway strategy for Uganda, the EU and Denmark have already co-financed comparable blended-finance agribusiness instruments: a EUR 12 million joint EU-Denmark investment in the Agricultural Business Initiative (ABI), reaching 200,000 Ugandan farmers through matching grants and business development services, and an EUR 11.5 million START Facility supporting Ugandan agribusinesses through concessional loans, technical assistance grants, and credit guarantees. Both use a matching-grant-plus-BDS architecture already jointly endorsed and proven in Uganda's agricultural sector.8

On the Danish side, the Uganda Bilateral Development Programme (UBDP) 2023-2028 sets out Denmark's overall vision for its Uganda engagement as supporting "a green, sustainable and inclusive economic transformation," continuing a partnership Denmark and Uganda have maintained for three decades. The Country Strategic Framework underpinning it states explicitly that Denmark will prioritise "expanding Danish commercial cooperation with Uganda, especially promotion of green solutions," drawing on "Denmark's experiences in green technologies for example within water, agro-processing and climate smart productions" - a near-direct description of the technology categories this chapter's dairy assessment covers.9 Danida's development cooperation strategy separately names green growth, built on sustainable natural resource management and sustainable food production, as one of its four core strategic priorities globally, not a Uganda-specific exception.

Read together, dairy technology investment in this sector is a value-chain-specific application of policy commitments both governments have already made jointly and bilaterally, rather than a request for institutional buy-in to a new direction. The investment-structuring implications of this alignment are set out in 5.6 and 5.9.

5.1.6 Sector Outlook 2030 and 2035

Table 5.6 Uganda dairy sector outlook, 2025-2035

Indicator	2025 Baseline	2030 Projection	2035 Projection
Cattle milk production (M tonnes)	4.23	5.5-6.6	7.6-9.7
Formal processing rate	40%	45-55%	60-70%
Registered collection centres	~570	800-1,000	1,200-1,500
Solar-powered MCCs (% of total)	<5%	25-35%	50-60%
Dairy export earnings (USD M)	~264	320-380	480-650
Direct jobs in formal dairy processing	~35,000	55,000-70,000	80,000-110,000

Sources: 8% base-case CAGR from FAOSTAT 2023 baseline. Formal processing rate assumes combined effect of solar MCC upgrade, quality-based payment rollout, and sector technology investment. Not endorsed by DDP, MAAIF, or NPA.

PILLAR 2 Market Dynamics and Supply Chain Architecture *Supply chain analysis* | *Bacterial contamination cascade* | *Value addition ladder* | *Field-validated price ladder*

5.2.1 The Dairy Supply Chain: Six Stages, Six Bottlenecks

Uganda's dairy supply chain maps across six functional stages, each with distinct actors, margin structures, and technology gaps. The formal processing sector is led by Pearl Dairy (brand: Lato Milk, 31% market share), Brookside Uganda (23%), Jesa Farm Dairy (brand: JESA, 16%), and Amos Dairies (13%). The entry of Benni Foods Limited in Lyantonde with 1 million litres per day installed capacity represents the most significant expansion of the formal processing sector in recent years; Benni Foods and Brookside Uganda are confirmed active exporters to Algeria.

Supply intermittency has three compounding causes rather than one: genetics (Uganda's 16 million-head cattle herd remains dominated by low-yield local breeds averaging roughly 3 litres/animal/day), dry-season feed and pasture scarcity across the cattle corridor, and the resulting 40-50 percent dry-season processing capacity utilisation this produces downstream. Breed improvement (Jersey-cross genetics for feed-conversion efficiency) and commercial dry-season feed/pasture production follow directly from this but sit upstream of GTTF's collection/processing/waste-to-energy mandate and are documented here for investment-appraisal completeness rather than proposed as direct GTTF capital lines.

Table 5.7 Uganda dairy supply chain stage analysis

Stage	Key actors	Primary bottleneck	Technology solution	GTTF Entry Point
Farm	1.7-1.8M smallholder HH; 80%+ of national output	Mastitis; poor milking hygiene; no quality incentive	SCC meter at MCC intake creates economic incentive	Stage A quality gate
Collection centre (MCC)	729 active MCCs; cooperative committees	No chilling; bacterial count rises ~600-fold; diesel cost	LP system; SCC meter; solar chilling; UV-C; quality-based payment	Stage A + B

Stage	Key actors	Primary bottleneck	Technology solution	GTTF Entry Point
Bulking and transport	Road tanker operators; cooperative fleets	Temperature rise during 2-8 hr transit; no CIP facility in the cattle corridor (confirmed by Brookside field KII)	Insulated tanker; solar-compatible refrigeration; tanker CIP investment	Stage C
Primary processing	145 licensed processors; 4 firms hold 83% share	Energy-intensive HTST; bacterial enzyme burden; effluent liability. Field KIIs confirm established processors see limited business case for UV-C at their own plants (see 5.4.4)	Energy-efficient pasteurisation; anaerobic digestion biogas	Stage D + E
Export markets	Kenya (dominant); DRC; S. Sudan; Algeria (Benni Foods, Brookside)	Taste defects; AFM1 compliance for EU/Algeria	UV-C AFM1 reduction; ESL shelf life	Export readiness: B + D

Sources: *DDP FY2024/25; ILRI (2023); Miyama et al. (2023); FAO MAFAP (2022); A2i field research June-July 2026.*

5.2.2 Field-Validated Price Ladder (June-July 2026)

Field engagement across seven sites produced a substantially more granular price picture than the desktop baseline. The table below reproduces the confirmed chain-level price ladder recorded directly at the Jesa Farm Dairy field visit (8 July 2026) and cross-validated against the Brookside Uganda KII (20 July 2026) and the Nakaseke cluster cooperative visits (9 July 2026).

Table 5.8 Confirmed price ladder: farm gate to retail

Chain node	Price (USD/L; UGX-/L in parentheses)	Volume indicator	Source / notes
Farm gate (wet season)	0.17-0.25 (UGX 600-900)	Seasonal, variable	Nakaseke cluster cooperative MCCs; wet season USD 0.22-0.25 (UGX 800-900)/L confirmed at Migani, Kijjumba, Kalyabulo
Farm gate (dry season)	0.33-0.47 (UGX 1,200-1,700)	Seasonal, variable	Nakaseke dry season USD 0.33-0.44 (UGX 1,200-1,600)/L; Brookside dry season confirmed USD 0.47 (UGX 1,700)/L directly - the historic high, and the first time raw milk has retailed at that level, per Brookside's own account
Jesa purchase margin to cooperatives	+0.06 above farmer-gate price (UGX 200)	Not a quality premium	Not disclosed by Jesa directly; independently confirmed by all three Nakaseke cluster cooperatives (Migani, Kijjumba, Kalyabulo)
Processor intake (Jesa)	Not disclosed	240,000-280,000 L/day total	Plant Manager referred this to head office; outstanding data gap, not estimated

Chain node	Price (USD/L; UGX-/L in parentheses)	Volume indicator	Source / notes
JESA UHT milk, retail 0.5L	~1.22/L equivalent (~USD 0.61 per 0.5L; UGX 2,200 per 0.5L)	20,000 L/day equivalent (Brookside)	Confirmed at Jesa premises; cross-validated - Brookside Uganda confirmed an identical retail price for the same SKU
JESA fresh pasteurised, retail 0.5L	~1.22/L equivalent (~USD 0.61 per 0.5L; UGX 2,200 per 0.5L)	Largest volume product	Confirmed at Jesa premises; at parity with UHT. JESA Fresh Milk is the enterprise's flagship product and Uganda's number one fresh pasteurised brand
JESA butter, retail 250g	~7.78/L equivalent (~USD 1.94 per 250g; UGX 7,000 per 250g)	5,000 L fat-equivalent/day (Brookside)	Confirmed at Jesa premises; cross-validated - Brookside Uganda confirmed an identical retail price for the same SKU
JESA yoghurt, retail	Not disclosed	30,000 L/day equivalent (Brookside)	Not disclosed by Jesa; Brookside confirms yoghurt as its own largest single product category by volume
Dwaniro Cooperative farmgate	As low as 0.17 (wet, UGX 600); 0.39 (dry, UGX 1,400, from 14 July 2026)	~40,000 L/day wet season	Self-reported by cooperative management, 15 July 2026
Lato Milk (Pearl Dairy) UHT, retail 0.5L	~0.97/L equivalent (~USD 0.49 per 0.5L; UGX 1,750 per 0.5L)	Online retail, bulk 12-pack	Jumia Uganda, accessed August 2026 (Lato Milk Pack of 12 Sachets Fino, 500ml, UGX 21,000/pack). Not KII-confirmed; see note below on bulk-pack vs single-unit pricing.
Brookside branded UHT, retail 0.5L	~0.94/L equivalent (~USD 0.47 per 0.5L; UGX 1,700 per 0.5L)	Online retail, bulk 12-pack	Jumia Uganda, accessed August 2026 (Brookside Dairy Bestmilk Carton, 12x500ml, UGX 20,400/pack, reduced from UGX 22,700). Not KII-confirmed; see note below.

Sources: *A2i field visit reports and KIIs, June-July 2026: Jesa Farm Dairy (8 July, confirmed price ladder), Brookside Uganda (20 July, cross-validation), Migani/Kijjumba/Kalyabulo (9 July), Dwaniro (15 July). Values converted to USD at 1 USD = 3,600 UGX (NFP/Wageningen factsheet, Q1 2026 average) throughout this chapter; UGX retained in parentheses for farmgate and other local-level prices.*

Lato Milk and Brookside's own branded prices above are sourced from current online retail listings (Jumia Uganda), not from KII confirmation at source, and should be read at a different confidence level from the rest of this table. A useful internal check: JESA's own product is also listed on the same platform at a comparable bulk-pack price (UGX 1,625 per 0.5L equivalent, 12-pack), roughly 26 percent below JESA's KII-confirmed single-unit retail price of UGX 2,200 used elsewhere in this table. This gap is consistent across all three brands and reflects bulk-carton wholesale pricing rather than single-unit shop retail price, not a real difference in market positioning between the brands. Lato Milk and Brookside's true single-unit retail prices are therefore likely modestly higher than the online bulk-pack figures shown - plausibly close to JESA's own confirmed UGX 2,200 price point, consistent with this table's existing finding that JESA and Brookside converge on the same price for comparable SKUs. This should be confirmed directly with Pearl Dairy and Brookside management in a dedicated follow-up rather than treated as final.

The retail cross-validation between Jesa and Brookside on UHT and butter - both confirming the same price points for comparable SKUs - establishes these as market-level benchmarks rather than enterprise-specific pricing, indicating a competitive equilibrium at retail. Lato Milk (Pearl Dairy) and Brookside's own branded retail pricing are added below from current online retail listings, since neither enterprise's KII or field visit report captured product-level pricing directly.

Jesa's intake price from cooperatives remains undisclosed - management referred this to head office during the field visit and it stands as an outstanding data gap. It should not be estimated or imputed in this or future versions.

5.2.3 District-Level Price Cross-Validation (UBOS National Livestock Census 2021)

UBOS's National Livestock Census 2021 independently records average and median farmgate milk prices at district level, derived from household-level survey data rather than cooperative or enterprise reporting. Six districts in the census correspond directly to this chapter's field-validated sites, providing an independent, government-sourced check on the KII-confirmed price ladder above.

Table 5.9 District-level farmgate price cross-validation

District (field site)	UBOS mean price	UBOS median price	Cross-check against this chapter's field data
Wakiso (Jesa Farm Dairy)	USD 0.24 (UGX 862)	USD 0.22 (UGX 800)	Highest of the six districts - consistent with proximity to the Kampala market pushing farmgate prices up
Kiboga (Dwaniro Cooperative)	USD 0.19 (UGX 698)	USD 0.17 (UGX 600)	Within this chapter's confirmed wet-to-dry season range
Sembabule (Nabitanga Cooperative)	USD 0.16 (UGX 593)	USD 0.14 (UGX 500)	Below cooperative-gate prices confirmed by KII, as expected - UBOS captures all farmer sales including informal channels, not only cooperative intake
Mbarara (Pearl Dairy, Amos Dairies)	USD 0.21 (UGX 752)	USD 0.19 (UGX 700)	Consistent with this chapter's wet-season farmgate range
Lyantonde (Benni Foods, Amos Dairies)	USD 0.17 (UGX 609)	USD 0.14 (UGX 500)	Consistent with this chapter's wet-season farmgate range
Nakaseke (Migani, Kalyabulo, Kijjumba)	USD 0.15 (UGX 535)	USD 0.11 (UGX 400)	Lowest of the six districts - consistent with field findings that Nakaseke cluster farmers absorb Jesa's UGX 200/L purchase margin before reaching cooperative gate price

Sources: *Uganda Bureau of Statistics, National Livestock Census 2021, Tables 3.4.1-3.4.2 (dairy production by sub-region and district).*

UBOS district averages are lower than this chapter's cooperative-gate KII prices in every case except Wakiso, which is expected rather than contradictory: the census captures all household-level milk sales in a district, including informal and roadside sales that trade below the cooperative-gate price, while this chapter's field KIIs specifically recorded prices at the cooperative or MCC intake point. The direction and scale of the gap - Nakaseke showing the widest spread, Wakiso showing none - is itself consistent with, and adds independent weight to, this chapter's findings on where farmers receive the least value for their milk.

The same census also confirms the Western corridor's structural weight in national production: the Western

region alone accounts for 1.64 billion litres of national annual milk production - 44 percent of the national total - with the Ankole sub-region contributing 1.20 billion litres on its own, close to a third of national output from one sub-region.

5.2.4 Value Formation Along the Chain: Price Multiples and Technology Relevance

Table 5.8 establishes the confirmed price points; this table restates them as value multiples relative to wet-season farm gate, to show where value is actually captured along the chain and which nodes carry the strongest technology-investment case. Figures use an indicative exchange rate of 1 USD = 3,600 UGX (per the Netherlands Food Partnership factsheet's own Q1 2026 average), applied consistently throughout this chapter with USD as the primary figure and UGX retained in parentheses for local-level prices.

Table 5.10 Value chain price formation and technology relevance

Chain node	Price (USD/L or L-equivalent; UGX in parentheses)	Value multiple vs farm gate	Primary driver of value increase	Technology relevance
Farm gate, wet season	0.17-0.25 (UGX 600-900, baseline)	1.0x	N/A - reference point	Not a direct technology node; upstream productivity (feed, water) sits outside the processing/MCC technology scope per Pearl Dairy's own KII
Ex-MCC, chilled and certified	0.24-0.30 (UGX 864-1,080)	~1.3x	Chilling and quality certification at intake	High - this is Stage A+B, the core of this chapter's investment thesis (Nabitanga, Southwest bundle)
Processor ex-gate, pasteurised	0.40-0.48 (UGX 1,440-1,728)	~2.1x	Pasteurisation and packaging	Moderate - Stage D relevant for Tier 1 processors, though field evidence (Jesa) shows this node's UV-C appetite is narrower than desktop assumptions suggested
Export parity at Kampala, to Kenya	0.49 (UGX 1,764)	~2.4x	Export certification and quality compliance	High - UV-C's AFM1 reduction and shelf-life benefit compound directly into export-readiness at this node
JESA UHT / fresh pasteurised, retail	~1.22/L equivalent (UGX 4,400; USD 0.61 per 0.5L pack, UGX 2,200)	~5.9x	Shelf-life extension, brand distribution, retail packaging	Moderate - indirect benefit from Stage A+B upstream quality improvement rather than a direct plant-level technology target
JESA butter, retail	~7.78/L equivalent (UGX 28,000)	~37x	Fat concentration, premium product positioning	Low-direct, high-indirect - the highest commercial margin in the chain, but a product-mix decision downstream of processing rather than a direct technology lever itself

Sources: *A2i field visit reports and KIIs, June-July 2026 (Table 5.8); FAO GIEWS FPMA tool (2024) and DDP market monitoring (Table 5.11); exchange rate per NFP/Wageningen factsheet (2026).*

This is a price and value-multiple analysis, not a return-on-investment calculation - the underlying cost struc-

ture at each node (energy, labour, packaging, financing cost) has not been disaggregated in this study and a stated ROI percentage would not be defensible from the evidence gathered. The value multiple shows where price is captured along the chain; it should not be read as profit margin, which depends on the cost structure at each node.

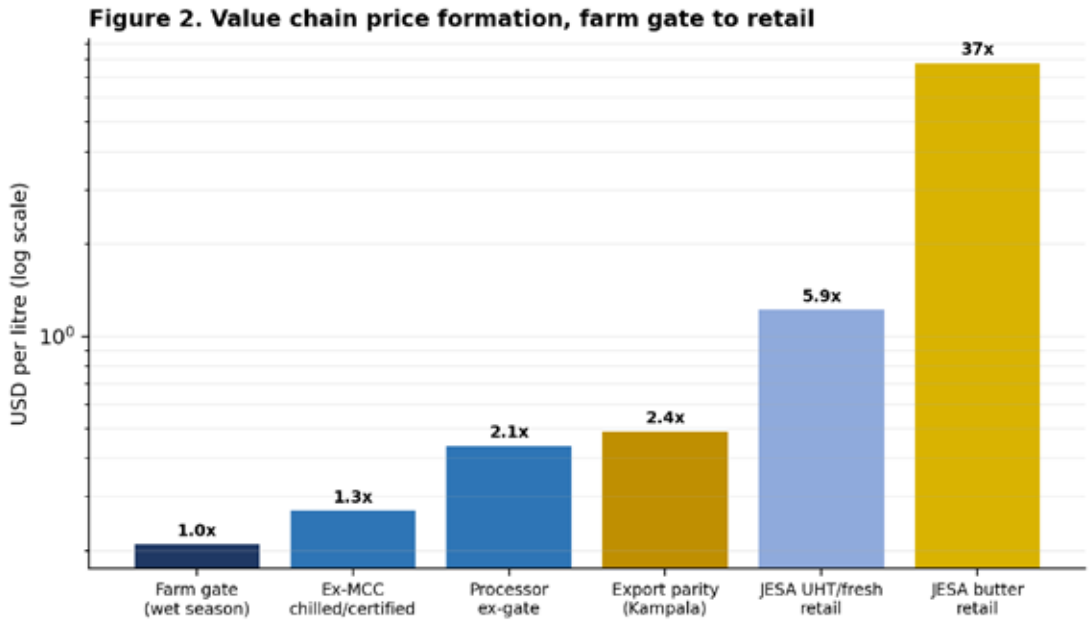


Figure 2. Value chain price formation, farm gate to retail (Table 5.9). Log scale; note the outsized value multiple at butter reflects fat concentration and premium positioning rather than a proportional technology lever.

5.2.5 The Bacterial Contamination Problem

The Dairy Development and Production department (DDP), MAAIF, has confirmed through regulatory enforcement data that Uganda raw milk quality failures present in a consistent priority order: bacterial load is the primary issue, antibiotic residues are the second-ranked concern, and adulteration is third.10 Field engagement added a fourth, emerging concern not previously documented at scale: Brookside Uganda's quality team reported chlorine adulteration, subsequently confirmed in a direct follow-up call - farmers adding chlorine as an informal preservative, which passes standard organoleptic and lactometer tests but causes steriliser coagulation downstream. Brookside has already added chloride testing to its intake platform in response. This should be tracked as an emerging fourth quality risk alongside DDP's three-part hierarchy, though it does not currently displace DDP's own priority ordering.

At farm level, the mean bacterial count is approximately 5,000 cells per millilitre. By the time milk reaches the collection centre, that count has risen more than 600-fold to over 3 million cells per millilitre - breaching the EAC regulatory standard of 200,000 cells per millilitre by a factor of 15 to 30.6 Brookside's own intake data corroborates this independently: total plate count at intake measured 1 to 2.5 million cells per millilitre, 5 to 12.5 times the EAC standard, across its four bulking centres.

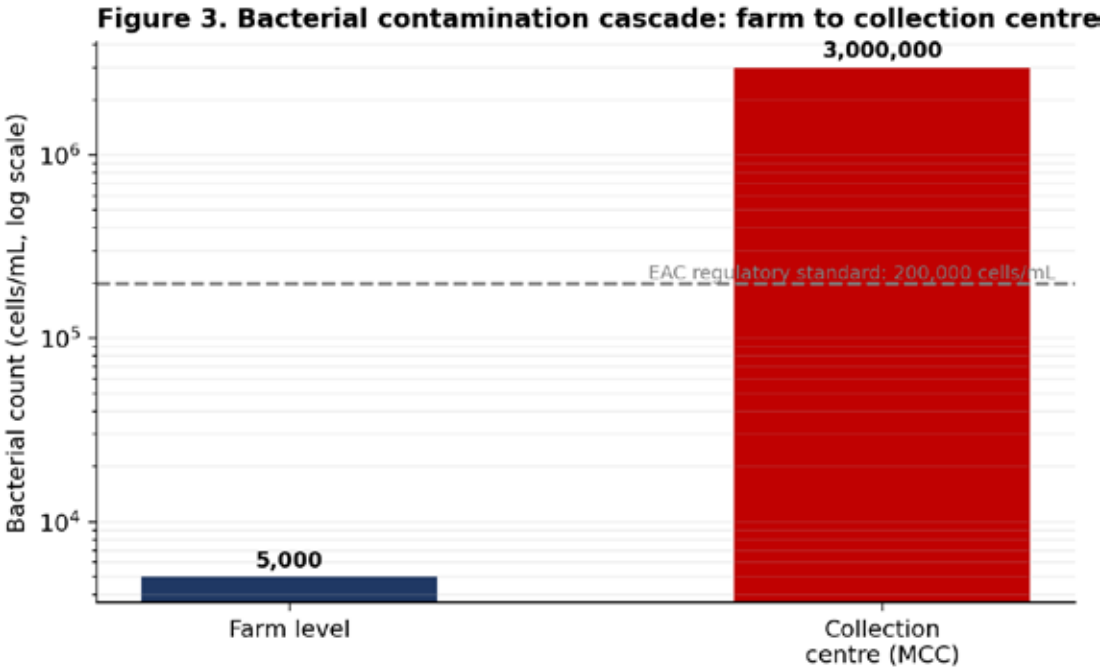


Figure 3. Bacterial contamination cascade: farm to collection centre. Log scale. Published research (Miyama et al. 2023) and Brookside's independently field-collected intake data both fall well above the EAC and EU regulatory ceilings.

5.2.6 Import and Export Parity Analysis

Export parity price is the price a Ugandan processor receives in regional export markets - the destination wholesale price minus transport, handling, and certification costs.11 For Uganda pasteurised milk in 2023, the Nairobi wholesale price of approximately USD 0.55 per litre minus transport and handling costs gives an export parity price of approximately USD 0.49 per litre at Kampala, above Uganda's average processor ex-gate price.

Table 5.11 EAC dairy comparative price matrix, 2023-2025

Price point	Uganda (USD/L)	Kenya (USD/L)	Tanzania (USD/L)	Rwanda (USD/L)
Farmgate raw milk	0.16-0.24	0.32-0.38	0.20-0.26	0.28-0.34
Ex-MCC chilled certified	0.24-0.30	0.40-0.48	0.26-0.32	0.34-0.42
Processor ex-gate pasteurised	0.40-0.48	0.52-0.62	0.44-0.52	0.48-0.58

Sources: *FAO GIEWS FPMA tool (2024); DDP market price monitoring; A2i field price estimates.*

PILLAR 3 Ecosystem Mapping and Gap Analysis *Donor landscape | Structural bottlenecks | White space for technology investment*

5.3.1 Donor Programme Landscape

The Uganda dairy sector has attracted substantial donor investment focused primarily on cooperative development and farmer extension, but has largely stopped short of supporting commercial-scale technology adoption at the collection centre or processing level.12

Table 5.12 Active and historical donor programme matrix, Uganda dairy sector

Programme	Donor	Scale	Complementarity and gap
SNV TIDE / ISDAP (closed 2023)	Netherlands	~EUR 12M	Foundation layer; cooperative and MCC infrastructure predates and complements later technology upgrades. No hardware investment gap.
SNV INCLUDE (2024-2029)	Netherlands	USD 17.2M	Confirmed NOT active in Kiruhura, Ibanda, Mbarara, Ntungamo. Non-replication confirmed by SNV INCLUDE management.
Heifer International SSID/ADAP	Private donors	7 solar MCCs	Preferred first deployment sites for UV-C - technology layering, not duplication.13 Active coordination with Heifer Uganda. Nabitanga, the strongest field-validated UV-C candidate in this chapter (5.4.2), is a Heifer-supported site.
Resilient Livestock Value Chain Project (ReLIV)	IFAD / GCF / GEF / GoU	USD 181.33M total (IFAD USD 99.56M)	Confirmed active since 18 September 2024, running to 2032, targeting 200,000 dairy and beef households in the same Southwest cattle-corridor geography this chapter examines. Active coordination with IFAD Uganda is the top non-replication consideration identified in this chapter (see 5.9).
World Bank UCSATP	World Bank/GoU	USD 311.9M (UGX 1,122.7B)	Farm-level climate resilience across 69 districts. Does not address processing technology or cold chain. No replication risk.
aBi Development Dairy Strategy 2017-2022 (completed)	aBi/Denmark/EU	USD 5.0M+ (UGX 18B+)	Established cooperative infrastructure; concluded, no capital grants remain active under this strategy.
aBi Green Dairy Investment Program (active)	aBi Development, with Heifer International Uganda	Cluster-based; partners include Pearl Dairy Farms, Jesa Farm Dairy, and Maddo Dairies Limited	Direct overlap with two of this chapter's own Tier 1 anchors (Pearl Dairy, Jesa Farm Dairy); active coordination with aBi's own programme team is a non-replication priority alongside the ReLIV/ IFAD coordination already identified above.

Sources: SNV TIDE Close-Out Magazine 2023; SNV INCLUDE Annual Report 2024; Heifer International SSID Lessons Learnt Report October 2024; IFAD Project 2000003953 (ReLIV), accessed July 2026; World Bank UCSATP; aBi Development programme documentation, including the aBi Green Dairy Investment Program.

5.3.2 Structural Gaps: Uncontested White Space for Technology Investment

Three areas remain uncovered by any active programme as of July 2026: the post-harvest quality and cold chain gap at collection stage (13.6 percent post-harvest loss, no programme financing the full LP-plus-SCC-plus-UV-C-plus-analyser technology combination); the commercial-scale green processing technology and DDP regulatory pathway gap (no active programme financing energy-efficient pasteurisation or UV-C at enterprise scale, and DDP itself lacks budget to pilot UV-C independently); and the dairy effluent biogas gap (entirely absent from the donor map and a Danish technology strength).

Field engagement added a fourth, previously undocumented gap: **tanker and transport-stage CIP (clean-in-place) infrastructure**. Brookside Uganda's quality team named the absence of a proper CIP facility anywhere in the cattle corridor as the single biggest quality intervention needed - transit times of 3 to 8 days from farm to plant, combined with water drawn from swamps to clean chillers at bulking centres, compound the bacterial load problem after collection. This is Stage C in the technology framework and has not previously been prioritised at this level; it should be tracked as a live investment opportunity alongside the three original gaps, pending a costing exercise Brookside's projects manager has offered to provide.

5.3.3 Heifer International Solar MCC Programme

Of Uganda's approximately 729 registered MCCs, the large majority remain off-grid on hydro-diesel generation, at an estimated chilling cost of roughly UGX 200 per litre; aggregated at processor level this is an approximately EUR 40 million sector-scale investment opportunity, coordinated through Heifer's SSID programme and UDB's solarisation programme rather than as a parallel initiative. Heifer International's SSID programme has completed 7 solar-powered collection centres as of mid-2026, of which 6 are fully off-grid. The financing structure is 30 percent grant (training, feasibility, operations) and 70 percent commercial finance from impact investors or commercial banks at 12 percent per annum over 5.5 years. Heifer's target is 20 solar MCCs across 100 cooperatives, focused on the Central milkshed.13

Rather than treating Heifer-supported MCCs as sites to avoid, this chapter treats them as the preferred first deployment sites for UV-C cold treatment technology, on three grounds. First, Heifer's selection criteria for MCC support - land availability, currently off-grid status, sound cooperative financial systems, and a confirmed relationship with an offtaker - are precisely the criteria a technology pilot requires to succeed; these are the most investment-ready cooperative sites in the country. Second, the solar infrastructure already installed creates the stable off-grid power supply UV-C requires, so a UV-C investment adds one technology module to a functioning cold chain rather than building from scratch. Third, the Ddwaniro case study - Heifer's first solar MCC, documented energy cost reduction from USD 3,611 to USD 1,556 (UGX 13M to UGX 5.6M) per month loan repayment - demonstrated that solar investment creates new economic roles, specifically youth motorcycle aggregators who collect milk from farmers too distant to walk to the MCC and deliver it within the extended chilling window solar infrastructure enables. UV-C further extends the viable collection radius by reducing bacterial load during transit, supporting additional aggregator roles.

Two deployment clusters were identified from the Heifer site list at the design stage of this study and have since been field-visited in full: the Nakaseke cluster of three cooperatives (Migani, Kalyabulo, Kijjumba), which reduces mobilisation cost per site; and the Kiboga-Sembabule pairing (Ddwaniro and Nabitanga Dairy Farmers' Cooperative Society), which offers an off-grid versus grid-tied performance comparison. Field results from both clusters are reported in full at Table 5.27 (5.4.3). Nabitanga - the only grid-tied solar MCC in the Heifer portfolio - returned the highest readiness score of any site visited in this study, and is this chapter's lead recommenda-

tion for the first commercial UV-C deployment once the DDP regulatory pathway clears (5.9). All deployments at Heifer-supported sites should continue to be agreed in advance with Heifer Uganda to ensure technology layering rather than programme duplication.

PILLAR 4 Enterprise Profiling and Technology Matching *Tier 1 and Tier 2 pipeline | Field-validated cooperative profiles | EU/Danish technology matrix*

The map below orients every enterprise and cooperative named in this pillar. Five sites carry GPS coordinates recorded by the field team - Migani, Kalyabulo, Kijjumba, Nabitanga, and Jesa Farm Dairy on-site during the visit itself. The remaining enterprises (Pearl Dairy, Brookside, Yoghurt Express, Dwaniro, Amos Dairies, Benni Foods) were engaged virtually, in Kampala without a field GPS reading, or remain desktop-only, and are shown as geocoded locations rather than field-recorded points.

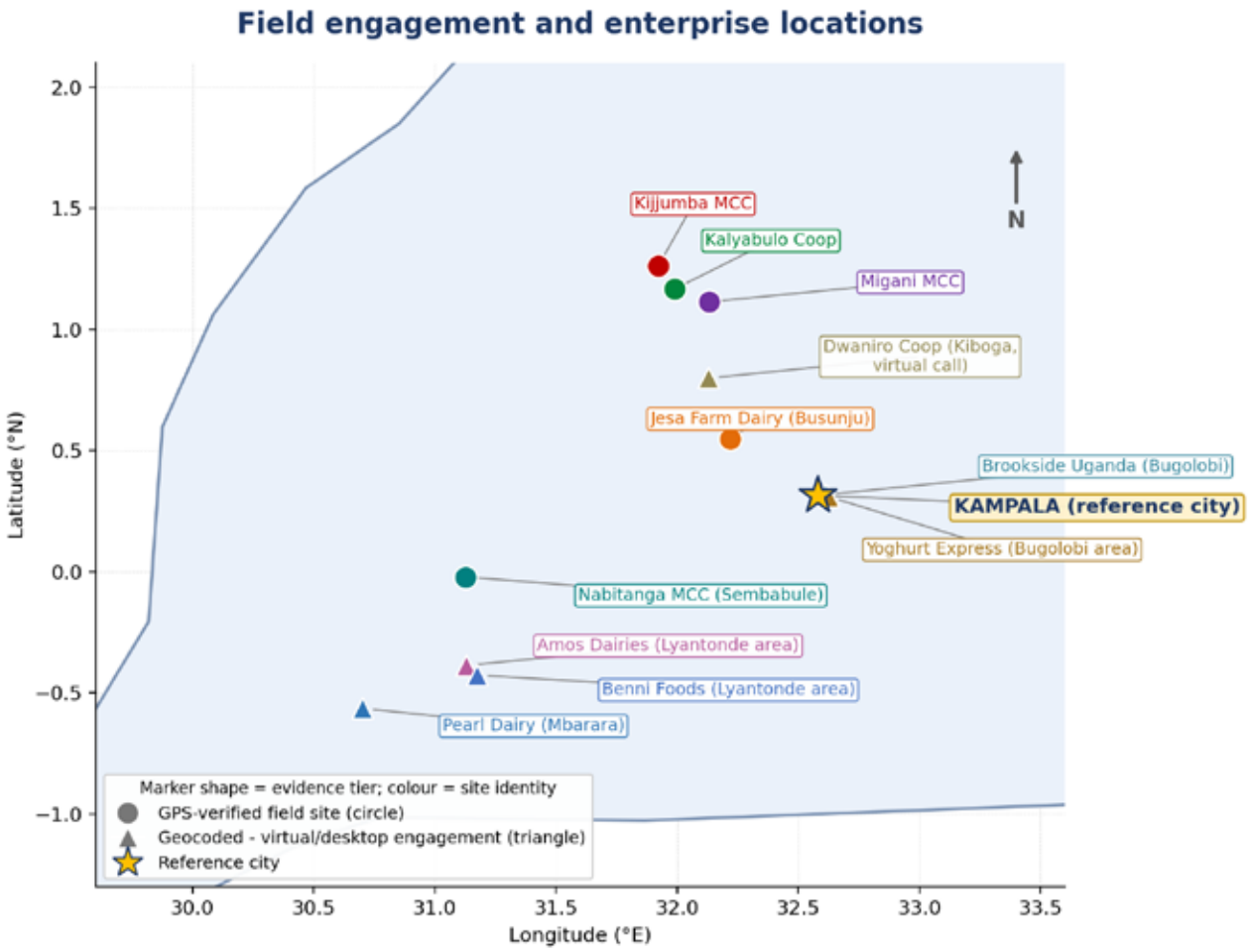


Figure 4. Field engagement and enterprise locations, plotted against Uganda's national boundary. Each site has a distinct colour for identification; marker shape indicates evidence tier - circles are GPS coordinates recorded on-site by the field team, and triangles are geocoded locations for enterprises engaged virtually or not yet visited. Yoghurt Express, engaged in-person in Kampala, is geocoded to the Bugolobi neighbourhood rather than a specific address, since the enterprise has no independent map listing. Amos Dairies and Benni Foods carry a small positional offset for legibility, since their true geocoded locations sit within roughly one kilometre of each other in the Lyantonde area.

The Tier 1/Tier 2 classification below reflects this chapter's own field-based reasoning (balance sheet strength and adoption readiness vs. market linkage and capitalisation gap) and is provisional pending the cross-consultant agreement on a single enterprise tiering metric across all sector chapters.

5.4.1 Tier 1 Enterprises: Immediate Investment Targets

Enterprises are profiled using a standard two-table format: a profile table stating engagement basis, scale, and current technology position, followed by an investment and technology opportunities table. Technology matching in these tables reflects neutral EU/Danish supplier fit; grant structuring and enterprise ranking is reserved for Section 5.9.

Pearl Dairy, Mbarara (brand: Lato Milk)

Table 5.13 Pearl Dairy, Mbarara (brand: Lato Milk) profile

Item	Description
Engagement basis	KII completed 25 June 2026, virtual, with enterprise management.
Location	Mbarara, Southwest corridor
Core business	Uganda's largest dairy processor by market share (31%); UHT, pasteurised milk, and value-added products under the Lato Milk brand
Installed capacity and utilisation	Approximately 1,000,000 L/day installed; current IFC capital programme underway9
Current technology position	Only processor operating quality-based payment on milk solids rather than volume. Assesses processing capacity as abundant sector-wide, with raw milk supply as the binding constraint rather than capacity. Cold treatment at collection centres assessed internally as not economically justified.
Commercial position	Medium-term pipeline; commercially confidential, public framing only externally

Table 5.14 Pearl Dairy, Mbarara (brand: Lato Milk) investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/EU providers	Investment maturity
Farm-level productivity, not processing capacity, is the sector's binding constraint by Pearl's own assessment.	Upstream farmer productivity support rather than a second treatment line at the existing plant.	Not applicable at plant level - quality-based payment infrastructure already in place.	n/a - upstream/farm-level, outside processing-technology scope	Low

Brookside Uganda (Sameer Agriculture)

Table 5.15 Brookside Uganda (Sameer Agriculture) profile

Item	Description
Engagement basis	Field KII completed 20 July 2026, virtual, with enterprise Head of Systems and Compliance.
Location	Kampala (Bugolobi head office); 4 bulking centres each with 10-15 MCCs across the South-west/Central corridor
Core business	Regional processor - yoghurt, UHT, fat products, milk powder; confirmed active Algeria exporter
Installed capacity and utilisation	450,000 L/day installed; 100,000 L/day current throughput (22% utilisation)
Current technology position	No solar coolers at any of the four bulking centres; no clean-in-place (CIP) facility anywhere in the cattle corridor; intake bacterial count measured at 1-2.5 million cells/mL; chlorine adulteration detected and chloride testing added to the intake platform in response. ISO 22000 certified annually.
Commercial position	CIP costing exercise offered by the enterprise's projects manager; Algeria offtake paused this year on low raw milk availability

Table 5.16 Brookside Uganda (Sameer Agriculture) investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/EU providers	Investment maturity
Absence of tanker and bulking-centre CIP infrastructure is the single largest quality gap identified anywhere in the cattle corridor.	Tanker and bulking-centre CIP facility investment.	CIP design and installation; cold chain hygiene systems.	GEA (Germany); Alfa Laval (Sweden)	High

Jesa Farm Dairy, Wakiso (brand: JESA)

Table 5.17 Jesa Farm Dairy, Wakiso (brand: JESA) profile

Item	Description
Engagement basis	Field KII completed 8 July 2026, in-person, with the Plant Manager.
Location	Busunju, Wakiso District
Core business	Uganda's number one fresh pasteurised milk brand; UHT, fresh milk, butter, and yoghurt
Installed capacity and utilisation	400,000 L/day installed; 60-70% current utilisation
Current technology position	ISO 22000 certified, renewed annually through UNBS. Existing conventional pasteurisation line running below capacity. Grid hydroelectric power is inexpensive at the enterprise's consumption scale. Two prior Uganda Development Bank co-financing arrangements.
Commercial position	Biogas from the existing effluent treatment plant is the enterprise's own stated second investment priority, after water recycling

Table 5.18 Jesa Farm Dairy, Wakiso (brand: JESA) investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/EU providers	Investment maturity
Existing effluent treatment plant is underutilised as a potential energy asset; a second treatment line of any kind is not justified given existing spare capacity on the current line.	Biogas recovery from dairy effluent.	Anaerobic digestion, combined heat and power, digestate management.	Bigadan A/S (Denmark); PlanEnergi (Denmark)	High

Benni Foods Limited, Lyantonde

Table 5.19 Benni Foods Limited, Lyantonde profile

Item	Description
Engagement basis	Desktop study.
Location	Lyantonde
Core business	Uganda's largest single-site dairy processing facility; confirmed active Algeria exporter
Installed capacity and utilisation	1,000,000 L/day installed (largest in the country); current utilisation not yet confirmed
Current technology position	Not yet confirmed through direct engagement
Commercial position	Largest effluent volume of any enterprise in the portfolio; pasteurisation at national scale

Table 5.20 Benni Foods Limited, Lyantonde investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/EU providers	Investment maturity
Unconfirmed pending direct enterprise engagement.	Energy-efficient pasteurisation; biogas from effluent, indicative given largest effluent volume in the portfolio.	HTST/VTIS pasteurisation upgrade; anaerobic digestion.	GEA (Germany); Alfa Laval (Sweden); Bigadan A/S (Denmark)	Medium

Amos Dairies, Mbarara

Table 5.21 Amos Dairies, Mbarara profile

Item	Description
Engagement basis	Desktop study.
Location	Kiruhura District (DDP processor register); previously referenced as Mbarara/Southwest corridor in earlier desktop work - Kiruhura is the confirmed district per DDP's own installed-capacity data below
Core business	Southwest anchor dairy processor
Installed capacity and utilisation	700,000 L/day installed; 200,000-300,000 L/day utilised (DDP processor register, not confirmed with the business)24

Item	Description
Current technology position	Not confirmed
Commercial position	Retained on market position and Southwest anchor location alone; investment appetite, capital constraints, and technology readiness are unconfirmed and should not be read as validated to the same standard as engaged enterprises

Table 5.22 Amos Dairies, Mbarara investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Unconfirmed - no direct enterprise engagement at any stage of this study.	Energy-efficient pasteurisation (indicative, desktop-only).	HTST/VTIS pasteurisation upgrade (indicative).	GEA (Germany); Alfa Laval (Sweden)	Low

5.4.2 Tier 2 Enterprises: Grant-Dependent De-Risking Targets

Nabitanga Cooperative MCC, Sembabule

Table 5.23 Nabitanga Cooperative MCC, Sembabule profile

Item	Description
Engagement basis	Field KII completed 10 July 2026, in-person, with cooperative management. GPS: -0.0214912, 31.1266232.
Location	Sembabule District
Core business	Dairy cooperative milk collection centre; former Pearl Dairy supplier, now supplying MKE Enterprises
Installed capacity and utilisation	Zero rejection rate; volume not disclosed
Current technology position	Most advanced on-site testing suite in the portfolio - improved Lactoscan analyser plus an on-site Zoetis laboratory partnership. National quality awards. The only grid-tied solar MCC in the Heifer-supported portfolio.
Commercial position	Highest-readiness site identified anywhere in the field programme

Table 5.24 Nabitanga Cooperative MCC, Sembabule investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/EU providers	Investment maturity
Bacterial load reduction and shelf-life extension needed for a supply chain with no legacy processing infrastructure to compete against.	Electronic quality gate (SCC meter, milk analyser) and UV-C cold treatment, pending regulatory approval.	Electronic quality testing instruments; UV-C cold treatment unit.	DeLaval (Sweden) - chilling/analyser systems; Lyras A/S (Denmark) - UV-C	High

Yoghurt Express Limited, Bugolobi

Table 5.25 Yoghurt Express Limited, Bugolobi profile

Item	Description
Engagement basis	KII completed in-person in Kampala, with the enterprise owner/manager.
Location	Bugolobi, Kampala
Core business	Direct-sourcing premium micro-processor; fresh pasteurised milk and yoghurt
Installed capacity and utilisation	500 L/day current, sourced from two dairy farmers within 20 km of Kampala; expansion planned to 2,000-3,000 L/day
Current technology position	Self-reported bacterial counts below 100,000 cells/mL from direct-sourced milk, against 1-4 million cells/mL for commercial dairies - self-reported, not independently verified. Single wholesale line (full-fat yoghurt) to Carrefour; remainder sold via home delivery at more than double commercial dairy prices.
Commercial position	A business development services and quality-systems candidate at current scale rather than a capital-intensive technology target; re-assess once the planned expansion is underway

Table 5.26 Yoghurt Express Limited, Bugolobi investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/EU providers	Investment maturity
Scale and capital to expand beyond two supplier farms while maintaining quality as the supplier base grows.	Quality-gate support as the supplier base expands; UV-C only becomes relevant once the enterprise scales past its current micro-processing footprint.	Basic quality testing infrastructure (near-term); UV-C cold treatment (longer-term, scale-dependent).	Lyras A/S (Denmark) - longer-term only	Low

5.4.3 Field-Validated Cooperative Profiles: Nabitanga, Nakaseke Cluster, and Dwaniro

Five cooperative sites were visited in person in July 2026 to build a within-cluster comparison and test the desktop hypothesis at cooperative scale.

Table 5.27 Field-validated cooperative findings: Nabitanga, Nakaseke cluster, and Dwaniro

Cooperative	Key finding	Readiness
Nabitanga Cooperative MCC (Sembabule, 10 July)	All four readiness gates passed; most advanced testing suite in the portfolio (improved Lactoscan analyser plus on-site Zoetis laboratory partnership); zero rejection rate; national quality awards; management raised UV-C grid compatibility directly, unprompted. Former Pearl Dairy supplier, now supplying MKE Enterprises. The only grid-tied solar MCC in the Heifer portfolio (5.3.3).	Highest-readiness site in the entire field programme; recommended first commercial UV-C deployment once the DDP regulatory pathway clears (5.9)

Cooperative	Key finding	Readiness
Migani Cooperative MCC (Nakaseke, 9 July)	Central milkshed off-grid solar deployment; confirmed USD 0.06 (UGX 200)/L Jesa purchase margin; confirmed Jesa does not send technicians for chilling equipment repair.	Pipeline; technical support gap flagged
Kalyabulo Cooperative MCC (Nakaseke, 9 July)	Strongest unprompted UV-C demand signal in the field programme: "Yes, this could eliminate the rejection issues we are facing."	Strong candidate for Southwest/Central bundle
Kijjumba Cooperative MCC (Nakaseke, 9 July)	Solar technical failure; double loan burden from the failed installation; 15-20% rejection rate, the highest in the cluster, directly attributable to absence of bacterial testing.	Reclassified: pipeline, not immediate
Dwaniro Cooperative (Kiboga, 15 July)	Established 2011; ~1,000 members; 3 branches; ~10 coolers. Wet season intake ~40,000 L/day (independently corroborated by the NFP factsheet's Table 5, which separately lists Dwaniro at 40,000 L/day), dry season 22,000-28,000 L/day. Government-donated 500 L/hr processing plant installed but commercially stalled - working capital, packaging, and distribution are the binding constraints, not equipment. Main buyer: Jesa.	Strategic fit high; principal risk is commercial execution capability, not technology. Recommended next step is a technical and commercial diagnostic visit rather than a hardware pilot - not a ranked near-term hardware investment.

Sources: *A2i field visit reports, 9, 10, and 15 July 2026; NFP/Wageningen factsheet 2026 (Table 5, cross-validation).*

5.4.4 EU and Danish Technology Provider Matrix vs Asian Alternatives

The Uganda dairy sector has unusually strong alignment with Danish and EU agri-technology competencies in chilling systems, UV-C treatment, energy-efficient pasteurisation, and biogas from organic waste. This chapter's technology recommendations are limited to EU or Danish providers throughout, consistent with the technology-transfer mandate governing this assessment; the comparison below is presented for completeness, not because Asian equipment is treated as an eligible alternative.

Table 5.28 EU/Danish technology providers vs Asian alternatives: Uganda dairy context

Technology	EU/Danish provider	Indicative EU/Danish price	Chinese/Asian alternative and assessment
MCC solar chilling equipment	DeLaval (Sweden); GEA (Germany); Alfa Laval (Sweden)	USD 35,000-60,000 per MCC unit	Snowman, Bingshan (China): USD 15,000-28,000. Higher maintenance; shorter asset life; limited service network in Uganda.
UV-C cold treatment, whole milk	Lyras A/S (Denmark) - patented turbulent coil flow; only proven commercial whole-milk system	USD 76,000 (Louis C2000, 12,000 litres/hr)	No equivalent system at commercial scale. Not available - no Asian alternative exists for whole-milk UV-C treatment.

Technology	EU/Danish provider	Indicative EU/Danish price	Chinese/Asian alternative and assessment
Energy-efficient pasteurisation (HTST)	GEA VTIS (Germany); Alfa Laval Hybrid (Sweden): 35-40% energy reduction; East Africa track record	USD 200,000-350,000 per installation	Hento, Kefai (China): limited energy recovery; no documented EAC deployments. USD 60,000-130,000 - lower upfront, higher operating cost, no service network.
Dairy effluent biogas	Bigadan A/S (Denmark); PlanEnergi (Denmark): SCADA-monitored, 50+ years experience	USD 800,000-2M+ (site-specific)	Chinese fixed-dome digesters: basic design, limited SCADA. USD 200,000-600,000 - higher documented failure rate in tropical conditions.
Regulatory and export market acceptance	EU food safety compliant (EC 853/2004; EFSA); accepted by EAC, MAAIF, and Algeria markets	Built into product specification	Not typically certified to EU/EAC food safety standards. This assessment's mandate is limited to EU/Danish technology - Asian equipment is out of scope regardless of price.

Sources: *GEA Group AG (2023); Alfa Laval AB (2022); DeLaval International (2023); Bigadan A/S technical reference; Lyras A/S (2018). Prices are indicative 2024-2026 market estimates from manufacturer documentation, to be confirmed through direct supplier engagement.*

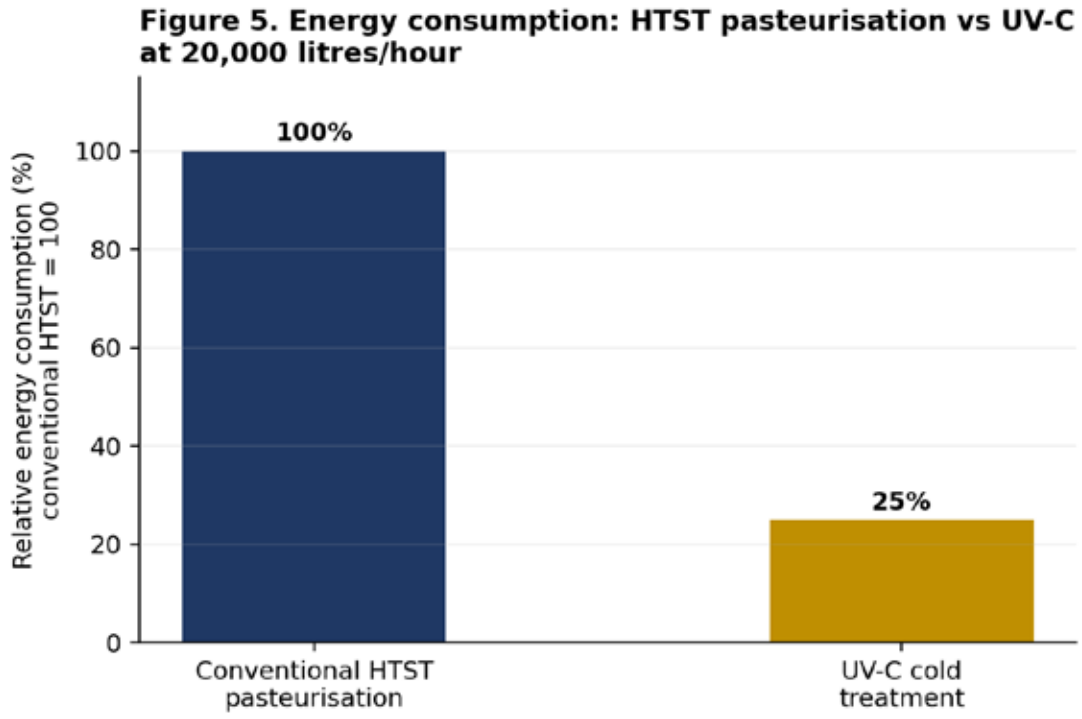


Figure 5. Energy consumption: conventional HTST pasteurisation vs UV-C cold treatment at 20,000 litres/hour. Source: Lyras A/S Product Information Document (2018), Thise Dairy Denmark case study.

5.4.5 Technology Deep Dive: Where the UV-C Business Case Holds

Field evidence from Uganda's two largest processors now converges on a single analytical conclusion that this chapter treats as central rather than incidental: **UV-C cold treatment's business case is strongest at the cooperative collection-centre node, and does not clear the bar at the established-processor node - not**

because the technology underperforms there, but because a second treatment line of any kind doesn't make sense for a processor already running below capacity on the line it has.14

- **Jesa (confirmed):** the underlying issue is capacity, not technology choice. Jesa's existing conventional pasteurisation line is running at 60-70% utilisation, so a second treatment line - whether UV-C or another HTST line - doesn't clear the threshold regardless of which technology it is. Cheap grid hydroelectric power as a Large Industrial Consumer reinforces this by additionally weakening the energy-saving case UV-C would otherwise lean on.
- **Pearl Dairy (resolved by inference from Pearl's own market diagnosis):** Pearl's KII did not address UV-C at its own plant directly, but it did establish, in Pearl's own words, that processing capacity "exists in abundance across the sector" and that raw milk supply, not capacity, is the binding constraint. That is Pearl's own assessment of the market condition it operates in, at the scale it operates at, and it leads to the same conclusion as Jesa's by a different route: an already-abundant-capacity processor does not need a second treatment line. This chapter treats Pearl's UV-C question as closed on this basis, not as an extrapolation of Jesa's finding onto a different company.
- **Nabitanga and Kalyabulo (confirmed, positive signal):** neither carries legacy processing infrastructure to compete against, both face the acute bacterial-load problem the technology is designed to solve, and both cooperative managements raised UV-C compatibility positively and without prompting during field visits.

This refines the deployment sequencing already set out in 5.3.2 and 5.7.1: the Lyras/Raslysation regulatory pilot remains the necessary first step for any commercial deployment, but the commercial rollout that follows should prioritise cooperative MCC sites over large processor plants, reversing what a purely desktop-driven sequencing might have assumed. The full replication and technology-partner business case for this pilot is set out in 5.9, alongside the ranked investment recommendation it supports.

PILLAR 5 Impact Metrics and Commercial Engagement *Smallholder integration | Regional competitiveness | Four impact vectors | Field-validated evidence*

5.5.1 Smallholder Farmer Engagement and Commercial Integration

Smallholder farmers account for more than 80 percent of national milk output from approximately 1.7 to 1.8 million farm households.14 Their integration into formal commercial supply chains, however, remains uneven. Technology investment generates smallholder impact only if it is structured to create the economic incentives and digital infrastructure that make formal channel participation consistently more rewarding than informal sale.

The SNV TIDE programme demonstrated that quality-based payment on both microbial and compositional testing - using a combined milk scanner, without cold chain investment - produces a 58 percent increase in milk volumes delivered through cooperative channels as farmers respond to the financial incentive.15 When physical cold chain investment and quality testing instruments are added, the effect is compounding: the premium becomes verifiable, informal side-selling weakens, and cooperative membership grows.

Field data from Nabitanga adds a concrete, current example of this mechanism working end to end: the cooperative's prior participation in a DDP quality-based payment pilot passed benefits to farmers as premiums and

year-end dividends, and its national quality awards and zero-rejection record are the clearest practical demonstration in the portfolio that objective testing plus a functioning payment mechanism changes farmer behaviour. Farmers supplying Heifer-supported solar MCCs represent a similarly investment-ready cohort: they already receive quality-linked payment and have experienced the direct financial benefit of quality differentiation, so the adoption barrier for an electronic SCC meter is minimal - it simply makes an existing incentive auditable and enforceable.

The Jesa Farm Dairy partnership with Emata, a licensed digital microfinance institution active since March 2026, illustrates the next stage of integration. The Emata platform digitises milk delivery records at cooperative level, enabling farmers to receive instant SMS confirmation of delivery quantities and entitlement, and to access loans based on delivery history rather than formal collateral. The Budimbo Dairy Farmers Cooperative Society grew its monthly milk collection from 50,000 to 200,000 litres within twelve months of Emata adoption - a 300 percent increase attributed to reduced side-selling, price transparency, and farmer productivity investment using Emata credit.16

Table 5.29 Smallholder livelihoods indicators: baseline and technology investment scenario

Livelihood indicator	Current baseline	With technology investment	Key mechanism
Farmgate price per litre	USD 0.17-0.25 wet / USD 0.33-0.47 dry (UGX 600-900 / UGX 1,200-1,700; field-validated, Brookside confirmed USD 0.47/UGX 1,700 as historic dry-season high)	USD 0.25-0.33+ (UGX 900-1,200+) with enforceable quality premium	Electronic SCC meter at Stage A enables enforceable quality-tier payment; Emata digital record provides audit trail
Post-harvest loss at collection	13.6% of milk produced nationally; Kijjumba recorded 15-20% rejection, the highest field-observed figure, directly attributable to absent bacterial testing	Targeted reduction to 6-8%	LP activation holds bacterial growth; solar chilling prevents temperature-driven multiplication
Household income from dairy (2-3 cows)	USD 417-694/year (UGX 1.5-2.5M)	USD 528-917/year (UGX 1.9-3.3M)	Quality premium adds 30-40% to effective price; loss reduction adds 8-12% more saleable volume
Access to input finance	Less than 15% of smallholders have formal dairy credit	Emata delivery history enables credit scoring without collateral	Digitised records substitute formal collateral; Emata-Jesa MOU (March 2026) creates the platform
Women's economic participation	Women manage 60-70% of cooperative milk delivery logistics	Quality premium and digital payment directly benefit women as primary delivery agents	Electronic SCC testing removes subjectivity; reduces scope for informal deductions

Sources: *FAO MAFAP (2022); ILRI (2023); DDP market price monitoring; A2i field KIIs June-July 2026; Emata and FSD Uganda (2026).*

5.5.2 Regional Competitiveness, Trade Performance and Import-Export Parity

Uganda's position in the EAC dairy market is assessed across six competitiveness dimensions. Uganda ranks

second overall - behind Kenya on processing infrastructure and technology adoption, but ahead on production scale, growth trajectory, and export orientation. The technology adoption gap is the sector's core investment case in summary form.

Table 5.30 EAC dairy regional competitiveness index, 2025

Indicator (1=very weak, 5=very strong)	Uganda	Kenya	Tanzania	Rwanda
Production scale and growth trajectory	5	4	4	2
Export capacity and orientation	4	3	2	1
Processing infrastructure	4	5	3	2
Cold chain and MCC network density	3	4	2	2
Investment readiness	4	4	3	3
Technology adoption rate	3	4	2	2
OVERALL SCORE (/30)	23 2nd	24 1st	16 3rd	12 4th

Sources: *A2i assessment, field-adjusted July 2026. Scores are a qualitative synthesis rather than a direct statistical reading; production-scale ranking is informed by the FAOSTAT/DDP series in Table 5.1 and the corrected EAC comparison in Table 5.2, with all other dimensions drawn from field engagement and DDP market monitoring.*

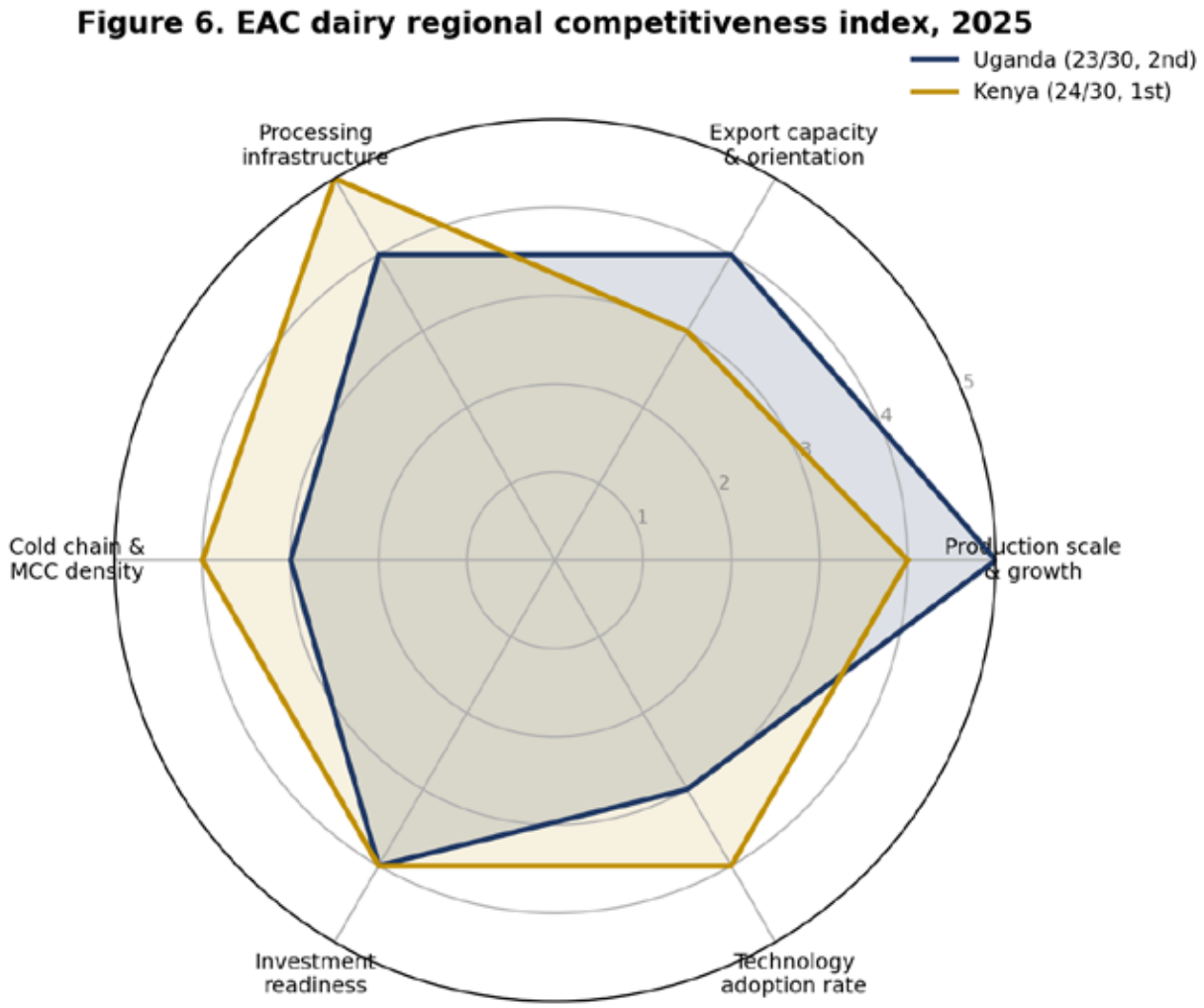


Figure 6. EAC dairy regional competitiveness index, 2025. Uganda leads on production scale and investment readiness; Kenya leads on processing infrastructure and technology adoption - the gap this chapter's technology investment case is built to close.

5.5.3 Four Impact Vectors

Table 5.31 Impact assessment across four investment vectors

Impact vector	Baseline (2024-26)	Target (2028-30)	Key mechanism and field evidence
Green Agenda	59.5% of MCCs on diesel. Brookside confirmed zero solar coolers at any of its four bulking centres. Effluent largely unmanaged outside Jesa's existing ETP.	25-35% of MCCs solar-powered by 2030. 60-90% energy reduction from UV-C where deployed. 85-95% COD reduction at Jesa biogas site.	Solar chilling displaces diesel (documented 68% cost saving, Heifer case study). Biogas from Jesa effluent addresses a confirmed, field-validated gap. Brookside's CIP gap is a newly identified Stage C green-technology opportunity.

Impact vector	Baseline (2024-26)	Target (2028-30)	Key mechanism and field evidence
Livelihoods	Farmgate 16% below export parity. 13.6% PHL at collection nationally; field-observed range 0% (Nabitanga) to 15-20% (Kijjumba).	Quality premium: USD 0.06-0.11 (UGX 200-400)/litre uplift where enforceable. PHL at collection: 13.6% to 6-8%. Budimbo cooperative equivalent: 300% volume increase from digitisation.	Electronic SCC meter enables quality-tier payment. Emata platform creates digital audit trail. SNV TIDE: 58% milk volume increase from quality-based payment alone. Nabitanga's own quality-payment history corroborates the mechanism directly.
Employment	~35,000 direct jobs in formal dairy processing.	55,000-70,000 direct processing jobs by 2030. New roles: MCC quality technician, solar system operator, biogas plant operator, digital delivery system manager.	Higher capacity utilisation at Amos Dairies, Jesa, and Benni Foods (currently only 1M L/day installed, largest new processor) creates direct employment. Youth motorcycle aggregator roles already documented at Heifer-supported cooperatives; UV-C extends the viable collection radius further, supporting more aggregator roles per MCC.
Trade Balance	Gross export value USD 102.0M (DDP, FY2025/26, down from a USD 264.5M FY2022/23 peak), net trade balance +USD 188.6M (2023, FAOSTAT). Only EAC dairy net exporter. Algeria: Benni Foods and Brookside Uganda confirmed active exporters; DDP confirms Algeria has finalised negotiations for 1.4 billion litres/year; Brookside's own Algeria supply paused this year on low raw milk availability.	Base case: recovery toward and beyond the FY2022/23 peak, USD 150-220M gross export value by 2030. The confirmed Algeria offtake (1.4 billion litres/year, 26-33% of current national production) represents substantial upside but requires supply-side expansion most current pipeline enterprises are not yet sized for - model fulfilment risk conservatively even though the deal itself is confirmed.	UV-C AFM1 reduction improves EU/Algeria compliance. Improved shelf life strengthens Kampala-Nairobi corridor. Brookside's confirmed 2026 Algeria supply pause demonstrates that even with the offtake agreement confirmed, year-to-year fulfilment depends on raw milk availability that is not guaranteed.

Sources: *FAOSTAT TCL 2023; ILRI 2023; Miyama et al. 2023; DDP FY2024/25 and internal export figure; FAO MAFAP 2022; Emata 2026; Heifer International SSID 2024; A2i field KIIs June-July 2026. Confidence levels: Green Agenda HIGH; Livelihoods MEDIUM-HIGH; Employment MEDIUM; Trade Balance MEDIUM.*

5.5.4 EU/Danish RIO Markers: Full Four-Marker Assessment

This section applies the OECD DAC Rio and Environment marker system - the standard cross-cutting classification EU and Danish development finance reporting uses, current as of the May 2026 handbook revision - to this chapter's technology recommendations. All four Rio markers are scored: Climate Change Mitigation, Climate

Change Adaptation, Biodiversity, and Desertification. Scoring follows the Handbook's purpose-based three-point system: 0 (not targeted - examined but the objective is not explicitly part of the activity's stated design), 1 (significant - the objective is explicitly stated but is not the fundamental driver), or 2 (principal - the objective is fundamental to the activity's design; the activity would not have been funded, or designed that way, but for that objective). The purpose-based rule matters throughout this table: a technology's incidental co-benefits do not qualify it for a score - only objectives explicitly built into the activity's own design and documentation do.

Table 5.32 RIO Markers scoring: climate mitigation and adaptation

Intervention	Mitigation	Adaptation	Scoring rationale
Biogas recovery (Jesa Farm Dairy, Southwest MCC bundle)	2 - Principal	0 - Not targeted	The Handbook's agriculture guidance names "livestock projects that reduce methane or other GHG emissions (manure management with biodigestors, etc.)" as a qualifying mitigation activity. Score 2 rather than 1 is justified because methane capture from dairy effluent is the entire stated purpose of this transaction - it meets the principal-objective test directly. Adaptation is not scored: climate resilience is not part of this intervention's stated design.
Solar-powered chilling (Nabitanga, Southwest corridor MCCs)	2 - Principal	1 - Significant	Displaces diesel generation - the Handbook's renewable energy guidance scores this as mitigation on the basis that in the absence of the investment, high-emission diesel would be used, matching the confirmed baseline (59.5% of MCCs on diesel). Adaptation scores 1, not 2: reduced dependency on unreliable grid or diesel supply during weather shocks is a real, statable secondary benefit, but bacterial load reduction and cost saving remain the fundamental design driver.
UV-C cold treatment (Lyras pilot and subsequent MCC rollout)	1 - Significant	1 - Significant	The documented 60-90% energy reduction versus conventional pasteurisation supports a mitigation score, scored significant rather than principal since energy reduction is a consequence of the technology rather than its stated purpose (bacterial load and shelf-life). Adaptation scores 1 on the same conservative basis - improved shelf life reduces spoilage risk under variable weather, but this is not how the intervention has been designed or proposed.
Tanker/bulking-centre CIP investment (Brookside, pending costing)	0 - Not targeted	0 - Not targeted	A water-and-hygiene infrastructure investment with no GHG or climate-resilience objective currently stated in this chapter's documentation.

Sources: *OECD DAC. Reporting Rio Markers and Environmental-Related Development Finance in the OECD Creditor Reporting System: Handbook for Reporters. DCD/DAC/STAT(2025)50/REV2, 7 May 2026. Agriculture sector guidance (CRS purpose code 311) and general eligibility criteria (Annex 20) applied directly.*

Table 5.33 RIO Markers scoring: biodiversity and desertification

Intervention	Biodiversity	Desertification	Scoring rationale
Biogas recovery (Jesa Farm Dairy, Southwest MCC bundle)	0 - Not targeted	0 - Not targeted	Effluent capture plausibly reduces water-body pollution near processing sites (Biodiversity criterion a) and biogas digestate plausibly supports soil quality as an organic amendment (Desertification criterion a). Neither is scored, because neither objective is currently stated in this chapter's investment documentation - the Handbook's purpose-based rule requires the objective to be explicit in project design, not inferred from a side-effect. Both could become legitimately scorable if the transaction's own design documentation is revised to state a water-ecosystem or soil-quality objective explicitly.
Solar-powered chilling (Nabitanga, Southwest corridor MCCs)	0 - Not targeted	0 - Not targeted	No ecosystem, species, genetic-diversity, or land-degradation objective is stated in this intervention's design; diesel displacement is scored under mitigation only.
UV-C cold treatment (Lyras pilot and subsequent MCC rollout)	0 - Not targeted	0 - Not targeted	No biodiversity or land-degradation objective applies to a bacterial-treatment technology at the collection-centre node.
Tanker/bulking-centre CIP investment (Brookside, pending costing)	0 - Not targeted	0 - Not targeted	No stated ecosystem or land-management objective; this is a hygiene and water-use infrastructure investment.

Sources: *OECD DAC. Reporting Rio Markers and Environmental-Related Development Finance in the OECD Creditor Reporting System: Handbook for Reporters. DCD/DAC/STAT(2025)50/REV2, 7 May 2026. Biodiversity criteria (Annex 20, Table 3) and Desertification criteria (Annex 20, Table 6) applied directly; Uganda's cattle corridor - the Western and Central milkshed geography this chapter covers throughout - falls within the semi-arid zone the Desertification marker's geographic scope addresses, which was considered before concluding that none of the four interventions currently qualify.*

This is a complete, honestly-scored four-marker assessment, not a partial one: every intervention was tested against all four markers' actual eligibility criteria rather than assigned a score by default. The result - two markers scoring positively (Mitigation, Adaptation) and two scoring zero across the board (Biodiversity, Desertification) - reflects this chapter's technology recommendations as currently designed and documented, not a limitation in the assessment itself. Biogas and the CIP investment both have a plausible, defensible path to a Significant biodiversity or desertification score if their investment design documentation is revised to explicitly state a water-ecosystem or soil-quality objective alongside the mitigation objective already established; this chapter recommends that as a specific, actionable design refinement for A2i's investment committee to consider, rather than assigning the score pre-emptively.

PILLAR 6 Investment Structuring and GTTF Grant Outcomes *Capital stack design | 5:1 leverage pathway | Deal archetypes, field-corrected*

5.6.1 Capital Stack Design by Transaction

The GTTF matching grant retires the technology-adoption risk premium at first commercial deployment, creating the evidence that attracts subsequent investments without grant support. The grant crowds in commercial capital; it does not substitute for it. Field engagement has materially shaped the composition of this capital stack: the Jesa transaction narrows from a two-technology bundle to biogas alone, the DDP regulatory pilot is added as the lead enabling investment, Nabitanga enters as a field-validated single-site transaction, and a new Stage C opportunity opens at Brookside pending costing.

Table 5.34 Capital stack design by technology transaction (field-corrected, July 2026)

Transaction	Technology	GTTF grant (indicative)	Commercial co-financing (5:1) and instrument
DDP Raslysation regulatory pilot (enabling investment)	Lyras A/S UV-C unit, DDP-supervised field validation, three demonstration milksheds	Full cash cost financed by GTTF/A2i	DDP contributes technical expertise, a project vehicle, and facilities in kind. Grant, regulatory enabling investment - not subject to the 5:1 ratio given its public-good character.
Nabitanga Cooperative MCC: quality gate + UV-C (post-approval)	SCC meter; milk analyser; Lyras A/S UV-C	USD 0.15-0.25M range	Cooperative equity + Stanbic/Absa term debt + supplier credit. Matching grant + milestone disbursement.
Jesa Farm Dairy: biogas from effluent only	Bigadan A/S anaerobic digestion + CHP + digestate management.17 UV-C excluded following field KII (5.4.2).	USD 0.4-0.8M	UDB co-financing (precedent established twice) + Jesa equity + Bigadan supplier credit. Matching grant + TA; existing ETP site reduces capex.
Southwest corridor MCC bundle (50 MCCs)	DeLaval solar; Ekomilk analyser; LP system; UV-C post-approval	USD 0.8-1.2M	Cooperative equity + Stanbic/Absa term debt + processor pre-financing + supplier credit. Matching grant + milestone disbursement.
Amos Dairies: energy-efficient pasteurisation	GEA VTIS or Alfa Laval Hybrid Pasteuriser15	USD 0.6-1.2M	Commercial bank + enterprise equity + supplier credit. Desktop-only pending KII (5.4.1) - structure indicative, to be confirmed on enterprise engagement.

Transaction	Technology	GTTF grant (indicative)	Commercial co-financing (5:1) and instrument
Brookside: tanker CIP investment (newly identified, pending costing)	CIP facility design, Stage C	To be determined pending Brookside projects manager costing	Likely enterprise equity + matching grant + TA. Contingent on costing exercise Brookside has offered to provide.

Sources: *A2i field KIIs June-July 2026; DDP concept note budget order of magnitude; UDB and IFC project disclosures.*

Supplier financing counts as commercial capital in the 5:1 leverage calculation. Milestone disbursement releases grant tranches against verified enterprise co-financing and technology installation milestones. Amos Dairies and Benni Foods structures remain indicative, desktop-only estimates, since neither KII will be conducted at this stage; both should be confirmed through direct enterprise engagement before structuring.

5.6.2 A Generalised Grant Ceiling Framework

Table 5.34 prices five specific transactions. GTTF will encounter enterprises and cooperatives beyond this initial list over the life of the programme, so a repeatable ceiling framework is set out here for the investment committee to apply consistently as the pipeline grows, rather than negotiating each new deal's grant share from first principles.

Table 5.35 Generalised GTTF grant ceilings by enterprise category

Enterprise category	Typical total investment (USD)	Recommended GTTF grant ceiling (USD)	Typical grant share	Private co-financing
Tier 1 - Anchor processor (Pearl, Brookside, Jesa, Benni Foods, Amos-type profile)	2-7 million	300,000-1,200,000	15-20%	80-85%
Tier 2 - Cooperative / MCC bundle (Nabitanga-type single site to Southwest corridor multi-site)	150,000-1.5 million	30,000-300,000	15-25%	75-85%
Tier 3 - SME / micro demonstration (Yoghurt Express and Dwaniro-type profile)	50,000-500,000	15,000-125,000	20-30%	70-80%
Regulatory / enabling pilot (Lyras/Raslysation DDP pilot)	Under 1 million	Full cash cost	Not leverage-rated - public-good enabling investment, DDP contributes technical expertise and facilities in kind	N/A

Sources: *Derived from the five transaction-specific figures in Table 5.34 and generalised into a repeatable*

ceiling structure.

This framework generalises rather than replaces Table 5.34. Where a specific KII-validated transaction exists, its own figures take precedence; this table exists for deals not yet named in this chapter.

5.6.3 The 5:1 Leverage Pathway: Three Enabling Conditions

First, milestone-based disbursement. Grant tranches are released against verified co-financing commitments and technology installation milestones, protecting against working capital substitution.

Second, commercial bank pre-engagement. Stanbic Bank Uganda, Absa Uganda, and UDB have agribusiness lending portfolios and documented willingness to co-finance dairy investments when cases are well-structured. UDB's two prior co-financing precedents with Jesa Farm Dairy are the clearest existing proof point in the portfolio. These relationships must be activated at programme design stage, not after a transaction is structured.

Third, blended business development services. For Tier 2 enterprises and cooperative-level transactions, the gap is as much capability - HACCP documentation, UNBS certification, EU supplier negotiation, and in Dwaniro's case basic commercial and market-development capacity around an already-installed asset - as it is capital. BDS support must accompany every matching grant as an integral component, not an optional add-on.

Field evidence adds a fourth, practical qualifier to how these three conditions should be applied: enterprises with existing sunk processing capacity and favourable industrial power tariffs - Jesa being the confirmed case - should not be assumed to require or want the same technology package as cooperative-level MCCs. Capital stack design should be built enterprise-by-enterprise from confirmed KII findings rather than applied as a uniform template across a tier, and Pearl Dairy's position on this same question should be confirmed directly before any comparable assumption is made about it.

PILLAR 7 Policy Alignment, Regulatory Framework and Post-Grant Sustainability *NDP IV alignment | Regulatory pathway for UV-C | SWOT analysis*

5.7.1 Regulatory Pathway for UV-C Milk Treatment

A pilot operator formally requests DDP approval for testing under Section 25(3)(e) of the Dairy Industry Act Cap. 85.21 DDP holds the primary institutional mandate for technology testing - it is the only mandated pathway through which a novel dairy processing technology can be unlocked for commercial deployment in Uganda. DDP has confirmed it does not currently have budget to finance technology pilots independently and explicitly welcomes an intervention partner to co-finance the pilot while DDP contributes technical expertise and regulatory authority. This structured, officially sanctioned regulatory pathway is the basis for the lead investment recommendation in Section 5.9.

Following DDP technical assessment, the pathway proceeds to a Ministerial Statutory Instrument under Sections 25(3)(e) and 28 (no Parliamentary action required), a UNBS standard amendment to US 38:2018, and a MAAIF National Dairy Analytical Laboratory export certification protocol update contingent on ISO 17025 accreditation continuity. The pilot itself must establish the critical UV dose for Uganda's raw milk profile, alongside secondary microbiological, sensory, and market-perception testing; A2i's role is to bring the technology concept to the

ministry and work the policy preliminaries in parallel with the pilot, not sequentially after it. Estimated timeline: 12-24 months from formal initiation. First-mover regulatory clearance for this technology in East and Sub-Saharan Africa is itself part of the investment case put to Danish and EU technology partners (5.9).

5.7.2 Policy Trigger Clause: Structuring the Algeria Offtake and Regulatory Timeline Risks

GTTF-financed transactions sized against the confirmed Algeria offtake (1.4 billion litres/year) should incorporate a supply-fulfilment trigger clause: milestone-based disbursement should be conditioned on independently verified raw milk supply-side progress at the relevant milkshed, not on the offtake agreement's existence alone, given Brookside's own confirmed 2026 supply pause. Separately, any transaction whose business case depends on UV-C commercial deployment should incorporate a regulatory trigger clause: disbursement tranches tied to UV-C-dependent milestones should be held pending the Ministerial Statutory Instrument (5.7.1), with the capital stack's non-UV-C components permitted to proceed on their own timeline regardless of the UV-C regulatory outcome.

5.7.3 SWOT Analysis: Uganda Dairy Sector

STRENGTHS	WEAKNESSES
Only EAC dairy net exporter (+USD 188.6M net trade balance, 2023) against Kenya's structural -USD 157.9M deficit. Production CAGR 10.3% (2015-2023); per-animal yield doubled to 1,005 kg - confirmed intensification. Nabitanga field KII: all four readiness gates passed, zero rejection rate, national quality awards - the strongest single readiness case in the portfolio. Jesa Farm Dairy: UDB co-financing precedent (twice), existing ETP site, Emata digital supply chain. DDP's own FY2022/23 export peak (USD 264.5M) is corroborated in order of magnitude by an unrelated NFP/Wageningen estimate (USD 282M), though DDP's own subsequent figures (down to USD 102.0M by FY2025/26) show this was a peak, not a stable baseline. SNV non-replication in the Southwest milkshed confirmed directly by SNV INCLUDE management.	Mean bacterial count at Mbarara MCCs is 15-30x the EAC standard - independently confirmed twice, by published research and by Brookside's own intake data (1-2.5M cells/mL). 59.5% of MCCs run on diesel; Brookside confirmed zero solar coolers at any of its four bulking centres despite a documented 68% cost saving from conversion. Emerging chlorine adulteration risk identified by Brookside - passes standard tests but causes downstream steriliser coagulation. ReLIV (USD 181.33M, active since September 2024) raises non-replication risk in the Southwest corridor and now requires active coordination with IFAD, not passive monitoring. DDP/MAAIF institutional transition (January 2025): ISO 17025 accreditation continuity uncertain. Amos Dairies and Benni Foods are profiled on a desktop study basis - the largest single-site processor in the country (Benni Foods) and a primary Southwest anchor (Amos) - with direct enterprise engagement recommended to confirm investment readiness before commitment.

OPPORTUNITIES	THREATS
Nabitanga and Kalyabulo provide field-ready, unprompted UV-C demand signals - not a theoretical technology push. Brookside's CIP gap is a newly identified, uncontested investment opportunity at Stage C, with a costing exercise already offered. Dwaniro's existing but underutilised processing asset offers a low-hardware-cost value-addition demonstration case - the constraint is commercial capability, not equipment. Algeria: Benni Foods and Brookside Uganda confirmed active exporters; DDP confirms Algeria has finalised negotiations for 1.4 billion litres/year, a scale that will drive substantial supply-side investment demand. UV-C AFM1 reduction supports compliance (5.1.3). School Milk Programme (~1 million students) provides a structurally growing domestic demand anchor independent of export market volatility.	Jesa's and Pearl's independent conclusions that a second treatment line doesn't clear the bar at their own plants - both underutilised-capacity processors, reasoned from capacity utilisation rather than technology preference - confirms the enterprise-level technology market is narrower than a desktop-only assessment would suggest, reinforcing the case for cooperative-level rather than processor-level deployment. Brookside's Algeria supply paused this year on low raw milk availability - a live demonstration that export upside cannot be assumed year to year. Kenyan non-tariff barriers: the 2019-2020 corridor closure demonstrated Uganda's primary export route can be politically blocked without warning. MAAIF ISO 17025 lapse would compromise Algeria and EU export certification simultaneously. UV-C regulatory timeline: if the Ministerial Statutory Instrument is not issued, commercial deployment across every UV-C-dependent recommendation in this chapter is delayed 12-24 months.

SECTION 5.8 FIVE CRITICAL LENSES

Interrogating the dairy investment narrative from five analytical standpoints, updated with field evidence.

01 THE PRACTITIONER: What do they know that academics miss?

Ask a cooperative manager in Mbarara what the real constraint is and they will not mention bacterial contamination statistics. They will tell you about the price problem: the farmer who has managed mastitis carefully and cooled milk promptly receives the same price as the farmer who has done neither, because no instrument distinguishes them at intake. The SCC meter and LP system are not academic interventions - they are the instruments that make the price signal work, and Nabitanga's national quality awards and zero rejection rate are the clearest practical demonstration of this in the portfolio.

Practitioners also point to the diesel reliability problem ahead of the pure cost argument: when a generator fails, the entire day's collected milk is at risk, not just that day's fuel bill. Solar systems eliminate generator failure as a business risk, not only as an energy cost - the reliability argument is stronger in practice than the cost argument. Practitioners at Heifer-supported cooperatives add a related, unplanned observation: the solar upgrade extended the chilling window at the MCC, which made it commercially viable for youth to ride further out and collect milk from farmers who would otherwise lose their morning production. That employment outcome was not designed into the programme; it emerged from the infrastructure investment, and UV-C extends the window further still.

Practitioners at Jesa added a different but equally practical point: an investment case has to compete against what a plant already has running, not just against theory. A processor with underutilised conventional pasteurisation capacity and a favourable industrial power tariff will not adopt a new technology on the strength of its energy-saving case alone if that case doesn't beat what they already own. This chapter treats that as confirmed

evidence rather than a hypothetical risk, and it is why the ranked recommendation in 5.9 concentrates near-term commercial deployment at the cooperative node rather than the processor node.

02 THE SKEPTIC: What is the strongest counterargument?

The investment case has always rested on three foundational assumptions, and field engagement has now tested each of them directly.

- **First,** that UV-C cold treatment will achieve in Uganda field conditions the bacterial reduction documented in Danish commercial facilities. The starting concentrations match - Brookside's own intake data (1-2.5 million cells/mL) falls within the published range - but hygiene controls and power supply consistency in rural western Uganda are materially different from a Danish dairy. The first commercial deployment, recommended at Nabitanga in 5.9, remains the proof of concept this assumption has always needed.
- **Second,** that quality-based payment will sustainably redirect supply from informal channels, which offer farmers cash immediacy that a quality premium must consistently outcompete. Nabitanga's own history with a prior DDP quality-based payment pilot - premiums and dividends passed through to farmers - is the first concrete field evidence that this mechanism holds in practice rather than only in theory.
- **Third,** that the Algeria market will be confirmed at the scale current pipeline profiles assume. DDP has confirmed Algeria has finalised negotiations to purchase 1.4 billion litres of milk annually from Uganda - this removes the confirmation risk itself, but Brookside's own 2026 supply pause to Algeria, on low raw milk availability, demonstrates a different and still-live risk: that Uganda's supply side is not yet sized to reliably fulfil a commitment of this scale year to year. The investment case should therefore treat the Algeria demand as confirmed but its fulfilment as conditional on the supply-side productivity gains Pearl Dairy's own KII identifies as the sector's binding constraint (5.4.1).

A fourth objection has emerged directly from field evidence rather than from desktop assumption-testing, and it now applies to both processors interviewed rather than one: an established processor already running below capacity on its existing treatment line does not need a second one, regardless of which technology that second line would use. Jesa said this directly; Pearl's own diagnosis of sector-wide capacity abundance leads to the same conclusion by inference. This narrows the addressable enterprise-level market for UV-C technology below what the Tier 1 tables in Section 5.4 might suggest on their own. This chapter's response is not to assume the objection resolves itself across every Tier 1 enterprise, but to concentrate the near-term commercial case at the cooperative MCC node - Nabitanga and Kalyabulo - where no legacy treatment capacity exists to compete against.

03 THE ECONOMIST: Who profits from the current system?

European equipment manufacturers have a direct commercial interest in presenting Uganda's dairy technology gap as a problem solvable by Danish and EU machinery. Their technologies are appropriate and will generate real productivity gains, but the equipment supplier perspective naturally emphasises hardware over the market systems and institutional constraints that hardware alone cannot fix - Dwaniro's stalled, already-installed processing plant is the clearest illustration of that limit.

The informal milk trade ecosystem - handling an estimated 55 percent of total supply against approximately 180 processing plants now accounting for 45 percent formally (DDP)25 - profits structurally from the absence of quality infrastructure. Raw-milk traders operating in this space are licensed and regulated by DDP, not unregulated as earlier estimates implied. Formalisation and quality-based payment threaten this margin directly. Any formalisation effort should expect passive resistance from informal trade actors as cooperative quality systems strengthen, and field evidence corroborates this directly: Nabitanga's own management described losing its

relationship with Pearl Dairy to private MCCs offering better prices in the same area, which is a reminder that formal buyers compete with each other for supply just as much as the formal sector competes with the informal one.

04 THE HISTORIAN: What pattern has played out before?

Uganda has invested in dairy infrastructure twice before in the post-independence era. In the 1970s, the Uganda Dairy Corporation held processing monopoly with state-owned cold chain infrastructure nationally. The model collapsed when political pricing decisions removed commercial discipline. The lesson: dairy infrastructure without commercial price signals produces cold rooms without milk.

In the 1990s and 2000s, liberalisation brought private processors but no accompanying quality infrastructure, entrenching the taste and shelf life problem that still characterises Uganda dairy today. That convention is already established across the sector, and changing it requires not only new technology but a shift in market expectations - a slower and less certain process than technology deployment alone.

The Dwaniro case is a live, current-day echo of the same pattern: a government-donated processing asset installed but commercially stalled for want of working capital, packaging, and market development, not equipment. It is a direct caution against treating hardware provision alone as sufficient, from exactly the kind of intervention this chapter is recommending elsewhere.

05 THE ACADEMIC: What does the evidence actually say?

The academic evidence on the enzyme and taste mechanism is robust across multiple peer-reviewed studies spanning three decades. The starting bacterial count at Uganda's western corridor MCCs is documented in published research, and Brookside's own intake data (1-2.5 million cells/mL) falls within, and independently corroborates, that published range from an entirely separate, field-collected source. The match between the documented Uganda problem and the documented technology solution is scientifically credible on two independent lines of evidence rather than one.

SECTION 5.9 FIVE CASE MODEL AND RANKED INVESTMENT RECOMMENDATION

Strategic | Commercial | Financial | Socio-Economic | Management

CASE 1 - STRATEGIC: STRONG

The strategic case for GTTF dairy investment sits at the confluence of agro-industrialisation and export growth, import substitution, food safety certification, and climate-smart energy transition. Non-replication in all target technology areas is confirmed, with one item now requiring active coordination rather than passive monitoring: the ReLIV project's true scale and status (5.1.4, 5.3.1).

CASE 2 - COMMERCIAL: VIABLE, NOW WITH GREATER PRECISION

Field engagement resolved the primary commercial uncertainty flagged in the previous version: enterprise contact and KII completion. Pearl Dairy, Jesa Farm Dairy, Brookside Uganda, Nabitanga, and the Nakaseke cluster cooperatives are all field-validated; Amos Dairies and Benni Foods are profiled on a desktop study basis and are ranked accordingly below.

CASE 3 - FINANCIAL: POSITIVE, SEQUENCING REVISED

The 5:1 leverage ratio remains achievable across the Tier 1 pipeline. Jesa's transaction scope is biogas only, in line with its own assessment that UV-C does not compete against its existing conventional pasteurisation capacity and grid power pricing, while Nabitanga offers a lower-capital, field-ready alternative for early UV-C commercial proof of concept.

CASE 4 - SOCIO-ECONOMIC: STRONG AND MEASURABLE

Quality premium of USD 0.06 to 0.11 (UGX 200 to 400) per litre, employment growth to 55,000-70,000 direct processing jobs by 2030, and the youth motorcycle aggregator effect documented at Heifer-supported sites all stand, reinforced rather than displaced by field evidence.

CASE 5 - MANAGEMENT: ACHIEVABLE, FOUR CONDITIONS UPDATED

- Amos Dairies and Benni Foods KIIs are formally closed as not-to-be-conducted; both remain desk-top-only profiles and any future capital commitment should be conditioned on direct enterprise engagement before structuring.
- Coordinate formally with IFAD's Uganda country programme on ReLIV's dairy-specific activities before Southwest corridor commitments are finalised.
- Obtain Brookside's CIP costing from its projects manager to convert the Stage C opportunity from a named gap into a structured transaction.

Stakeholder Summary At A Glance

Before the detailed ranked recommendation, this table summarises every enterprise and cooperative engaged in this study on a single page - the full evidence and reasoning behind each entry is in 5.4 and below.

Table 5.36 Stakeholder comparison summary

Stakeholder	Main focus	Biggest constraint	Biggest opportunity	GTTF status
Pearl Dairy (Lato Milk)	Uganda's largest processor, 31% market share	Farm productivity / milk supply deficit, not processing capacity	Quality-based payment system scaling	Tier 1, medium-term, commercially confidential
Jesa Farm Dairy (JESA)	Premium processor, 400,000 L/day installed	Water security (7M L/month borehole dependency); UV-C not commercially compelling at own plant	Biogas from existing ETP	Tier 1, near-term, biogas only
Brookside Uganda	Regional processor, 22% capacity utilisation	Tanker/bulking-centre CIP gap; raw milk availability for Algeria export	CIP investment; heat recovery	Tier 1, CIP costing pending
Benni Foods Limited	Largest installed capacity, 1M L/day	Desktop study basis	Biogas (largest effluent volume) and Algeria-export pasteurisation	Tier 1, ranked below field-validated sites

Stakeholder	Main focus	Biggest constraint	Biggest opportunity	GTTF status
Amos Dairies	Southwest anchor processor	Desktop study basis	Energy-efficient pasteurisation	Tier 1, lowest-confidence profile pending direct engagement
Nabitanga Cooperative MCC	Highest-readiness cooperative MCC in the portfolio	None significant - all four GTTF gates passed	First commercial UV-C deployment site	Tier 2, immediate priority once regulatory pathway clears
Yoghurt Express Limited	Micro premium processor, 500 L/day	Scale and capital to expand beyond two supplier farms	BDS and quality-systems support	Tier 2, re-assess once expansion underway
Dwaniro Cooperative	Underutilised government-donated processing asset	Working capital, packaging, distribution - not equipment	Value-addition demonstration case	Pipeline; diagnostic visit recommended before any hardware investment
DDP (MAAIF)	Sector regulator and sole mandated technology testing authority	No budget to finance technology pilots independently	Raslysation regulatory pathway (5.9)	Enabling partner; lead recommendation

Sources: *Synthesised from the field KIIs and enterprise profiles at 5.4.1-5.4.3.*

Ranked Investment Recommendation

This closing recommendation states explicitly where GTTF investment should go, to which enterprises, and why. The sequence ranks capital allocation by strength of evidence - field-validated findings first, desktop-only enterprises last - rather than by theoretical fit alone.

1. Lyras/Raslysation regulatory pilot (DDP-led) - enabling investment

The recommended first commitment is not an enterprise deal but the enabling investment: co-financing the DDP-supervised field pilot that unlocks UV-C cold treatment as an approved processing method nationally. It is the lowest-cost, highest-leverage item in this sequence - every subsequent UV-C-dependent recommendation below is contingent on the regulatory pathway this pilot completes. DDP has confirmed it lacks budget to run the pilot independently and has invited a financing partner; no other donor occupies this space, making it the cleanest non-replication case in the chapter. For GTTF to justify treating it as the lead investment in this chapter, the pilot has to open onto a credible national rollout, and that rollout has to make commercial sense on both sides of the transaction - for GTTF and Uganda's cooperative network, and independently for Lyras A/S and the wider Danish/EU technology partner relationship the GRASP programme exists to build. Both cases are set out below rather than left implicit.

The Uganda-side replication case

DDP's own technical assessment estimates that, once the technology is approved, adoption across roughly 60 percent of the country's 729 active MCCs - concentrated among centres that sell milk directly into formal channels - would bring an estimated 1.326 million litres per day into improved-quality processing, out of the 3.01 million litres per day of aggregate installed MCC capacity nationally. That is not a hypothetical addressable market; it is a specific, DDP-sized replication target that the Nabitanga deployment is designed to prove out before it is scaled.

The unit economics support replication at that scale. A single-site Stage A+B bundle - SCC meter, milk analyser, and a Lyras UV-C unit - runs USD 0.15 to 0.25 million per site in the capital stack already set out in Table 5.34. Applied indicatively across a multi-hundred-MCC rollout, that per-site cost falls further as installation, training, and DDP validation processes standardise after the first deployment - the same learning-curve effect the pilot itself is structured to capture. The GTTF grant retires the technology-adoption risk premium once at the pilot; every subsequent MCC deployment is a lower-risk, better-understood transaction that commercial co-financing can absorb at a smaller matching-grant share than the first site required.

The technology vendor and Danish/EU partner case

This chapter has so far argued the investment case from Uganda's side. It is equally important to state why Lyras A/S and the broader Danish/EU technology-transfer relationship should want this rollout, since the GTTF mandate exists specifically to make that case work for both parties, not just to subsidise adoption of European equipment.

- **A regulatory-approval market entry, not just an equipment sale.** Lyras's technology is not currently an approved milk-processing method anywhere in East Africa. A DDP-validated Statutory Instrument and UNBS standard amendment, financed by GTTF rather than by Lyras, gives the company a regulatory precedent it does not have to fund itself - a materially cheaper route into a new regional market than Lyras entering unassisted.
- **A reference case with existing commercial credibility to build on.** Lyras already has functioning European reference sites - Novozymes' filtration operations and Arla Foods' Krusaa dairy plant, where the technology has cut daily cleaning procedures and enabled full brine reuse. A validated Uganda deployment extends that reference set into a tropical, smallholder-supplied dairy system fundamentally different from Danish conditions, which is commercially valuable to Lyras as proof the technology generalises beyond the market it was developed for.
- **A beachhead into a materially larger regional market.** Uganda's roughly 4.2 to 5.4 billion litres of annual production is a fraction of the EAC's combined dairy output - Kenya alone produces more than Uganda today. A Uganda-validated regulatory and commercial template is the natural basis for Lyras and its EU/Danish partners to pursue Kenya, Tanzania, and Rwanda next, at a fraction of the market-entry cost a first-mover would otherwise bear in any single one of those markets.
- **A direct return on Denmark's own aid-funded technology-transfer objective.** GRASP is funded specifically by the Government of Denmark and the EU to transfer Danish and EU green agri-technology into Uganda. A Danish company converting a GTTF-financed regulatory pilot into a commercial East African market position is precisely the outcome that funding relationship is designed to produce - it is not incidental to the programme's purpose, it is close to the programme's purpose stated in commercial terms.

Taken together, this is a mutually reinforcing structure rather than a one-sided subsidy: GTTF gets the lowest-cost, highest-leverage enabling investment in its portfolio; Uganda's cooperative network gets a validated quality technology with a credible path to 60 percent MCC coverage; DDP gets the pilot data and regulatory precedent it has said it cannot fund alone; and Lyras and Denmark get a de-risked, evidence-backed entry into Uganda and, on the strength of that, the wider EAC market.

2. Nabitanga Cooperative MCC, Sembabule

The strongest field-validated commercial deployment candidate in the portfolio. All four GTTF gates passed at KII; the most advanced on-site testing suite recorded in the Western milkshed; zero rejection rate; and management raised UV-C compatibility directly and unprompted during the field visit. This is the natural first commercial UV-C site once the regulatory pathway clears, and does not carry the legacy-infrastructure objection that narrowed Jesa's package.

3. Jesa Farm Dairy, Wakiso - biogas from effluent

A Tier 1 transaction with low execution risk: existing approved effluent treatment plant site, two prior UDB co-financing precedents, and a premium brand with a direct commercial stake in effluent management. **UV-C is explicitly excluded from this deal following Jesa's own field KII finding** that the technology does not compete against their underutilised conventional pasteurisation capacity and grid power pricing. Three independent field sites in Jesa's supply network separately confirmed a technical support gap for cooperative chilling equipment, which is a distinct, unaddressed opportunity worth tracking outside this specific transaction.

4. Southwest corridor MCC solar and quality bundle

The scale investment: largest addressable volume, fastest payback from documented energy savings alone. Kalyabulo returned the strongest unprompted demand signal for UV-C in the field programme; Kijjumba is retained in the corridor but reclassified as pipeline rather than immediate, given its existing double loan burden from a prior failed solar installation.

5. Benni Foods Limited, Lyantonde

Largest installed single-site capacity in the country and a confirmed active Algeria exporter, with the strongest biogas business case by effluent throughput of any enterprise in the portfolio. Ranked below the field-validated sites because enterprise engagement remains desktop-only pending KII completion; the fundamentals justify continued Tier 1 priority, but commitment should await direct management contact.

6. Amos Dairies, Mbarara

Retained as a Tier 1 target on the strength of market position and Southwest anchor location, but this recommendation rests entirely on desktop research. No KII was conducted with Amos Dairies management at any stage of this study, and investment appetite, capital constraints, and technology readiness cannot be independently confirmed. Any capital commitment to Amos Dairies should be conditioned on direct enterprise engagement before structuring, and should not be treated as validated to the same evidentiary standard as Nabitanga or Jesa above.

7. Brookside Uganda and Pearl Dairy - medium horizon

Brookside's newly identified Stage C tanker CIP opportunity is a live near-term possibility pending the costing exercise its projects manager has offered; its broader Tier 1 processing investment remains medium-horizon subject to Algeria offtake recovery. Pearl Dairy remains on the commercially confidential, public-framing-only basis already established in this chapter. Its UV-C question is treated as closed - a second treatment line does not clear the bar at an underutilised-capacity processor of Pearl's scale, by the same capacity logic Pearl's own KII established for the sector.

Engagement Modality Mapping: EU and Danish Instruments

Each item in the ranked recommendation above is mapped below to the Danish business instrument or engagement modality best suited to it, based on the new Danida instruments summary shared by the Royal Danish Embassy (RDE). This shows concretely how Danish and EU private-sector engagement channels connect to this chapter's specific recommendations, rather than leaving that connection implicit.

Table 5.37 Ranked recommendations mapped to Danish/EU engagement instruments

Rank	Recommendation	Danish/EU instrument	Rationale
1	Lyras/Raslysation regulatory pilot	E4 - Innovation Bridge (feasibility study under DKK 750,000; demonstration plant under DKK 6 million)	Direct match: E4 exists specifically to test and demonstrate new technologies with companies, authorities, and non-commercial partners - precisely DDP's role in this pilot.
2	Nabitanga Cooperative MCC	E2 - Business Partnerships (Full Scale tier, under DKK 10 million)	First commercial deployment of a technology already validated by the E4 pilot - matches E2's role of developing and maturing a business case once feasibility is established.
3	Jesa Farm Dairy - biogas	E3 - Impact Incubator (concessional soft loan up to DKK 15 million)	Established enterprise with an existing Danish technology link (Bigadan A/S); capex and working-capital financing for a proven technology matches E3's midstream role directly.
4	Southwest corridor MCC bundle	E5 - Impact Investors (investments of DKK 10-30 million) or E3, depending on final structuring	Scale investment across up to 50 MCCs - the larger capital requirement and multi-site mobilisation fits E5's downstream, larger-ticket role better than a single-site instrument.
5	Benni Foods Limited	Likely exceeds single-instrument scope	Uganda's largest single-site dairy facility; capital requirement likely exceeds any one Danish instrument's ceiling and would need blended GTTF, commercial, and Danish co-financing. Desktop-only pending KII - structuring indicative.
6	Amos Dairies	Likely exceeds single-instrument scope	Same scale consideration as Benni Foods; desktop-only pending KII - structuring indicative.
7	Brookside Uganda / Pearl Dairy	E3 (Brookside CIP, pending costing) / not applicable (Pearl, confidential medium-term pipeline)	Brookside's Stage C CIP investment is capex-scale and could fit E3 once costed; Pearl remains on the confidential, public-framing-only basis already established in this chapter.

Climate-Funding Share Against the 75% Threshold

GTTF's climate-finance eligibility requires that at least 75 percent of proposed funding address a climate challenge, scored against this chapter's own RIO Markers assessment (5.5.4). This section computes that share transparently, using only the ranked recommendation items with a defined capital range already established in this chapter's capital stack (Table 5.33), rather than assuming a positive result.

Table 5.38 Climate-funding share of quantified ranked recommendations

Recommendation	Capital range (USD M)	Midpoint (USD M)	RIO climate score	Climate-positive?
Nabitanga (UV-C + solar bundle)	0.15-0.25	0.20	Mitigation 2 / Adaptation 1	Yes
Jesa Farm Dairy - bio-gas	0.4-0.8	0.60	Mitigation 2 (Principal)	Yes
Southwest corridor MCC bundle	0.8-1.2	1.00	Mitigation 2 / Adaptation 1	Yes
Amos Dairies (pasteuri-sation only)	0.6-1.2	0.90	Not scored - no biogas or renewable component in this recommendation	No

Sources: *this chapter's Table 5.33 (capital stack) and Table 5.32 (RIO Markers scoring).*

At the midpoint of each range, USD 1.80 million of the USD 2.70 million in quantified capital across these four items - 66.7 percent - is climate-positive under this chapter's own RIO scoring. This is below the 75 percent threshold, and this chapter states that plainly rather than rounding up.

This calculation is necessarily incomplete: the Lyras/Raslysation regulatory pilot (ranked first, and fully climate-positive on both Mitigation and Adaptation) does not yet have a specific dollar figure stated in this chapter, and including it would raise the share. Benni Foods, Brookside's CIP investment, and Pearl Dairy are all desktop-only, pending-cost, or confidential, and none carry a defined capital figure yet - Benni Foods' recommendation explicitly includes a biogas component and would likely score climate-positive once quantified, while Brookside's CIP investment is confirmed climate-neutral under this chapter's own scoring (5.5.4) regardless of its eventual cost.

Two concrete paths would close the gap without altering the substance of this chapter's recommendations: obtaining the Lyras pilot's specific cost figure from DDP, which is climate-positive and would raise the share on its own; and reconsidering whether Amos Dairies' recommendation should be paired with a renewable or effluent-management component, consistent with the same logic already applied to Jesa. Both are recommended before this chapter's capital stack is finalised.

CHAPTER 5 - KEY FINDINGS SUMMARY

Table 5.39 Key findings and investment implications

Key finding	Investment implication
ReLIV (IFAD, USD 181.33M) is confirmed active since 18 September 2024, targeting 200,000 households in the Southwest cattle-corridor geography.	Active non-replication coordination with IFAD Uganda is the top diligence priority before Southwest corridor commitments.
Jesa Farm Dairy has explicitly ruled out UV-C investment at its own plant on sunk-capacity and industrial-tariff grounds.	UV-C's commercial case concentrates at the cooperative MCC node (Nabitanga, Kalyabulo), not the processor node. Jesa's GTTF package narrows to biogas only.

Key finding	Investment implication
Jesa's and Pearl's own reasoning both resolve to the same conclusion: an underutilised-capacity processor does not need a second treatment line, regardless of technology.	Pearl's UV-C question is treated as closed by inference from Pearl's own stated market diagnosis, not by extrapolating Jesa's finding onto a different company. UV-C's commercial case concentrates at the cooperative MCC node.
Nabitanga passed all four GTTF gates with the highest readiness score recorded in the field programme.	Nabitanga is the recommended first commercial UV-C deployment site once the DDP regulatory pilot clears.
Brookside identified tanker CIP as the single biggest unaddressed quality gap in the cattle corridor.	New Stage C GTTF opportunity, pending costing from Brookside's projects manager.
Amos Dairies and Benni Foods are profiled on a desktop study basis.	Both retained as Tier 1 targets but ranked behind field-validated enterprises; direct engagement is recommended before any future capital commitment.
DDP, FAOSTAT, and NFP export figures reconciled as three distinct metrics rather than a contradiction.	Use DDP's FY2025/26 figure (USD 102.0M) as current gross export value, not the FY2022/23 peak (USD 264.5M); retain FAOSTAT's +USD 188.6M as the 2023 net trade balance time series.
DDP has confirmed Algeria has finalised negotiations for 1.4 billion litres/year - 26-33% of current national production.	Treat the demand as confirmed; treat fulfilment as conditional on the farm-productivity gains Pearl Dairy's own KII identifies as the binding sector constraint. Model supply-side investment demand accordingly, not as speculative upside.
Formal sector now handles approximately 45 percent of milk supply against approximately 180 processing plants, informal approximately 55 percent (DDP, current).	Raw-milk traders are licensed and regulated, not an unregulated grey market; formalisation and quality-based payment interventions should be sized against this corrected baseline.
Supply intermittency has three compounding causes - genetics, dry-season feed/fodder gaps, and the resulting 40-50 percent dry-season capacity utilisation - not one.	Collection and cold-chain quality investment improves what happens to milk produced; it does not by itself raise how much is produced. Breed improvement and feed/pasture production are documented as upstream, non-GTTF interventions.
aBi's own Green Dairy Investment Program is active and overlaps directly with two of this chapter's Tier 1 anchors (Pearl Dairy, Jesa Farm Dairy).	Coordinate directly with aBi's programme team before structuring any GTTF transaction at these two enterprises.

ANNEX F - STAKEHOLDER CONSULTATION LOG

All named stakeholder contacts, meeting dates, and engagement records are consolidated here. References in the chapter body are to organisations and roles only.

Table 5.40 Stakeholder consultation log (as of 4 August 2026)

Organisation	Role / Name	Date	Notes
Pearl Dairy, Mbarara	Quality Assurance Manager, Amit Sagar	25 June 2026	KII completed online. UV-C position at own plant not addressed - flagged for follow-up.
Nabitanga Cooperative MCC, Sembabule	Ronald Mwesigwa	10 July 2026	Highest GTTF readiness score in the field programme.
Jesa Farm Dairy, Wakiso	Denis Sibanda, Plant Manager	8 July 2026	UV-C explicitly ruled out for own plant; biogas confirmed as investment priority.
Migani / Kijjumba / Kalyabulo Cooperative MCCs, Nakaseke	Cooperative management, on-site	9 July 2026	Cross-cutting Jesa margin confirmation; Kalyabulo strongest UV-C demand signal; Kijjumba reclassified pipeline.
Dwaniro Cooperative, Kiboga	Charles Iboona, General Manager	15 July 2026	KII completed, virtual. Installed processing asset underutilised for commercial-capacity reasons, not technology.
Brookside Uganda	Calvin Oyugi	20 July 2026	Virtual. CIP gap identified as top quality priority; costing follow-up offered.
Yoghurt Express Limited, Bugolobi	Owner/Manager	KII completed	Direct-sourcing premium micro-processor, 500 L/day current throughput; expansion planned to 2,000-3,000 L/day.
Benni Foods Limited, Lyantonde	Management, contact identified	Desktop study	Profile developed through desktop research; direct engagement recommended before investment structuring.
Amos Dairies, Mbarara	Contact not yet established	Desktop study	Profile developed through desktop research; direct engagement recommended before investment structuring.
Dairy Development and Production (DDP) department, MAAIF	Pamela Annet Kyomuhangi, Assistant Commissioner	June 2026	MCC data, quality issue hierarchy, regulatory pathway.
SNV INCLUDE Programme	Jeen Kootstra, Project Manager	15 June 2026	Non-replication confirmation, Southwest milkshed.

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Chapter 6 : Piggery Value Chain Assessment

Sector context

Uganda has one of East Africa's strongest structural pork - demand markets, with approximately 3.2 kg per capita annual pork consumption, nearly twice Kenya's and three times Tanzania's. Key findings will cover: the large gap between Uganda's 7.1 million confirmed pig herd and its formal processing infrastructure, African Swine Fever (ASF) biosecurity risk, genetics and feed - quality constraints, HACCP - compliant abattoir and cold - chain opportunities, Black Soldier Fly (BSF) protein and farm - scale biogas, and the regulatory requirements for integrating new feed technologies into the formal pig industry.

Uganda's 2021 National Livestock Census recorded 7.08 million pigs, with an A2i growth - adjusted estimate of approximately 9.0 million by 2025. Yet less than 15 per cent of pig offtake passes through certified formal channels, with fewer than 35 nationally licensed HACCP abattoirs. The resulting value gap is substantial: live pigs trade at approximately USD 2.22–2.78/kg liveweight, compared with USD 5.00–6.94/Kg for packaged processed pork, representing approximately 2.0–3.1x value multiplication through formal processing.

The GTTF investment case is anchored in five complementary opportunities: genetics and artificial insemination, feed - quality improvement, biosecurity infrastructure, HACCP - compliant modular slaughter and cold - chain systems, and circular - economy technologies including BSF protein and farm - scale biogas. BSF systems can achieve approximately 14–20 - month payback at a commercial scale, while farm - scale biogas offers an estimated 18–28 - month payback. The principal investment constraint is therefore not demand but the infrastructure, productivity and biosecurity gap preventing Uganda's large pig population from consistently supplying the formal domestic and regional market. A critical policy enabler is Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) recognition and standardization of BSF larval meal as a feed ingredient for formal compound pig feed.

Key Findings

1. Uganda has a large and rapidly growing pig sector, underpinned by strong domestic demand. The 2021 National Livestock Census recorded 7.08 million pigs, up 122.5% from 2008, with an A2i projection of approximately 9.0 million pigs by 2025. Uganda's per - capita pork consumption of about 3.2 kg/year is the highest among the EAC comparators, creating a strong and durable domestic market.

2. The major investment opportunity is the large gap between informal production and formal processing. Less than 15% of pork offtake passes through certified formal channels, while certified processed pork sells at roughly USD 4.86–6.76/kg, compared with about USD 2.16–2.70/kg liveweight at farm gate. This creates a 2–3x value - addition opportunity through HACCP - compliant slaughter, cold chain, packaging, and formal market access.

3. Productivity and biosecurity are the critical constraints to capturing this market opportunity. African Swine Fever remains the defining sector risk, with reported herd losses of 30–60% in affected districts and no accessible commercial vaccine mitigation in Uganda. At farm level, feed accounts for 68–73% of production costs, while genetics, feed quality and mycotoxin control strongly influence feed - conversion efficiency and reproductive performance.

4. GTTF should focus on a combination of biosecurity, productivity, formal processing, and circular - economy technologies. Priority investments include AI genetics and improved feed quality, HACCP - compliant modular abattoirs and cold chains, BSF protein production, and farm - scale biogas. BSF has a potential 14–20 - month payback at commercial scale, while biogas offers approximately 18–28 months; however, BSF adoption requires an enabling Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) feed - quality standard. The DRC market also offers an attractive export corridor, with certified pork prices of approximately USD 5.95–8.65/kg.

Uganda holds a genuine competitive advantage in pigs alongside poultry and fish and is approaching a tipping point where it could become a net exporter of processed pork to Kenya and the wider region rather than a net importer. This is independently supported by the live - swine trade data in Section 6.2D: Uganda flipped from a net importer to a net exporter of live pigs by weight in 2022–2024, driven by the DR Congo export surge.

The plenary discussion cited the declining import share of established formal - retail pork brands as further evidence Farmer's Choice Limited (Kenya) was named as the reference brand with imported product's share of premium processed pork said to have fallen from approximately 100 percent to approximately 50 percent. The formal data request to URA and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) for HS 1601/1602 processed - pork trade figures, needed to test this claim properly, was outstanding at the time of writing.

As an interim check only, Comtrade - derived figures (via WITS and commercial trade - intelligence aggregators, not URA primary data) show Uganda's sausage and similar meat - preparation imports (HS 160100, all meats, not pork - specific) growing in absolute terms approximately 820 tonnes and USD 3.3 million in 2023, up at roughly 12–16 percent per year from 2020 sourced mainly from Kenya, China, and Belgium rather than from Kenya alone. This is a genuine tension with the plenary framing, not a confirmation of it: absolute import volume rising is consistent with a falling import share only if domestic consumption and production are growing faster still, which this interim data cannot establish either way.

Farmer's Choice's own confirmed export markets (Uganda among them, per company and industry sources) corroborate that it is a real and active brand in Uganda's market, but no public source including this interim check corroborates the specific 100 - to - 50 percent share figure. This observation should be treated as an open question pending the formal URA/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) response, not as a settled finding, and should not be cited outside this chapter until then. The genetics and AI intervention, while the smallest single ticket size in this chapter's investment portfolio, carries a disproportionately large multiplier effect: improved genetics raises feed intake and feed - conversion demand per animal, which in turn increases demand for quality compound feed and raw material inputs (Section 6.3A), and raises the volume and consistency of market - ready pigs reaching the processing industry (Section 6.2, Section 6.4B) so genetics functions as an upstream multiplier for the feed and processing investment cases elsewhere in this chapter, not as a stand - alone intervention.

6.1 Pillar 1: Historical Baseline and Strategic Alignment

Uganda's pig sector has expanded rapidly since the mid - 2000s. The 2021 National Livestock Census (NLC 2021), published by UBOS in April 2024, recorded a national pig herd of 7,083,943 (~7.1 million), up 122.5 percent from the 3.2 million recorded in the 2008 National Livestock Census. This implies a compound annual growth rate of approximately 6.3 percent over 2008 - 2021, applying forward to an A2i growth - adjusted estimate of approximately 9.0 million head by 2025. This growth rate substantially exceeds cattle (1.8% CAGR) and small ruminants (2.1%), driven by rapid urbanisation, rising demand for affordable animal protein, and the pig's inherent biological efficiency. See section 6.0B for a full reconciliation of this figure against the FAOSTAT - trend

estimate previously used in this chapter.

Table 6.2 Pig herd and pork production: Uganda and regional comparators, 2015 - 2025

Year	Uganda Herd	Uganda Pork MT	Kenya Herd	Kenya Pork MT	Tanza-nia Herd	Tanzania Pork MT	Rwanda Herd	Rwan-da Pork MT	Source
2015	4.91m*	n/r	0.40m	~30,000	1.8m	~42,000	0.9m	~18,000	FAOSTAT / UBOS
2016	5.22m*	n/r	0.40m	~31,000	1.8m	~43,000	0.9m	~18,000	FAOSTAT QCL
2017	5.55m*	~80,000	0.40m	~32,000	1.8m	~44,000	0.9m	~18,500	FAOSTAT QCL
2018	5.90m*	~90,000	0.40m	~34,000	1.8m	~45,000	0.9m	~19,000	FAOSTAT QCL
2019	6.27m*	~100,000	0.40m	~36,000	1.8m	~46,000	0.9m	~19,500	FAOSTAT QCL
2020	6.67m*	~108,000	0.40m	~37,000	1.8m	~50,000	0.9m	~20,000	FAOSTAT QCL
2021	7.08m	~120,000	0.40m	~80,000*	1.8m	~54,000	0.9m	~20,000	FAOSTAT; UBOS 2022
2022	7.53m*	~130,000	0.40m	~85,000	1.8m	~57,000	0.9m	~18,000	FAOSTAT; KRA/KNBS
2023	8.01m*	~140,000	0.40m	~90,000	1.8m	~59,000	0.9m	~18,000	FAOSTAT; KRA/KNBS
2024	8.51m*	~150,000	0.40m	~93,000	1.8m	~60,000	0.9m	n/r	FAOSTAT est.
2025	9.05m*	~155,000	0.40m	~95,000	1.8m	n/r	0.9m	n/r	UBOS 2025 est.

***Source:** UBOS National Livestock Census 2021; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; FAOSTAT Crops and Livestock Products. The 2021 Uganda herd figure of 7.08 million is the authoritative census baseline. Uganda figures for 2022–2024 use The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) livestock population series. Earlier historical figures and 2025 values should be explicitly identified as estimates/projections where they are not directly observed. Regional comparator series should be drawn consistently from FAOSTAT rather than combining national estimates with FAOSTAT observations.*

Figure 6.1 Pig Herd 2025: Uganda and Regional Comparators (million head). Sources: UBOS 2022; FAO FAOSTAT 2023; Statistics Denmark 2023. Denmark included as technology - transfer reference, not a production comparator.

Figure 6.2 Annual Pork Offtake 2023: Uganda and Regional Comparators (MT/year). Sources: FAO FAOSTAT

2023; KRA/KNBS 2023; TRA/NBS 2023; RAB/NISR 2023. DRC included as primary export target market.

6.1.1 African Swine Fever: The Defining Structural Risk

African Swine Fever (ASF) is an acute, highly contagious haemorrhagic viral disease with a case fatality rate approaching 100 percent in immunologically naive pig populations. As of June 2026, no ASF vaccine is registered or commercially available in Uganda or elsewhere in East Africa. Vietnam operates the world's only field - deployed commercial live - attenuated ASF vaccine (ASFV - G - I177L), in limited use since 2022, but it has not received regulatory approval in Uganda, and independent trials show its protective efficacy varies significantly by ASFV strain it is not established as broadly effective against the genotypes circulating in East Africa.

For planning purposes, this chapter treats ASF as having no accessible vaccine mitigation option for Uganda's pig sector. Uganda has experienced multiple devastating ASF epidemic cycles. The 2016 - 2017 outbreak resulted in the death or emergency culling of over 680,000 pigs and direct economic losses exceeding USD 45 million. More recent FAO - ECTAD assessment confirms ASF herd loss rates of 30 - 60 percent in affected districts during the 2022 - 2024 period. Note on data provenance: the National Livestock Census 2021 (UBOS) does not include a dedicated national - level ASF prevalence or mortality dataset it records Foot and Mouth Disease (FMD) only as a field - operations constraint encountered during data collection, not as a disease - burden statistic. The ASF figures cited in this section rest entirely on Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and FAO - ECTAD sourcing; they are not independently corroborated by UBOS at this time.

Field engagement with a long - standing commercial breeder reaffirms this risk profile: African Swine Fever is described as entering herds principally through contaminated feed, swill, and infected pork moving past weak meat inspection, with the virus remaining viable for roughly fourteen to twenty days, so that disciplined biosecurity house and paddock separation, dedicated staff per unit, controlled entry and showers is the single determinant of which producers survive the recurring outbreak cycle (Mulindwa 2026).

Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Animal Health and Production Department has elevated ASF to priority - disease status, ranking it alongside Foot and Mouth Disease (FMD) and tick - borne disease in its current disease - control priorities. This is a material alignment point for the GTTF investment case: a biosecurity intervention targeting ASF is not a donor - led priority imposed on the sector but one that tracks the national animal health authority's own current ranking, strengthening the case for Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) co - investment and regulatory support alongside the GTTF matching grant.

Uganda's pig sector remains predominantly informal and smallholder — an estimated 1.6 million rural households keep pigs, the great majority outside any certified or biosecure system. The GTTF interventions in this chapter are deliberately sequenced rather than simultaneous, because they scale through different mechanisms. ASF biosecurity infrastructure and genetics investment are targeted first at emerging large - scale commercial farms (Section 6.1A), not because smallholders are excluded by design but because compartmentalised biosecurity is not achievable at backyard scale; the scaling pathway for smallholders runs through the demonstration effect and market signal these commercial farms create, not through direct smallholder - level biosecurity grants.

Resolving ASF risk at the commercial tier is what unlocks broader sector expansion in two concrete ways: it de - risks private co - investment into the certified processing capacity (HACCP abattoirs, cold chain) that smallholders need as a route to formal - market prices once ASF - related supply shocks stop periodically collapsing herd inventories sector - wide; and it establishes the AI and genetics multiplication capacity (Section 6.4B) that can, over time, extend improved genetics to smallholder - supplying outgrower schemes on the same model already

used in the poultry and dairy value chains. Scalability in this chapter is therefore read as sequential commercial - tier de - risking first, smallholder market access second rather than as a single intervention reaching all 1.6 million households directly.

Note: KEY ANALYTICAL PRINCIPLE: ASF biosecurity infrastructure is the foundation on which every other piggery investment stands or falls. No piggery grant is disbursed without biosecurity compliance as a precondition.

'ASF biosecurity infrastructure' in this chapter means physical infrastructure and protocols for large - scale commercial farms controlling human traffic (dedicated staff per unit, controlled entry, showers), pig traffic (compartmentalisation, paddock and house separation, quarantine of new stock), and incoming feed (swill bans, verified feed sourcing) not a medicine or vaccine. As set out above, the Vietnamese ASFV - G - I177L vaccine does not offer reliable protection against Uganda's circulating strains, and an Africa - specific vaccine is realistically around five years away on current research timelines. This also means the intervention cannot be delivered to the backyard - pig segment, where physical compartmentalisation is not commercially or practically achievable at household scale; it is designed for, and should be targeted at, emerging large - scale commercial farms, where biosecurity protocol compliance is enforceable and financeable.

6.1.2 EAC Regional Context and Uganda's Structural Demand Advantage

Table 6.3 EAC piggery sector comparison: Uganda vs. regional comparators and Denmark reference

Indicator	Uganda	Kenya	Tanzania	Rwanda	DRC	Denmark
Pig herd (head)	~7.1 million (NLC 2021)	~0.40 million	~1.8 million	~0.90 million	~5.1 million	~15 million
Annual pork offtake (MT)	130,000 - 160,000	~95,000	~60,000	~18,000	~210,000	~1,800,000
Per capita pork (kg/yr)	~3.2	~1.9	~1.1	~1.4	~2.4	~31.0
Herd CAGR 2015 - 2025	~6.0%	~0%	~0%	~5 - 7%	~4 - 5%	Stable
Formal HACCP - certified processing	<35 abattoirs nationally; <15% formal market share	~20 - 25%	~10%	~15%	n/r	~95%+
ASF endemic status	Yes - HIGH RISK	Yes - MEDIUM	Yes - MEDIUM	Yes - MEDIUM	Yes - HIGH	Controlled
Primary production regions	Central, Eastern, Western Uganda	Central (Nairobi belt)	Kilimanjaro, Arusha, Dodoma	Central Rwanda (Kigali belt)	Kinshasa, Katanga, Nord Kivu	National (highly intensive)
Cultural demand (pig consumption)	HIGH: Buganda, Busoga, Kigezi - deep cultural integration	MEDIUM: Nairobi urban only	LOW: largely taboo outside highland regions	MEDIUM: growing urban peri - urban	HIGH: urban DRC consumer markets	Very high - cultural staple

Indicator	Uganda	Kenya	Tanzania	Rwanda	DRC	Denmark
Primary DRC export opportunity	Direct export to Goma, Beni, Bunia - 20 - 35% price premium	Limited - Kenya supply constrained	Limited - distance	Limited - small supply	-	n/a

Sources: FAO FAOSTAT 2023; UBOS 2022; KRA/KNBS 2023; TRA/NBS 2023; RAB/NISR 2023; DAFF/Stats SA 2023; Statistics Denmark 2023.

Figure 6.3 Per Capita Pork Consumption: Uganda in Global and Regional Context (kg/person/year). Sources: FAO FAOSTAT 2023; UBOS NHS 2023/24; Statistics Denmark 2023.

Note: Uganda is the dominant pork consumer in the EAC by per capita terms and by growth rate. This structural demand position not replicated by Kenya or Tanzania is the commercial foundation on which GTTF investment rests.

This structural demand position is corroborated by field consultation with a vertically integrated pork processor, which identifies Uganda as the region's largest pork consumer and points to the Democratic Republic of Congo, South Sudan and a production - constrained Rwanda as the principal external growth markets (Wallace 2026).

6.1.3 Production Projections to 2030

Table 6.4 Pork production projections to 2030, three scenarios

Year	Conservative (4% CAGR)	Base Case (6.3% CAGR)	Optimistic (9% CAGR)	(MAAIF)) Target MT	Note
2025	155,000	155,000	155,000	-	UBOS / FAOSTAT 2025 est. (baseline)
2026	161,200	164,800	169,000	-	Catalytic capital investments commence; biosecurity first cohort
2027	167,600	175,100	184,200	-	First HACCP abattoir operational
2028	174,400	186,100	200,700	-	BSF cluster model reaches Tier 2 scale
2029	181,300	197,800	218,800	250,000	NDP IV target year; DRC export corridor opens
2030	188,600	210,300	238,500	-	NDP IV +1 horizon

Conservative = 4% CAGR; Base Case = 6.3% CAGR (the NLC 2021 - implied empirical herd growth rate carried through to production, per section 6.1); Optimistic = 9% CAGR. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) target from Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Sector Strategic Plan 2023/24 - 2027/28. Not endorsed by NPA or Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) as official projections.

Figure 6.4 Uganda Piggery: Commercial Output by Enterprise Tier. Sources: UBOS 2022; Ministry of Agriculture, Animal

Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2023; Mulindwa 2017; A2i KII intelligence 2026.

6.1.4 NDP IV and Government Strategy Alignment

NDP IV (2025/26 - 2029/30) designates agro - industrialisation as a primary driver of structural transformation and names livestock including piggery as one of four priority agro - industrial value chains. This alignment sits inside a larger national ambition: NDP IV is the first of three consecutive five - year plans designed to deliver Uganda's Tenfold Growth Strategy, which targets expanding the economy roughly tenfold, from approximately USD 50 billion in FY 2023/24 to USD 500 billion by 2040, by doubling the economy every five years. The strategy rests on four anchor sectors captured in the official ATMS framework: Agro - industrialisation, Tourism, Minerals, and Science, Technology and Innovation. Agro - industrialisation is the first - named and most labour - intensive of the four, and piggery sits within it as a named livestock sub - sector.

The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Sector Strategic Plan 2023/24 - 2027/28 explicitly designates piggery as a priority investment sub - sector for protein security, value addition, and cooperative organisation formalisation, and identifies ASF biosecurity control, formal processing capacity, and cooperative aggregation as the three constraints to sector formalisation constraints that map directly onto the technology investment categories in section 6.6 of this chapter.

In the FY 2026/27 budget, Government committed approximately 95.6 percent of discretionary resources to the four ATMS anchor sectors, making piggery investment a direct private - capital contribution to the single highest national economic - transformation priority rather than a peripheral agricultural activity. This is reinforced by a structural funding gap: the Agro - industrialisation Programme's share of the national budget fell from approximately 2.9 percent in FY 2024/25 to approximately 2.4 percent in FY 2025/26, leaving the allocation at roughly 70 percent of its NDP IV target. The gap between the policy mandate for agro - industrialisation and the public financing available to deliver it is the space a blended - finance instrument is designed to occupy.

STRATEGIC ALIGNMENT SUMMARY: NDP IV names agro industrialisation as the first of four ATMS anchor sectors driving the Tenfold Growth Strategy and identifies livestock including piggery within it. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Sector Strategic Plan names ASF biosecurity, formal processing capacity, and cooperative aggregation as the sector's three formalisation constraints, mapping directly onto this chapter's technology investment categories. With the Agro - industrialisation Programme funded at roughly 70% of its NDP IV target, private - capital leverage closes a documented public - financing gap rather than duplicating state effort.

Sources: National Planning Authority, NDP IV 2025/26 - 2029/30; Ministry of Finance, Planning and Economic Development, National Budget Framework Paper FY 2025/26 and Budget FY 2026/27; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Sector Strategic Plan 2023/24 - 2027/28. Budget - share figures are subject to confirmation against final Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and MoFPED published abstracts and are not sourced from any poultry - chapter material.

6.1D - 1 Forward - Looking Outlook: 10 - , 20 - and 30 - Year Horizon and International Benchmarks

The projections elsewhere in this chapter are built to a 2030 horizon, consistent with NDP IV and the GTTF programme period. Read against Denmark's Africa strategy which frames engagement in generational terms the sector's trajectory is better understood across three horizons: the 2030s (10 years), the 2040s (20 years) and the 2050s (30 years).

10 - year horizon (to the mid - 2030s)

The biosecurity - first consolidation trajectory documented in Section 6.1A is expected to continue on its current path, with the certified formal - processing share of offtake rising from today's under - 15 percent as HACCP abattoir and cold - chain investment comes online. This is the horizon over which the genetics - and - feed investment case in this chapter should mature from KII candidate to funded, operating enterprise, and over which the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) BSF larval meal feed - quality standard (Section 6.7) should be secured.

20 - year horizon (to the mid - 2040s)

Denmark is already used throughout this chapter as the technology - transfer reference point (Table 6.2, Table 6.3, Figure 6.1) rather than as a production comparator, given the roughly tenfold gap in per - capita pork consumption (Denmark ~31 kg/year against Uganda's ~3.2 kg/year, Table 6.1) and Denmark's status as a mature, disease - free, genetics - exporting pork sector. On a 20 - year horizon, the realistic aspiration is not to close that consumption gap which reflects deep differences in income, culture and market structure but to close the productivity gap that Artificial Insemination genetics and feed - quality investment are designed to address: moving Uganda's commercial Feed Conversion Ratio (Feed Conversion Ratio (FCR)) from today's 2.8 - 3.5:1 baseline toward the 2.1 - 3.0:1 range already achievable with DanBred/Topigs Norsvin genetics (Section 6.4A), which is the same order of improvement that underpinned Denmark's own sector transformation.

30 - year horizon (to the mid - 2050s)

At this distance the specific figures in this chapter are illustrative rather than forecast, but the direction is robust to the underlying trends documented elsewhere in this assessment: a national herd substantially larger than today's 9.0 million (2025 estimate), continued urbanisation sustaining formal - channel demand, and no accessible ASF vaccine currently in sight (Section 6.1A) meaning biosecurity infrastructure remains the foundation of the investment case across all three horizons, not just the first. The genetics - and - feed foundation recommended in this chapter is the precondition for the sector absorbing growth competitively rather than losing ground to ASF - driven herd loss cycles.

This outlook is directional, not a substitute for the 2030 - horizon financial modelling in Sections 6.2 and 6.6, which remains the basis for the investment case put to the Call. It is included to show that the underlying rationale biosecurity as the foundation, genetics and feed quality as the productivity levers holds beyond the GTTF programme period.

Sources: Statistics Denmark 2023; Africa's Century: Strategy for Strengthened Danish Engagement with African Countries, August 2024; A2i GRASP sector analysis 2026.

6.1.5 HACCP and ISO 22000 Certification Status

This chapter currently states that less than 15 percent of Uganda's pork offtake moves through certified formal channels and that fewer than 35 Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - licensed HACCP abattoirs handle pigs nationally (Table 6.1). These are capacity and share figures, not enterprise - level certification claims, and this chapter does not assert that any named piggery enterprise holds or lacks a specific HACCP or ISO 22000 management - system certificate.

The five named piggery/pork processing enterprises referenced elsewhere in this chapter as KII or investment targets Prime Pork Uganda Ltd, Nsibirwa Pork Products, Brinas Development, Wambizzi Cooperative Society, and Ranchers Finest / Finest Farms have been checked directly against the live Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) List of Certified Systems (cims.Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS).go.ug). The register carries exactly one pig - processing HACCP certificate in the entire system: Uganda National Bureau of StandardsUganda National

Bureau of Standards (UNBS)/HC/0027, held by Nakifuma Farming Company Limited, covering pig carcass processing and cold - chain dispatch, status EXPIRED (validity period 2023 - 03 - 03 to 2026 - 03 - 02). Table 6.11 lists Nakifuma as one of Ranchers Finest / Finest Farms' operating sites; the legal - entity name on the register does not exactly match Ranchers Finest / Finest Farms as named in this chapter, so this is treated as a strong identified candidate requiring final confirmation at the next KII, not a closed identity match. None of the other four enterprises Prime Pork Uganda Ltd, Nsibirwa Pork Products, Brinas Development, or Wambizzi Cooperative Society appear anywhere on the current Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) register under HACCP, ISO 22000/FSMS, ISO 9001/QMS, GMP/GHP, EMS, IMS, or PSOMS certification categories a confirmed negative finding, not an unchecked gap.

With that verification complete, this chapter's investment hypothesis and formal - channel share figures should continue to be read as describing aggregate market structure: none of the four enterprises confirmed absent from the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) register should be described as certified in the integrated report, and Ranchers Finest / Finest Farms should be described as holding an expired certificate at its Nakifuma site pending final confirmation of the legal - entity link, rather than as either certified or simply unconfirmed.

Food - safety certification in this sector is properly read as a ladder, not a single rung. Good Manufacturing Practices (GMPs) and prerequisite programmes basic hygiene, pest control, water quality, staff training, facility layout come first and are the foundation without which HACCP cannot be meaningfully implemented. HACCP (Hazard Analysis and Critical Control Points) sits above that foundation: it is the specific, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - enforced hazard - control system, and for Tier 1 and Tier 2 piggery businesses in this chapter's framework, HACCP is the floor, not the ceiling fall below it and an enterprise is dropped at the GTTF hard - gate screening stage (Section 6.6), disqualified from matching - grant eligibility regardless of scale or genetics readiness. Higher management - system certifications such as ISO 22000 sit above HACCP again, representing a more comprehensive food safety management system that formal export buyers and some institutional tenders increasingly expect. This chapter's GTTF hard gates (Section 6.6) require GMP/prerequisite compliance and HACCP certification as the minimum bar for Tier 1/2 disbursement, with ISO 22000 or equivalent treated as a value - adding upgrade rather than a baseline requirement.

The practical consequence mirrors the poultry chapter's finding: a Ugandan pork processor without independently verified HACCP or ISO 22000 status cannot place packaged product on a modern retail shelf, supply a hotel group's institutional kitchen, or bid into a World Food Programme (WFP) or institutional feeding tender each of the Off - take Purchase Agreement (Off-take Partnership Agreement (Off-take Partnership Agreement (OPA))) - target buyer categories in Section 6.4C requires certified chain - of - custody documentation as a condition of listing. That gap is the entry point for a foreign technical or financial partner to add value: certification is a defined, fundable scope of work covering food - safety systems, cold - chain integrity and abattoir - line upgrades rather than an open - ended sector problem, and it converts directly into formal - retail and export market access for whichever enterprise closes it first, once its certificate status is confirmed current against the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) register.

6.2 Pillar 2: Market Dynamics

The piggery sector's market dynamics are defined by a single dominant feature: a 2 - 3x price gap between the informal slaughter channel and the certified formal processing channel, for the same animal. This gap is documented in the joint Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA Pork Price Monitoring Report 2023/24. The GTTF investment thesis is to build the infrastructure that captures this premium for Ugandan enterprises.

6.2.1 Market Size and Commercial Opportunity

Uganda's formal pork market is valued at approximately USD 133.3 million (UGX 480 billion) per year, with an estimated 8,000 - 12,000 pigs slaughtered daily in Kampala alone. Less than 15 percent of total offtake flows through certified formal channels that capture the processing premium.

Field engagement reaffirms that the binding constraint on the formal channel is supply rather than demand: premium and institutional buyers - supermarkets, restaurants and hotels - frequently cannot source enough pigs meeting the required size, fat ratio and consistency, so that demand for standardised pigs materially exceeds reliable supply (Mulindwa 2026).

Figure 6.5 Uganda Pork Market: Formal vs. Informal Channel Share (by estimated offtake volume). Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Licensed Establishments Register 2023; UBOS 2022; A2i KII intelligence 2026.

6.2.2 Import Parity Price Construction

Table 6.5 constructs both the export parity price for live pigs and the import parity price ceiling for certified processed pork in Kampala's formal retail channel, following the analytical framework established by John Magnay at the 1 June 2026 GRASP alignment meeting.

Table 6.5 Export and import parity price construction: Kampala, 2026

Component	USD/kg	UGX/kg (approx.)	Unit	Notes
EXPORT PARITY - LIVE PIG (Uganda domestic price anchored to regional live pig demand)				
Regional live pig price (Kenya/DRC border markets)	USD 2.20 - 2.80/ kg lw	USD 2.25 - 2.88 (UGX 8,100 - 10,360)	liveweight	Kenya and DRC border market benchmark for live pigs
Less: inland freight to Uganda farm gate	USD 0.05 - 0.10	-	per kg lw	Transport from Uganda farm to border: USD 0.05 - 0.10 (UGX 185 - 370)/kg
Less: trader aggregation margin	USD 0.05 - 0.08	-	per kg lw	Cross - border trader margin
\= FARM - GATE PRICE (export parity, live pig)	USD 2.16 - 2.70/ kg lw	USD 2.22 - 2.78 (UGX 8,000 - 10,000)	liveweight	Matches documented Uganda farm - gate price - confirms export parity mechanism
IMPORT PARITY - CERTIFIED PROCESSED PORK (Kampala formal retail)				

Component	USD/kg	UGX/kg (approx.)	Unit	Notes
Certified processed pork FOB: South Africa / EU	USD 3.50 - 5.00/ kg	-	dressed weight	SA export pork and EU specialty pork FOB price
Sea / road freight and handling to Kampala	\+ USD 0.30 - 0.55	-	per kg	Mombasa port + road Nairobi - Kampala
EAC import tariff on processed pork (25% CET)	\+ USD 0.95 - 1.39	-	of landed cost	EAC CET on HS 0203 fresh/frozen pork products
\= IMPORT PARITY PRICE - KAMPALA (certified processed pork)	USD 4.75 - 6.94/ kg	USD 4.89 - 7.14 (UGX 17,600 - 25,700)	dressed weight	Domestic price ceiling for certified processed pork
Uganda certified formal retail pork (current)	USD 4.86 - 6.76/ kg	USD 5.00 - 6.94 (UGX 18,000 - 25,000)	dressed weight	Within import parity band - GTTF abattoir investment directly competitive
Import substitution opportunity (annual estimate)	-	USD 5.0 million - 6.9 million (UGX 18 - 25 billion)	annual	Premium hotel/institutional import replacement - subject to URA HS trade data confirmation

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA Pork Price Monitoring 2023/24; A2i KII intelligence 2026; EAC CET 2022 - 2025; DAFF South Africa export prices.

Uganda's live pig farm - gate price is fully explained by regional export parity. Certified processed pork domestic pricing sits within the EAC 25% tariff - protected import parity band. GTTF abattoir investment captures the 2 - 3x spread between these two price points for the Ugandan enterprise.

4.7.6 Full Price Ladder: Farm Gate to Democratic Republic of the Congo Export

Table 6.6 Price ladder: farm gate to end market across all piggery product categories

Product / Market Level	UGX/kg	USD/kg	Quality Standard	Direction	Source
Live pig - farm gate (liveweight)	USD 2.22 - 2.78 (UGX 8,000 - 10,000)	USD 2.16 - 2.70	Liveweight commodity	Export parity / domestic commodity	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA Pork Price Monitoring 2023/24

Product / Market Level	UGX/kg	USD/kg	Quality Standard	Direction	Source
Dressed pork - informal open - air slaughter	USD 2.78 - 3.89 (UGX 10,000 - 14,000)	USD 2.70 - 3.78	Dressed, no cert., no chill	Domestic informal	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/ UPPA 2024
Certified fresh pork - formal retail (Kampala)	USD 5.00 - 6.94 (UGX 18,000 - 25,000)	USD 4.86 - 6.76	HACCP, chilled	Domestic premium channel	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA Pork Price Monitoring 2023/24
Packaged processed pork - supermarket	USD 5.56 - 7.78 (UGX 20,000 - 28,000)	USD 5.40 - 7.57	HACCP, vacuum - packed, labelled	Modern retail channel	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024; Mulindwa 2019
Imported processed pork - sausages/bacon (SA/Kenya/EU)	USD 6.11 - 9.72 (UGX 22,000 - 35,000)	USD 5.95 - 9.46	EU SPS, processed	Import competitor: import parity ceiling	A2i KII intelligence; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) import est.
DRC export: Goma / Beni certified pork (wholesale)	USD 6.11 - 8.89 (UGX 22,000 - 32,000)	USD 5.95 - 8.65	HACCP, chilled	Primary export corridor target	Mulindwa 2019; A2i trade intelligence

Product / Market Level	UGX/kg	USD/kg	Quality Standard	Direction	Source
BSF larval meal (fishmeal substitute, dry weight)	USD 0.89 - 1.06 (UGX 3,200 - 3,800)/kg	USD 0.86 - 1.03/kg	40 - 45% crude protein	Input substitute: feed cost saving	Sheppard et al. 2020; A2i DGBP 2024
Fishmeal - Kampala market price	USD 0.97 - 1.17 (UGX 3,500 - 4,200)/kg	USD 0.95 - 1.14/kg	65% crude protein	Import - volatile input cost	Mulindwa 2017; A2i KII 2026

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024; Mulindwa 2019; A2i trade intelligence 2026; Sheppard et al. 2020.

Figure 6.6 Pork Value Gap: Farm Gate → Formal Retail → DRC Export (UGX '000 per kg). The 3× value uplift that GTTF abattoir investment captures. Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2023/24; Mulindwa 2019.

4.7.7 World Pork Price Benchmarks

Table 6.7 Pork: Uganda domestic prices vs. world benchmarks (USD/kg dressed weight)

Price Point / Market	USD/kg	UGX/kg (approx.)	Quality Standard	Direction	Source
Brazil / USA FOB - frozen bulk pork	USD 1.50 - 2.20/kg	-	Frozen, commodity	Export origin	USDA FAS 2025
South Africa FOB - processed pork (sausages/bacon)	USD 3.50 - 5.00/kg	-	Processed, branded	Export origin (competitor)	DAFF / Stats SA 2023
EAC import parity - certified processed pork (Kampala)	USD 4.75 - 6.94/kg	USD 4.89 - 7.14 (UGX 17,600 - 25,700)	Certified, HACCP	Import ceiling	Derived, Table 6.6
Uganda farm gate - live pig (liveweight)	USD 2.16 - 2.70/kg lw	USD 2.22 - 2.78 (UGX 8,000 - 10,000)	Liveweight	Domestic baseline	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024

Price Point / Market	USD/kg	UGX/kg (approx.)	Quality Standard	Direction	Source
Uganda informal market - dressed pork	USD 2.70 - 3.78/kg	USD 2.78 - 3.89 (UGX 10,000 - 14,000)	Dressed, uncertified	Domestic informal	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024
Uganda formal retail - certified fresh pork	USD 4.86 - 6.76/kg	USD 5.00 - 6.94 (UGX 18,000 - 25,000)	HACCP, chilled	Domestic premium	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024
Uganda formal retail - packaged processed pork	USD 5.40 - 7.57/kg	USD 5.56 - 7.78 (UGX 20,000 - 28,000)	HACCP, vacuum - packed	Modern retail channel	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024
DRC wholesale - certified pork (Goma/Beni)	USD 5.95 - 8.65/kg	USD 6.11 - 8.89 (UGX 22,000 - 32,000)	HACCP, chilled	Primary GTTF export target	A2i trade intelligence; Mulindwa 2019
Kenya formal retail (Nairobi)	USD 4.50 - 6.50/kg	-	KEBS graded, chilled	Regional benchmark	KRA/KNBS 2023
EU retail - fresh pork (Germany)	USD 5.50 - 9.00/kg	-	EU SPS, traceable	Long - term export benchmark	Eurostat 2024

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024; KRA/KNBS 2023; DAFF/Stats SA 2023; USDA FAS 2025; Eurostat 2024.

CORE INVESTMENT FINDING: Uganda's certified pork at USD 4.86 - 6.76/kg is commercially competitive

within the import parity band. The DRC export market (USD 5.95 - 8.65/kg) is the highest - value corridor available. GTTF abattoir investment does not create demand demand exists and is currently served by imports and informal slaughter. This price - benchmark case is now independently confirmed by observed trade volumes: URA export records for live swine (HS 0103, 2015–2025) show DR Congo taking 94.9 percent of Uganda's live - pig export weight and 92.4 percent of export value an order of magnitude ahead of every other destination, including Kenya (3.3% of weight) and South Sudan (1.4%). This is a materially stronger evidentiary basis for the DRC corridor than the price - benchmark comparison alone: it is the destination Ugandan exporters are actually shipping to, not only the destination the price differential suggests they should. The same URA data shows Uganda's live - swine trade flipping from a net importer to a net exporter by weight in 2022–2024 (export/import ratio of 6.3x in 2022, 4.3x in 2023, 11.5x in 2024), driven almost entirely by this DRC surge a second, independent data point for the sector's approach toward net - exporter status, alongside the processed - pork observation below. Two data - quality notes carry over from the URA source file: reported export value for 2021 is corrupted at source (recorded equal to weight) and is excluded from these calculations, and 2025 figures are partial - year (data through October 2025 for exports, November 2025 for imports).

6.2.3 Production Cost Composition

Feed represents 68 - 73 percent of total pig production costs in Uganda's commercial sector. Fishmeal dependency at USD 0.97 - 1.17 (UGX 3,500 - 4,200)per kg is the primary structural cost vulnerability. The chart below shows how BSF protein integration targets the single largest cost item.

Feed quality compounds this cost exposure: field engagement links mycotoxin and aflatoxin contamination, typically entering through poor - quality maize, to reproductive losses (abortion and poor fertility) and stunted growth, with the heaviest damage in the breeding herd making careful maize sourcing and mycotoxin management a production - cost and biosecurity priority, not merely a quality concern (Mulindwa 2026). This is independently corroborated by the Grain and Animal Feed chapter's own field KII wave: northern Uganda maize entering the compound feed supply chain tested at 20–30 ppb aflatoxin (KAMP Group KII, 15 July 2026), against commercial buying thresholds ranging from sub - 7 ppb for premium millers (Mandela Millers KII, 29 July 2026) to 10–20 ppb for formal compound feed (De Heus standard, cited in the WARC Uganda KII, 16 July 2026) the same maize - quality gap this chapter identifies as a piggery cost driver is a sector - wide upstream constraint, not specific to pig feed formulation. See Grain and Animal Feed chapter, Section 8.4.4, Table 8.9a.

Figure 6.7 Pig Production Cost Composition: Commercial Uganda Sector. Sources: Mulindwa 2017; A2i KII intelligence 2026.

6.3 Pillar 3: EcoSystem Mapping

Table 6.8 Active donor programme matrix and GTTF additionality

Programme / Funder	Scale	Period / Status	Current Focus	Complementarity / Non - Replication Relationship
USAID FtF SIA / Chemonics	National	2019 - 2025 (Closed)	BDS for agribusinesses; investment readiness; transaction advisory	No biosecurity or green technology focus; no pig - specific investment; no circular economy mandate. GTTF occupies the capital investment space this programme did not enter.

Programme / Funder	Scale	Period / Status	Current Focus	Complementarity / Non - Replication Relationship
ILRI - Pig Value Chain Research	Central & Eastern Uganda	2015 - 2022 (Closed)	Value chain analysis; ASF epidemiology; market systems research	Research only; no technology transfer, capital investment, or enterprise - level BDS. Provides analytical baseline for GTTF investment design.
CGIAR/ILRI - Climate & Livestock	East Africa	2024 (Active)	Pig heat stress projections; GHG modelling; biogas co - benefit analysis for pig manure management	Climate adaptation research published; no investment facilitation or capital deployment. Validates technical case for climate - controlled housing and biogas investment.
A2i BSF Produce & Supply (DGBP)	Central Uganda	2024 - Present (Active)	BSF protein production from animal feed waste; circular economy demonstration	Direct predecessor - validates BSF technology for GTTF scale - up. Single most relevant proof - of - concept in the entire portfolio. GTTF extends to commercial scale.
FAO - ECTAD Uganda	National	Ongoing (Active)	ASF surveillance; emergency response protocols; biosecurity training	Training and surveillance only; no capital investment in biosecurity infrastructure. GTTF addresses the enterprise - level capital gap FAO - ECTAD cannot fill.
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / FAO - ASF Emergency Response Plan	National	2024 - 2026 (Active)	Government - led biosecurity investment roadmap; herd compartmentalisation; district rapid response	Government commitment documented. GTTF biosecurity grants complement and accelerate this plan - biosecurity grants are aligned, not duplicative.
aBi Development - ACF Piggery Portfolio	National	2020 - Present (Active)	ACF co - financing for piggery biosecurity housing and processing; UPPA Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) as bankability documentation	5:1 leverage feasibility confirmed for GTTF grants of USD 69K - 111K (UGX 250 - 400 M). ACF is the primary commercial debt channel for all GTTF piggery matching grants.

Programme / Funder	Scale	Period / Status	Current Focus	Complementarity / Non - Replication Relationship
IFAD / LADEP - Livestock & Agribusiness Dev.	National (rural)	Active	Livestock and agribusiness development financing; rural enterprise support	Co - financing pathway available; pig sector eligibility confirmed under LADEP livestock mandate. Potential co - financier for combined packages.
FAO/ILO - Pig Value Chain & Gender	Central, Western & Eastern Uganda	2024 (Published)	Household income analysis; gender dynamics; child labour mapping	Reference document - documents 1.6M rural pig - keeping households and 45 - 55% female participation. No investment component. Underpins GTTF gender targets.
NAGRC&DB - Pig Genetic Improvement	Entebbe + National	2020 - 2024 (Active)	Large White / Landrace / indigenous crossbreeding; AI programme development	Primary domestic partner for DanBred / Topigs Norsvin AI genetics investment. GTTF AI genetics investment must be coordinated with NAGRC&DB's existing service network.
SEGES Innovation / Skov A/S - Feasibility Review	East Africa	2024 (Published)	Climate - controlled pig housing, slurry management, biogas systems feasibility for tropical environments	Danish institutional feasibility validation - substantially reduces technology adoption risk for GTTF - supported climate - controlled housing and biogas investments.

Sources: Programme documentation as cited in each row. A2i GRASP KII intelligence to 18 June 2026.

VERIFICATION FLAG: UPPA's role as the sector's central bankability and aggregation platform is load - bearing throughout this chapter it underpins the aBi ACF financing pathway above, the Tier 2 - 3 investment hypothesis for UPPA member enterprises (Table 6.11), the BSF cooperative cluster model, and the MCDA/SWOT competitive - advantage case. None of the three most recent piggery KIIs (Christopher Mulindwa; Ranchers Finest/ Finest Farms; internal document review, July 2026) reference UPPA at all. Mulindwa's KII states directly that "no sufficiently coordinated ecosystem links producers, breeders, feed suppliers, vets, abattoirs and buyers" describing the coordination gap UPPA is assumed here to fill. Ranchers Finest describes an entirely separate, privately built aggregation model with no reference to UPPA. This does not mean UPPA's role is wrong, but it has not been corroborated by the current KII wave and should not continue to be treated as an established fact pending direct verification of UPPA's actual current membership, activity level, and ACF track record see the UPPA KII agenda item in Section 6.8.

6.3.1 Feed Input Market - Protein Meal Supply

Feed accounts for 68 - 73 percent of commercial pig production cost, and the domestic supply of protein feed ingredients is a structural input - market factor for the piggery chain. Mukwano Industries (U) Ltd, a vertically integrated FMCG and edible - oil group, produces two protein meal by - products of its soybean and sunflower crushing operations Mufigo Soybean Meal and Shamba Sunflower Seed Meal sold into the domestic compound feed market. Mukwano is not a pig producer or processor and is not classified within the Tier 1 - 3 enterprise

framework used elsewhere in this chapter; it sits upstream, at the feed - ingredient supply layer, and its output is an input to the compound feed millers that in turn supply commercial pig operations. A single authoritative profile of Mukwano's feed - ingredient business is maintained in the Grain and Animal Feeds value chain chapter; this section cross - references it rather than duplicating it, consistent with this landscape assessment's citation - discipline practice.

ADDITIONALITY ASSESSMENT: Of the eleven mapped programmes, none addresses the simultaneous combination of (1) green technology capital investment, (2) circular economy integration (BSF + biogas), and (3) EU/Danish technology transfer. ACF co - financing at 5:1 leverage has been confirmed by aBi Development as feasible for GTTF piggery grants of USD 69K - 111K (UGX 250 - 400 million).

6.3.2 The Circular Economy Investment Case

A single commercial pig farm housing 500 finishing pigs generates 1,500 kg of fresh manure daily. This manure stream simultaneously produces 120 - 150 m^3 of biogas per day, 85 - 95 kg of BSF larval meal per tonne processed, and 350 - 380 kg of frass fertilizer per tonne. Combined, these three output streams generate USD 97K - 125K (UGX 350 - 450 million) per year in additional value.

This is the same alternative - protein supply chain addressed at broiler - farm scale in the Poultry chapter and at municipal scale in the Waste Management (Municipal Bio - waste) chapter, where an estimated 1,000 tonnes per day of organic waste in Kampala currently has no end destination. Piggery - farm - scale BSF, poultry - farm - scale BSF, and the municipal systems - approach investment case should be read as three points on the same alternative - protein and circular - economy supply chain rather than three unconnected technology lines, and any Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) feed - quality standard secured for BSF larval meal (Section 6.7) benefits all three simultaneously.

Table 6.9 Circular economy value model: indicative returns for a 500 - pig commercial farm

Parameter	Value / Estimate	Basis
Pig herd scale	500 finishing pigs	Standard mid - commercial scale for Tier 1 / Tier 2 boundary
Daily manure generation	~1,500 kg fresh manure/day	Standard manure output: 3 kg/pig/day
Biogas potential (mesophilic digestion)	120 - 150 m^3 biogas/day	Appels et al. 2008; PlanEnergi tropical data
Biogas energy equivalent	600 - 750 kWh/day	At 5 kWh/m^3 biogas calorific value
On - farm energy cost saving (annual)	USD 4K - 10K (UGX 15 - 35 million)/year	Eliminates LPG and firewood costs; PlanEnergi installation data
BSF larval meal from manure (dry weight)	85 - 95 kg/MT fresh manure	Sheppard et al. 2020 meta - analysis; A2i DGBP 2024
Daily larval meal production potential	127 - 143 kg dried larval meal/day	At 1,500 kg manure/day × 85 - 95 kg/MT yield
Annual larval meal value (at USD 0.97 (UGX 3,500)/kg)	USD 45K - 51K (UGX 162 - 183 million)/year	Plus feed cost savings from partial fishmeal substitution
Fishmeal substitution saving (25 - 50% replacement)	USD 472K - 667K (UGX 1.7 - 2.4 billion)/year (500 - pig farm)	At USD 0.97 - 1.17 (UGX 3,500 - 4,200)/kg fishmeal × daily pig feed volume

Parameter	Value / Estimate	Basis
Bio - slurry organic fertiliser output	350 - 380 kg frass/MT manure processed	Sheppard et al. 2020; standard BSF conversion parameters
Annual fertiliser output value (at USD 0.14 (UGX 500)/kg)	USD 27K - 31K (UGX 96 - 110 million)/year	Frass replaces synthetic fertiliser; reduces Nile basin nitrogen runoff
TOTAL ANNUAL CIRCULAR ECONOMY VALUE (energy + BSF larval meal savings + fertiliser)	USD 97K - 125K (UGX 350 - 450 million)/year	Triple - revenue asset from what is currently a waste disposal cost
BSF unit capital cost (commercial scale)	USD 35,000 - 55,000 (UGX 130 - 200M)	Bühler AG; Innovafeed; BioCycle - tropical - grade units
Biogas digester capital cost (500 - pig scale)	USD 4,000 - 9,500 (UGX 15 - 35M)	PlanEnergi; Bigadan A/S - tropical - grade digesters
Combined BSF + biogas payback period	14 - 20 months	Derived from circular economy value vs. combined capital cost

Sources: Sheppard et al. 2020; Appels et al. 2008; PlanEnergi East Africa data; A2i DGBP 2024; Dankwa et al. 2021; Mulindwa 2017.

*Figure 6.8 Circular Economy Value: Annual Revenue per 500 - Pig Commercial Farm (UGX millions/year). Sources: Sheppard et al. 2020; Dankwa et al. 2021; PlanEnergi East Africa data; A2i DGBP 2024.**

6.4 Pillar 4: Enterprise Profiling and Green Technology Mapping

6.4.1 Technology Matching Assessment

Table 6.10 Green technology matching assessment: Uganda piggery sector

Ranking	Enterprise	Core Activities	Scale & Positioning	Strategic Strengths	Key Gaps
1	Frontmatec A/S (DK)	Modular HACCP - compliant pig abattoirs, slaughter and processing systems	Commercial - scale systems; approximately 30–80 carcasses/hour; indicative investment USD 120,000–250,000	Strong fit with Uganda's formalisation gap; documented African deployments; containerised/ modular format suits Uganda's infrastructure constraints; supports EU SPS/HACCP requirements; potential solar integration	Requires sufficient and consistent pig throughput; local cold - chain and logistics infrastructure must be developed alongside the abattoir

Ranking	Enterprise	Core Activities	Scale & Positioning	Strategic Strengths	Key Gaps
2	Skov A/S (DK) / SEGES Innovation (DK)	Climate - controlled pig housing, ventilation and biosecurity systems	Commercial farms; scalable from medium to large production units	SEGES East Africa feasibility work supports tropical deployment; addresses heat stress, mortality and productivity; biosecurity infrastructure is foundational to other piggery investments	Higher upfront CapEx; requires reliable electricity and technical maintenance; commercial adoption depends on farm scale
3	FOSS Analytical A/S (DK)	NIR feed analysis, mycotoxin, protein, moisture and energy testing	Feed mills, commercial farms and laboratories; approximately USD 18,000–35,000 per system	Rapid testing—approximately two minutes per test; directly addresses feed - quality and aflatoxin risks; existing East African service capacity strengthens deployment feasibility	Requires trained operators, calibration and quality - control systems; investment case is strongest for commercial feed mills and large farms rather than smallholders
4	DanBred (DK) / Topigs Norsvin (NL)	AI genetics, breeding stock and high - performance pig genetics	Commercial breeding and multiplication systems	Potential 15–25% Feed Conversion Ratio (FCR) improvement and faster growth compared with unimproved stock; supports transition toward 5–6 - month commercial finishing cycles; aligns with NAGRC&DB AI infrastructure	Requires Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) veterinary import certification and appropriate breed registration; genetics alone will not deliver expected gains without adequate feed, health and biosecurity
5	Bigadan A/S (DK) / PlanEnergi (DK)	Farm - scale anaerobic digestion and biogas systems	Approximately 500 - pig scale; indicative capital USD 4,000–9,500	Tropical - grade systems with East African experience; converts manure into energy; estimated 18–28 month payback; strong circular - economy proposition	Requires adequate manure volume, reliable digester management and appropriate utilisation of biogas; smaller farms may not achieve commercial viability

Ranking	Enterprise	Core Activities	Scale & Positioning	Strategic Strengths	Key Gaps
6	Bühler AG / Innovafeed / BioCycle / Enterra Feed	Black Soldier Fly (BSF) protein production and feed - insect processing	Most commercially viable at approximately 500+ pigs or clustered production scale	A2i DGBP work provides Uganda - specific proof of concept; potential 25–50% fishmeal replacement; estimated 14–20 month payback; strong circular - economy and feed - cost reduction opportunity	Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) standard for certified BSF larval meal remains a critical regulatory gap; commercial deployment should be conditional on feed - safety/ quality standards and certification
7	Skov A/S (DK) / Big Dutchman (DE)	Climate control, ventilation and environmental management	Medium - to - large commercial pig farms	Systems designed to maintain approximately 18–22°C; potential reduction in heat - related mortality and improved production efficiency; SEGES feasibility assessment supports tropical application	Higher CapEx and energy requirements; strongest business case for intensive commercial farms; requires reliable power and technical servicing

*Sources: Frontmatec 2023; PlanEnergi 2024; Bigadan A/S 2024; Bühler AG; Innovafeed; FOSS Analytical A/S 2024; DanBred / Topigs Norsvin 2024; Skov A/S; SEGES Innovation 2024; A2i DGBP 2024**

6.4.2 Investment Blueprints by Technology Category

Black Soldier Fly Protein Systems

BSF larval meal is A2i - validated under Ugandan operating conditions through the 2024 DGBP project. Dankwa et al. (2021) confirmed 25 - 50 percent fishmeal replacement with no impact on pig growth performance, reducing feed cost by 25 - 40 percent. For Tier 2 farms, the BSF cooperative cluster model (5 - 10 UPPA member farms sharing one BSF unit) converts the capital access barrier into a cooperative income stream. The Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification gap must be resolved in parallel as a policy catalyst priority.

Farm - Scale Biogas Digesters

A 500 - pig farm generates 1,500 kg of fresh manure daily with 120 - 150 m^3 biogas potential. Compact tropical - grade systems from PlanEnergi and Bigadan A/S cost USD 4,000 - 9,500 with operational generation within 4 - 6 weeks. Biogas is the most commercially accessible green technology in the piggery portfolio.

Modular HACCP Abattoir and Cold Chain

Frontmatec A/S modular containerised abattoir units at 30 - 80 carcasses per hour cost USD 120,000 - 250,000. At 400 pigs per day, the USD 2.50 - 4.17 (UGX 9,000 - 15,000)/kg certified premium generates USD 0.89 mil-

lion - 1.89 million (UGX 3.2 - 6.8 billion) per year in additional gross revenue. A GTTF first - loss guarantee may be more impactful than a matching grant for this investment category. Cold - chain capacity is broadly lacking nationally, obliging integrated operators to carry cold - storage CapEx in every retail channel they enter and reinforcing the case for modular abattoir - plus - cold - chain investment (Wallace 2026).

Genetics and AI Centre Expansion

Genetics is the underpinning of scalability for the entire piggery investment case, and the breeding structure that delivers it is a three - tier pyramid. At the top, grandparent stock is imported the breeding - stock import channel, not the ultimate genetic origin, is the more precisely evidenced claim. URA import records for live pure - bred breeding swine (HS 0103.10, 2015 - 2025) show South Africa as the dominant country of origin by a wide margin: 79.5 percent of import weight and 78.5 percent of value, against France at 11.5 percent of value and Denmark at 3.2 percent, with smaller volumes from Zambia and Kenya. This corrects an earlier framing of this section, which stated that all significant pig genetics entering Uganda originate in Europe; the URA data does not support that as written.

Two readings are possible and this chapter does not yet have the evidence to choose between them: South Africa's own commercial pig genetics industry is itself substantially built on imported European grandparent lines, in which case South African - sourced stock could still trace to a European genetic origin one generation further back; or South Africa is a genetic origin and multiplication hub in its own right, distinct from the Danish/French genetics houses referenced elsewhere in this chapter (Table 6.10).

This should be confirmed directly with Prime Pork, Ranchers Finest/Finest Farms, or NAGRC&DB before the integrated report states a single country or region of genetic origin. What the trade data does support is that genetics is, in practice, an EU/Southern - Africa technology - transfer question, not an EU/Danish one exclusively. Grandparent stock is multiplied domestically into parent stock at dedicated multiplication farms, and parent stock is in turn distributed to commercial grower operations via artificial insemination (AI). Each tier requires its own biosecurity standard, since a disease breach at the grandparent or parent tier compromises the genetic base for every downstream farm it supplies which is why genetics and ASF biosecurity infrastructure (Section 6.1A) are interdependent, not separate, investment cases. Uganda's AI industry the small number of companies currently importing French and Danish genetics and operating AI services is nascent and under - capitalised relative to the role it plays: it is the single channel through which imported genetic gain reaches the wider commercial herd, and its expansion is a precondition for the genetics case to scale beyond the handful of enterprises that can afford direct grandparent - stock import.

On performance gain, two figures from this study's field engagement should both be carried rather than reconciled to one: Ranchers Finest/Finest Farms reports that AI with an improved imported breed can raise herd performance by roughly 50 percent within a single gestation cycle (Wallace 2026), while a plenary comment at the Validation Workshop put the difference between a pig with and without imported genetics at roughly double the growth rate and market weight.

The two are not necessarily inconsistent; they may reflect different performance metrics (single - cycle liveweight gain versus cumulative growth - to - market - weight) or different genetic lines, but this chapter does not have the underlying data to collapse them into a single number, and presents both, attributed, rather than choosing one. Genetic multiplication farms are capital - intensive requiring grandparent and parent stock, biosecurity, AI facilities and trained technicians which positions imported breeding stock and AI - centre infrastructure as a high - leverage green - technology transfer node. Danish genetics were cited directly, with DanBred referenced and a previously considered genetics purchase of approximately USD 70,000 noted as an indicative ticket size.

Noted priority investment areas are: additional genetic and multiplication farms; dedicated AI centres; a region-

al abattoir with integrated cold storage; and feed - efficiency chemistry and enzyme inputs (including biotoxin binders) that raise feed conversion (Wallace 2026).

6.4.3 Comprehensive Sector Actor Landscape

Field engagement reaffirms the profile of Prime Pork Uganda Limited (Table 6.11) as a vertically integrated, genetics - led anchor: it runs its own feed distribution (extending from pig into poultry feed), supplies the premium supermarket, restaurant and hotel channel, and competes on certified quality and consistency rather than price (Mulindwa 2026).

That engagement also reconciles this chapter's genetics hypothesis for the enterprise. Where Table 6.11 and section 6.8 previously attributed Prime Pork's genetics to 'DanBred AI genetics via National Animal Genetic Resources Centre and Data Bank,' the enterprise in fact operates a structured breeding pyramid sourced from a French genetics nucleus - importing grandparent and great - grandparent stock directly, holding exclusive East - African multiplication and distribution rights, and maintaining its own ear - tag and RFID traceability - a channel independent of NAGRC&DB (Mulindwa 2026). The DanBred / Topigs Norsvin - NAGRC&DB route remains a valid national AI pathway (Table 6.10) but is not this enterprise's genetics channel, and the Prime Pork investment hypothesis is reconciled accordingly.

Table 6.11 Comprehensive sector actor landscape: Uganda commercial piggery value chain

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Tier	Investment Hypothesis
A - VERTICALLY INTEGRATED PRODUCERS AND PROCESSORS						
Ranchers Finest / Finest Farms	Vertically Integrated	Two farms - Weekway (genetics/AI, Bwikwe) and Nakifuma; own slaughter, processing, value addition and end - to - end cold chain; on - site feed mill with corn dryer; ~100 pigs/month scaling to 250 - 500; 4 t/month current offtake; 4,200 farmers trained this year	Alicia Wallace (Chief Strategy Officer)	Bwaise, Kampala / Wakiso; Nakifuma	Tier 3	Imported genetics and AI - centre expansion (DanBred; ~USD 70k genetics ticket); regional abattoir with integrated cold storage; feed - efficiency enzymes and biotoxin binders; women - led cooperative sourcing. Certification status unconfirmed/ lapsed pending Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) re - verification - verification found some certificates already expired (per 6.1E).

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Tier	Investment Hypothesis
Prime Pork Uganda Limited	Vertically Integrated	500+ sows; own feed mill; formal supermarket and hotel offtake; stated HACCP ambition	Christopher Mulindwa	Wakiso / Kampala	Tier 3	BSF integration (fishmeal substitution); HACCP abattoir upgrade; biogas system; DanBred AI genetics via NAGRC&DB. Clearest Tier 1 anchor for GTTF piggery portfolio. [Genetics route reconciled per 6.4C: sources from a French genetics nucleus with exclusive East - African distribution and its own RFID traceability, not via NAGRC&DB (Mulindwa 2026).]
Nsibirwa Pork Products Ltd	Processing / Distribution	Established Kampala formal pork supply; hotel and restaurant sector linkages	TBC via A2i	Kampala	Tier 2 - 3	HACCP certified processing upgrade; solar cold hub; institutional buyer Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) brokerage - hotel groups and supermarket chains.
UPPA Member Enterprises (Tier 1 cluster)	Processing / Production	Uganda Pork Producers and Processors Association Tier 1 members; Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) contractual offtake framework documented as bankable	TBC via UPPA Secretariat / A2i	National	Tier 2 - 3	Collective HACCP certification pathway; UPPA Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) framework as disbursement precondition; ACF co - financing confirmed at aBi. UPPA's current scale and activity not yet independently verified (see 6.3 flag) - treat this entire row as provisional until confirmed.

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Tier	Investment Hypothesis
B - FEED MILLS AND BSF COOPERATIVE CLUSTER						
Silverback Feeds Ltd	Feed Manufacture	Commercial pig feed production; Kampala region; key downstream customer of BSF larval meal	TBC via A2i	Kampala	Tier 2	NIR feed quality testing (FOSS A/S); BSF larval meal offtake agreement as anchor buyer for Tier 2 BSF cluster; mycotoxin management programme.
Multifeeds Ltd	Feed Manufacture	Commercial pig and poultry feed; Wakiso District; UPPA feed supply linkages	TBC via A2i	Wakiso	Tier 2	NIR spectrometry; BSF larval meal integration; least - cost formulation software.
UPPA Cooperative Feed Procurement	Feed Cooperative	5 - 10 UPPA Tier 2 farms sharing BSF unit and feed procurement	UPPA Secretariat - TBC	National	Tier 2	Cooperative BSF cluster model: GTTF grant (20 - 30%) for shared BSF unit; BDS for cooperative governance; ACF collective credit facility.
C - FORMAL ABATTOIRS AND PROCESSING						
Commercial Abattoir (Pig) - Kampala	Pig Abattoir	Urban - proximity HACCP - eligible; stated interest in certification; Kampala formal retail supply	TBC via A2i	Kampala	Tier 2 - 3	Frontmatec modular HACCP abattoir upgrade; solar cold hub; hotel group Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) as disbursement precondition.
Emerging peri - urban pork processors	Processing	Peri - urban clusters around Kampala, Jinja, Mbarara; informal but growing formal market interest	TBC via A2i	Peri - urban national	Tier 2	HACCP pre - certification support; BDS financial management; group cold storage access facilitation.

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Tier	Investment Hypothesis
D - Government, RESEARCH AND INSTITUTIONAL PARTNERS						
NAGRC&DB (Pig AI Programme)	State Genetics Institution	National pig crossbreeding and AI service network; Large White / Landrace / indigenous crossing	Director General NAGRC&DB - TBC	Entebbe + national	-	DanBred / Topigs Norsvin AI genetics integration via NAGRC&DB AI technician network. Primary domestic partner for EU pig AI investment.
National Livestock Resources Research Institute (National Agricultural Research Organisation (NARO))	Research Institution	Livestock genetics; ASF disease research; pig production systems under Uganda conditions	Director (contact confirmed - detail in master Annex F)	Nakyesasa, Wakiso	-	Feed Conversion Ratio (FCR) benchmark data for feedlot and BSF impact; ASF epidemiology; pig breed performance under Uganda conditions.
FAO - ECTAD Uganda	UN Technical Partner	ASF surveillance and emergency response; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) technical support	FAO - ECTAD Country Officer - TBC	Kampala	-	ASF outbreak early warning system linkage; ASF Emergency Response Plan technical support; biosecurity training complementary to GTTF infrastructure investment.
E - INSTITUTIONAL BUYERS (Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) TARGET COUNTERPARTS)						

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Tier	Investment Hypothesis
Carrefour Uganda / Nakumatt	Modern Retail	2 stores Kampala; formal certified pork supply procurement; HACCP required	Procurement Manager - TBC	Kampala	Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target	Certified HACCP pork Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) - disbursement precondition for HACCP abattoir grant. Critical anchor buyer.
Serena / Radisson / Protea / Speke Hotels	Hotel / Institutional	Weekly certified pork procurement; import substitution demand documented	Procurement Managers - TBC	Kampala	Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target	Certified fresh and packaged pork; hotel group Off-take Partnership Agreement (Off-take Partnership Agreement (OPA))s bundled for single HACCP abattoir transaction.
WFP Uganda / Institutional Feeding Programmes	Institutional Buyer	Government institutional feeding; school meals; UN procurement	WFP Supply Chain - TBC	National	Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target	Certified processed pork for institutional feeding programmes; anchor volume contract for HACCP abattoir.

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Tier	Investment Hypothesis
DRC Formal Import Buyers (Goma / Beni)	Export Buyer	DRC formal import market; Goma and Beni institutional buyers; 20 - 35% premium over local DRC production	TBC via A2i trade intelligence	DRC Eastern border	Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target	HACCP - certified chilled pork export Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) - second - priority disbursement precondition once domestic HACCP certification achieved.

Tier 3 = Priority KII target / deal candidate.

6.5 Pillar 5: Impact Metrices and Commercial Engagement

The FAO/ILO publication (2024) estimates 1.6 million rural households keeping pigs in Uganda's Central, Western, and Eastern Regions, with women managing the majority of smallholder pig operations. The UBOS Census of Agriculture (2021) confirms that women comprise 45 - 55 percent of smallholder pig - keeping households. The BSF model is particularly suited to women's cooperative enterprise: low capital, household - manageable, daily income streams.This gender pattern is corroborated by field consultation, which reports women being targeted as the most reliable and consistent farming partners and describes a viable cooperative - ownership model benchmarked against Danish and American dairy cooperatives and a Rwandan cooperative scaled to a 5,000 - member threshold that pairs fair pricing with capital, savings and household - budgeting training, and layered extension services (Wallace 2026).

6.5.1 Quantified Impact Projections

Each impact vector in the table below decomposes into one or more of three underlying value components: price uplift captured, loss avoided, or cost saved. HACCP abattoir processing premium and import substitution revenue represent price uplift; mortality reduction from climate - controlled housing represents loss avoided; BSF feed cost reduction and biogas energy self - sufficiency represent cost saved. AI genetics Feed Conversion Ratio (FCR) improvement operates across both loss - avoided and cost - saved channels simultaneously, since a compressed production cycle both reduces finance cost per cycle and increases realised output per unit of feed. This decomposition mirrors the framing applied in the Poultry chapter and gives the integrated report a consistent basis for comparing impact claims across chapters. Piggery's loss - avoided component carries distinctive weight relative to poultry's: a single ASF outbreak, rather than a gradual efficiency gap, remains the dominant threat to capital preservation in this sector.

Table 6.12 Impact assessment across GTTF investment vectors - piggery envelope

Impact Vector	Metric	Projection (Portfolio Envelope)	Methodology / Evidence Base
HACCP Abattoir Processing Premium	UGX/kg premium: certified pork over live - animal farm gate	USD 889K - 1.9 million (UGX 3.2 - 6.8 billion)/ year at 400 pigs/day throughput (USD 2.50 - 4.17 (UGX 9,000 - 15,000)premium per kg × daily volume × dressing yield)	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA Pork Price Monitoring 2023/24: USD 5.00 - 6.94 (UGX 18,000 - 25,000)/kg packaged retail vs USD 2.22 - 2.78 (UGX 8,000 - 10,000)/kg live farm gate. At 400 pigs/day, 80 kg average dressed weight.
BSF Feed Cost Reduction (500 - pig farm)	25 - 50% fishmeal substitution; 30 - 40% cost reduction on fishmeal fraction	USD 472K - 667K (UGX 1.7 - 2.4 billion)/year saving per 500 - pig commercial operation	Dankwa et al. 2021: 25 - 50% fishmeal replacement confirmed no impact on ADG, Feed Conversion Ratio (FCR) or carcass %; Sheppard et al. 2020: larval yield 85 - 95 kg DM/MT manure; A2i DGBP 2024 Uganda performance validation.
Biogas Energy Self - Sufficiency (500 - pig farm)	100% LPG and firewood replacement from pig manure biogas	USD 4K - 10K (UGX 15 - 35 million)/year energy saving per installation (+ USD 27K - 31K (UGX 96 - 110 M) frass fertiliser)	PlanEnergi East Africa installations: 120 - 150 m^3/day at 500 - pig scale; biogas calorific value ~5 kWh/m^3; Uganda LPG and firewood equivalent energy cost; Appels et al. 2008.
Mortality Reduction - Climate - Controlled Housing	Mortality: 8 - 12% open - sided <4% climate - controlled	USD 2K - 6K (UGX 7 - 20 million)/year per 500 - pig operation from pigs that survive to market weight	CGIAR/ILRI 2024: measurable pig performance decline above 25°C; SEGES Innovation 2024 feasibility review; mortality saving at USD 138.89 - 277.78 (UGX 500,000 - 1,000,000)per pig × mortality differential.
AI Genetics Feed Conversion Ratio (FCR) Improvement	Feed Conversion Ratio (FCR) improvement 15 - 25%; production cycle compressed 7 - 9 months 5 - 6 months	Same feed input produces a heavier pig 1 - 3 months faster - improving asset turnover and reducing finance cost per cycle	NAGRC&DB 2024 crossbreeding outcomes; DanBred / Topigs Norsvin tropical deployment performance data; Feed Conversion Ratio (FCR) improvement modelled at Uganda compound feed prices.
Employment Creation	Direct FTE jobs in certified abattoir, BSF operations, biogas maintenance	180 - 280 FTE jobs across GTTF piggery portfolio enterprises	8 - 15 FTE per HACCP abattoir unit; 6 - 10 FTE per commercial BSF unit; 3 - 6 FTE per biogas installation; 4 - 8 FTE biosecurity management. Source: Frontmatec deployment data; A2i DGBP project data.
GHG Emissions Reduction	tCO2e/year from biogas methane capture + fishmeal carbon substitution + housing efficiency	1,800 - 2,400 tCO2e/ year (piggery GTTF portfolio)	Biogas: CH4 at 84x 20 - yr GWP; 120 - 150 m^3/ day × 8 - 12 digesters × CH4 content. BSF: eliminates embedded carbon of marine fishmeal production (180 - 220 tCO2e/year per unit). IPCC Tier 1 emission factors.

Impact Vector	Metric	Projection (Portfolio Envelope)	Methodology / Evidence Base
Import Substitution (certified pork)	Domestic certified pork replacing imported sausages/ bacon/luncheon meat	USD 5.0 million - 6.9 million (UGX 18 - 25 billion)/year at HACCP portfolio scale (subject to URA HS trade data confirmation)	A2i KII intelligence; Mulindwa 2019; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) import estimates. URA HS - code trade data submission pending; figures are provisional and will be revised upon receipt.

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024; Sheppard et al. 2020; Dankwa et al. 2021; PlanEnergi East Africa data; SEGES Innovation 2024; CGIAR/ILRI 2024; A2i DGBP 2024; Frontmatec 2023; IPCC Tier 1 emission factors.

6.5.2 Green Agenda Adoption

Uganda's piggery sector has significant potential to contribute to food security, employment creation, household incomes, agro - industrialisation, and economic growth while improving environmental sustainability and climate resilience. The sector's rapid expansion and increasing demand for pork create opportunities to transition from predominantly smallholder and informal production toward more efficient, bio - secure, resource - efficient and commercially integrated pig production systems. The Green Agenda Adoption pillar promotes technologies and practices that reduce environmental impacts while improving productivity and farm profitability.

Priority interventions include farm - scale biogas and manure management, Black Soldier Fly (BSF) protein production from organic waste, climate - controlled and energy - efficient pig housing, improved feed efficiency and feed - quality management, water and energy efficiency, and strengthened biosecurity and disease - risk management. These interventions can reduce reliance on conventional energy and imported feed proteins, convert pig manure and agricultural waste into productive inputs, reduce greenhouse - gas emissions and improve resilience to heat stress and African Swine Fever (ASF).

The interventions align with Uganda's National Development Plan IV (NDP IV), Agro - industrialisation Agenda, National Climate Change Act (2021), Nationally Determined Contributions (NDCs), and Green Growth Development Strategy, while supporting the formalization, competitiveness, and sustainable growth of the piggery value chain.

Figure 6.9 Rio Marker Alignment: GTTF Piggery Technology Portfolio. 2 = Principal objective; 1 = Significant secondary objective; 0 = Not targeted. Source: A2i GRASP Rio Marker Assessment; CGIAR/ILRI 2024.

6.5B Rio Marker Scoring and Danish/EU Engagement Modality

Denmark's Africa strategy directs at least 75 percent of GTTF funding toward activities that address a climate challenge, and every recommended activity is scored against the OECD DAC Rio markers for climate change adaptation and mitigation before it reaches ministerial review (Africa's Century: Strategy for Strengthened Danish Engagement with African Countries, August 2024; OECD DAC Rio Markers for Climate Handbook). Figure 6.9 above summarises the resulting portfolio view; the table below sets out the decision - tree justification behind each score, applying the same methodology as the Poultry chapter: does the activity meet the marker's eligibility criteria, and would it have been undertaken, or designed the same way, without that objective. A double - principal score on the same activity is applied only on explicit justification, consistent with OECD DAC guidance.

Table 6.12A Rio marker scoring - piggery sector headline interventions

Intervention	Adaptation	Mitigation	Rationale
ASF biosecurity infrastructure	2 - Principal	0 - Not targeted	Designed specifically to protect herd assets against a disease risk with no vaccine mitigation option (Section 6.1A); this is a resilience investment against a defined biological shock, meeting the Principal threshold, with no material direct GHG effect.
AI genetics and feed quality	1 - Significant	1 - Significant	Formulated as a commercial productivity investment, but improved Feed Conversion Ratio (FCR) reduces feed - per - kg output and associated emissions intensity (mitigation), and lowers vulnerability to mycotoxin - linked feed - quality shocks (adaptation). Neither is the sole design driver, so both score Significant.
Farm - scale biogas	0 - Not targeted	2 - Principal	Captures methane from manure that would otherwise decompose uncontrolled and displaces LPG/firewood combustion - a core, not incidental, design objective, meeting the Principal threshold for mitigation.
BSF circular economy integration	1 - Significant	2 - Principal	Manure valorisation and fishmeal - substitution avoided - emissions pathway is a core design objective (mitigation, Principal); diversified, climate - resilient feed sourcing is a secondary adaptation benefit.
Climate - controlled housing	2 - Principal	0 - Not targeted	Designed specifically to reduce heat - stress mortality (8 - 12% to <4%, Table 6.12) under Uganda's ambient temperature range; would not be justified in its current form without the climate - vulnerability rationale.
HACCP processing and cold chain	1 - Significant	1 - Significant	Solar - compatible cold chain reduces energy - related emissions (mitigation) and builds resilience of processing infrastructure against grid - reliability risk (adaptation); commercial market access is the primary driver, so both score Significant.

Sources: OECD DAC Rio Markers for Climate Handbook (decision tree and eligibility criteria); CGIAR/ILRI 2024 (heat stress); A2i GRASP sector analysis 2026.

Following review of the zero scores (on 25 August 2026), only one piggery intervention in this study now carries a 0 on either marker ASF biosecurity infrastructure's mitigation score, retained at 0 for the stated reason above; no intervention scores 0 on both markers simultaneously; the biosecurity, biogas and housing categories alone - all Principal on one marker - make this the strongest single - marker - Principal profile of any chapter in the GRASP landscape, consistent with the chapter's stated highest circular - economy score. On a funding - weighted basis, the portfolio comfortably clears the 75 percent climate - relevant funding threshold. Biodiversity is not separately scored: none of the six interventions meets the Rio biodiversity marker's eligibility criteria (ecosystem, habitat or species - level conservation objective), so a biodiversity claim is not made for this sector, consistent with the discipline of scoring only where the eligibility criteria are met.

Danish and EU engagement modality

Each headline intervention is mapped against the four Danish and EU engagement modalities set out for the Call, mirroring the equivalent Poultry chapter table.

Table 6.12B Danish/EU engagement modality by intervention

Intervention	Investment/ exploration	Equipment	Technical assistance	Financial instrument
ASF biosecurity infrastructure	-	Primary - Skov A/S / Big Dutchman compartmentalisation systems	Biosecurity protocol training	Matching grant; precondition for all other grants
AI genetics and feed quality	-	Primary - FOSS NIR spectrometers; DanBred/Topigs Norsvin AI genetics	Feed formulation and AI technician training via NAGRC&DB	Matching grant against verified capital stack
Farm - scale biogas	-	Primary - PlanEnergi/ Bigadan digesters	-	Matching grant
BSF circular economy	Danish/EU private - sector partnership (exploration/ incubation)	Bühler/Innovafeed BSF units	Technical transfer from validated A2i DGBP model	Matching grant; Government - to - Government instrument for municipal linkage
Climate - controlled housing	-	Primary - Skov A/S / Big Dutchman / SEGES housing systems	-	Matching grant
HACCP processing and cold chain	Danish/EU private - sector investment or partnership	Primary - Frontmatec processing lines	HACCP pre - certification and food - safety systems training	Danida Business Instrument; matching grant

Source: Danish and EU engagement modalities as defined for the GTTF Call, August 2026; A2i GRASP sector analysis.

Complementarity with the Dutch and Danish sector programmes

The Dutch Government's roughly EUR 6 million enabling - environment programme and new EUR 12 million seed instrument, and Denmark's EUR 12 million programme on inputs, fish - feed processing and the enabling environment, sit alongside the eleven donor programmes already mapped in Table 6.8. None currently carries a piggery - specific biosecurity, genetics or HACCP - processing line item, so the GTTF piggery investment case remains additional to rather than overlapping with them; where the Dutch or Danish instruments finance enabling - environment work (certification systems, feed - sector regulation, including the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) BSF larval meal standard piggery and poultry both depend on) the two should be sequenced together during implementation.

Development bottom line: jobs and women's participation

180 - 280 direct FTE jobs are projected across the GTTF piggery portfolio (Table 6.12), concentrated in HACCP

abattoir operations, BSF and biogas maintenance. The FAO/ILO (2024) finding that women manage the majority of Uganda's 1.6 million pig - keeping households, and comprise 45 - 55 percent of smallholder pig - keeping households nationally (UBOS Census of Agriculture 2021), means the biosecurity and genetics investment case reaches this segment directly rather than only the certified - processing tier - consistent with field evidence that a cooperative - ownership model benchmarked against Danish, American and Rwandan dairy/livestock cooperatives is a viable vehicle for extending these gains to smallholder women producers (Section 6.5).

This chapter has already established that ASF biosecurity infrastructure is the foundation on which every other piggery investment stands or falls, and that the formal channel's binding constraint is independently verified HACCP or ISO 22000 status, not demand. Neither of these is a capital problem alone. Biosecurity protocols and certification systems require sustained technical training and quality assurance support to operate correctly once the infrastructure is built; a GTTF grant that funds a biosecure unit without funding technical assistance to run it to protocol risks funding infrastructure that reverts to informal practice within a season. Technical assistance should be an explicit, budgeted component of every piggery capital stack, not an implicit assumption.

6.6 Pillar 6: Investment Structuring and Leverage Framework

Field consultation with a vertically integrated pork enterprise frames the binding constraint on scaling agribusiness as the cost of capital rather than the availability of demand (Wallace 2026). The enterprise argues, citing a long - term African agricultural investor, that the effective cost of capital needs to sit between 2 and 4 percent for agribusinesses to expand and reach profitability, and that at the 10 - 12 percent rates typical of Ugandan commercial banks profitability is unattainable; the same account points to Vietnam and China having scaled smallholder protein production on affordable finance in the 1 - 3 percent range (Wallace 2026).

To build a bankable enterprise, the asset base needs to be strengthened by either deep equity injections that allow for CapEx assets or accessing foundational capital from development partners and foundations that build the asset base to bankability. Having since built an asset base of land, biological assets like (livestock), and a track record of taking batches to market and surviving African swine fever, then are businesses likely to find lenders willing to engage and equipment CapEx financing relatively accessible against those assets.

The pig sector's MCDA score and commercial investment readiness support its prioritisation within the target 5:1 leverage framework, at a proportional weighting of 35 percent of the livestock portfolio envelope. Catalytic capital is structured to be paired with Business Development Services (BDS) support technical extension, certification - pathway coordination, and buyer - linkage brokerage so that each unit of catalytic funding is designed to de - risk and mobilise private co - investment at the target ratio, rather than substitute for it. The 5:1 ratio, the leverage mechanics, and the absolute capital figures set out in this Pillar are this chapter's sector - level inputs to the programme's capital structure; the governing leverage methodology, blended - finance instrument design, and consolidated capital - stack figures are set centrally in the Finance chapter, and this section should be read as feeding that central framework rather than as a self - standing financing structure.

5:1 LEVERAGE MODEL (indicative, sector - level input): for every unit of catalytic capital committed to a BSF cooperative cluster investment (4 - 6 farm - scale units), the target structure is designed to mobilise private co - investment enterprise equity plus commercial credit lines at approximately five times that amount, alongside BDS support for cluster formation and Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification pathway coordination. Payback: 14 - 20 months from BSF feed savings alone. The 5:1 ratio applied here follows the programme - wide leverage assumption; final leverage terms, blended - finance structuring, and instrument selection are confirmed centrally in the Finance chapter.

Table 6.13 Capital stack by technology category - piggery envelope (indicative allocation weighting)

Technology Investment Category	% of Envelope	Leverage Ratio	BDS Support Focus	Payback
Biosecurity Infrastructure (Skov A/S / Big Dutchman perimeter and compartmentalisation systems)	33%	5:1	Biosecurity protocol training; perimeter and access - control design supervision; sequenced first in every enterprise capital package	Immediate - risk - avoidance rather than revenue payback
BSF Protein Systems & Feed Integration (Bühler / Innovafeed / BioCycle)	5%*	5:1	Cooperative cluster formation (5 - 10 UPPA member farms per unit); Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification pathway coordination	14 - 20 months
Farm - Scale Biogas Digesters (PlanEnergi / Bigadan A/S)	20%	5:1	Vendor selection and installation supervision; O&M training for 8 - 12 digester systems	18 - 28 months
Modular HACCP Abattoir & Cold Chain (Frontmatec A/S; Banss GmbH)	37%*	5:1	HACCP certification pathway support; risk - sharing structuring advice; institutional buyer - linkage brokerage	4 - 6 yrs (combined revenue)
AI Genetics Pilot (DanBred / Topigs Norsvin via NAGRC&DB)	5%	5:1	AI technician network training; semen import logistics coordination	2 - 3 yrs Feed Conversion Ratio (FCR) improvement
TOTAL PORTFOLIO	100%	5:1 leverage ratio (portfolio target)	-	-

Sources: Frontmatec 2023; PlanEnergi/Bigadan A/S 2024; Bühler/Innovafeed BSF unit cost benchmarks; DanBred/Topigs Norsvin. Figures are indicative allocation weightings and leverage ratios only; absolute capital amounts are withheld from this deliverable per programme disclosure policy. Climate - Controlled Housing is addressed within the Biosecurity Infrastructure line above rather than as a separate category - see the note in section 6.4B on its viability in the Ugandan context. BSF's allocation is set at 5 percent, reflecting that countryside players generally lack the production scale to make BSF commercially viable, consistent with the equivalent finding in the poultry chapter; HACCP holds the confirmed 35 - 40 percent range (37% shown here as a working midpoint) and remains the largest single technology allocation in the portfolio. Biosecurity Infrastructure is carried at 33 percent, reflecting its role as the precondition every other category depends on. The five rows sum to 100% of the envelope.*

6.6.1 Investment Screening: Hard Gates

This section sets out eight sequential screening gates applied to every enterprise before a GTTF matching grant is recommended, mirroring the equivalent gate structure adopted in the Poultry chapter, with the ASF - biosecurity gate and the certification/Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - standard gate replacing poultry's single certification gate as piggery's two sector - specific control

points.

Table 6.13B Hard - gate screening framework - piggery investment pipeline

Gate	Test	Failure Consequence
Operator identity	Named, legitimate enterprise with confirmed management and site - Prime Pork Uganda Limited and Ranchers Finest / Finest Farms are confirmed; Nsibirwa Pork Products and UPPA Tier 1 member firms remain TBC	Hold pending A2i verification for any enterprise without a confirmed contact and site visit
Buyer / Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) route	Confirmed offtake from formal retail, hotel group, or institutional buyer, consistent with the UPPA Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) framework documented as bankable by aBi Development	No HACCP abattoir grant disbursed without a documented Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) - mirrors the precondition already stated in 6.4B for the modular abattoir investment
Throughput and herd - size fit	Technology sized to verified sow inventory, finishing capacity, or feed mill tonnage - not aspirational scale	Resize or defer pending site visit; this is the open KII question for both Prime Pork (Table 6.17) and the UPPA cooperative cluster
Monetisable constraint	Technology addresses a priced, documented loss - the live - to - processed price spread (USD 2.22 - 2.78 (UGX 8,000 - 10,000)/kg liveweight vs. USD 5.00 - 6.94 (UGX 18,000 - 25,000)/kg formal retail), ASF - attributable herd loss, or fishmeal cost exposure	Redirect to BDS support if the request cannot be tied to one of these three documented constraints
ASF biosecurity verification	Biosecurity compartmentalisation status confirmed on site before any grant - the chapter's own stated principle in 6.1A that no piggery grant is disbursed without biosecurity compliance as a precondition	Do not proceed with housing, BSF, or abattoir investment until biosecurity baseline is documented; ASF can eliminate USD 14K - 56K (UGX 50 - 200 million) in enterprise assets per event
Certification and Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) standard verification	Any HACCP/ISO claim, and any commercial - scale BSF larval meal use, verified against the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register and the not - yet - existent Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) BSF feed quality standard respectively	Statement withheld pending verification - this is the existing 6.1E discipline (Prime Pork, Nsibirwa, Ranchers Finest, and Wambizzi Cooperative Society all currently unverified) and the 6.3A/6.7 BSF - standard gap, now applied as a standing gate

Gate	Test	Failure Consequence
Denmark/EU technology fit	Supplier route serviceable in Uganda - Frontmatec, PlanEnergi/Bigadan, Skov A/S, SEGES Innovation, FOSS, DanBred/Topigs Norsvin all confirmed with relevant East Africa deployment or feasibility data	Do not match technology until service and spares route is confirmed
Capital stack and post - grant sustainability	Credible 5:1 co - financing evidence (ACF/ aBi confirmed feasible for USD 69K - 111K (UGX 250 - 400 M) grants) and demonstrated capacity to sustain operations after the grant period	Do not count toward leverage, or defer the package, without audited accounts and a credible O&M plan

Application note: This mirrors the equivalent poultry gate structure directly, with the ASF - biosecurity gate and the certification/Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - standard gate replacing poultry's single certification gate as piggery's two sector - specific control points - reflecting that piggery carries both an open HACCP - verification question (as poultry does) and a disease - risk gate poultry does not carry in the same form.

6.6.2 Enterprise Ranking Against the Hard Gates

Table 6.13C applies the eight hard gates in Table 6.13B to the enterprises named in the actor landscape (Section 6.4C) and the KII agenda (Section 6.8) that have live engagement or confirmed operator identity, producing the ranking this chapter feeds into the cross - consultant enterprise - prioritisation exercise. As with the equivalent poultry table, this is a snapshot against currently available desk and KII evidence, not a funding decision; CONDITIONAL gates identify the specific verification step that must clear before an enterprise moves from KII candidate to funded case.

Table 6.13C Enterprise ranking against the hard - gate screening framework

Enterprise	Identity	Buyer/Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) route	Biosecurity	Certification/Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)	Overall status
Prime Pork Uganda Limited	PASS - confirmed	CONDITIONAL - formal retail/ hotel Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) not yet confirmed	Not yet verified on site	N/A - no certification claim currently made	CONDITIONAL, priority Tier 3 target

Enterprise	Identity	Buyer/Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) route	Biosecurity	Certification/Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)	Overall status
Ranchers Finest / Finest Farms	PASS - confirmed	Not yet assessed	Not yet verified on site	FAIL/HOLD - certificates identified as expired; treat as unconfirmed/lapsed pending current Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) numbers (Section 6.1E)	HOLD pending current certificate verification
UPPA Secretariat / Tier 1 members	CONDITIONAL - (Uganda Pig Piglets Association) UPPA's active existence and current scale not corroborated by the most recent KII wave (Section 6.3)	Not yet assessed	Not yet assessed	Not yet assessed	HOLD pending UPPA verification KII
Nsibirwa Pork Products	CONDITIONAL - contact TBC	Not yet assessed	Not yet assessed	Not assessed - no certification claim currently made	EARLY STAGE
Wambizzi Cooperative Society	CONDITIONAL - contact TBC	Not yet assessed	Not yet assessed	Not assessed - no certification claim currently made	EARLY STAGE

Sources: Sections 6.1E, 6.3, 6.4C, 6.6B, 6.8; A2i GRASP KII intelligence to July 2026.

Read against the cross - consultant scale - over - spread guidance, this ranking supports Prime Pork Uganda Limited as the enterprise closest to a fundable position, with Ranchers Finest/Finest Farms held pending current Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certificate confirmation rather than treated as a second near - term case, and UPPA's collective model tracked as a structural opportunity contingent on the outstanding verification KII in Section 6.8 rather than assumed as a going concern.

6.7 Pillar 7: Policy Alignment, Regulatory Framework, and Post - Grant Sustainability

Table 6.14 Legislative and regulatory mapping: Uganda commercial piggery sector

Instrument	Status	Key Provisions for Value - Addition Investment	Alignment Assessment	Required Policy Action
NDP IV (2025/26 - 2029/30)	Enacted	Agro - industrialisation primary growth driver; livestock as priority value chain; pig sector contributes to protein food security, agro - processing employment, and circular economy / NDC targets	Full alignment - GTTF piggery investment directly advances NDP IV agro - processing and protein food security objectives	No action required; GTTF positions within existing NDP IV mandate
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Sector Strategic Plan 2023/24 - 2027/28	In implementation	Piggery explicitly designated as priority investment sub - sector for protein security, value addition, and cooperative organisation formalisation; National Pig Production and Marketing Policy embedded	Direct alignment - GTTF implements against existing Government policy mandate; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) has already designated piggery for the commercial technology - enabled development GTTF facilitates	Formal alignment letter from Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); licensing expedite pathway for HACCP abattoir investments in the GTTF pipeline
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / FAO - ASF National Emergency Response Plan 2024 - 2026	Active	Government - endorsed biosecurity investment roadmap; herd compartmentalisation; district rapid response; herd loss compensation mechanisms	GTTF biosecurity grants complement and accelerate this plan - enterprises investing in GTTF - supported biosecurity infrastructure align with documented Government roadmap	GTTF biosecurity precondition to be co - designed with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/ FAO - ECTAD to ensure enterprise - level investment aligns with national containment zoning

Instrument	Status	Key Provisions for Value - Addition Investment	Alignment Assessment	Required Policy Action
EU Farm to Fork Strategy (2020 / EU Green Deal)	EU enacted	50% antimicrobial reduction in livestock by 2030; sets the institutional standard that EU pork import health conditions will increasingly reflect	Climate - controlled, HACCP - certified pig production achieves structurally lower antibiotic dependency positioning Ugandan producers for future EU SPS compliance	GTTF technology investment (Skov A/S / SEGES housing + Frontmatec HACCP) simultaneously satisfies Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) domestic standards and EU SPS import health conditions
Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) BSF Larval Meal Certification Standard	Does not yet exist	No national feed quality standard recognising BSF larval meal as certified protein for pig and poultry compound feed	BSF industrial system investment is designated CONDITIONAL until standard enacted; limits commercial - scale BSF to on - farm use only until Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification established	Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) to develop BSF larval meal feed quality standard - highest - leverage single policy action for GTTF BSF investment; 12 - 18 month development timeline; GTTF TA to support Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) standard development process
EAC Common External Tariff (25% CET)	In force	EAC CET on processed pork (HS 0203) provides import parity price floor protecting Uganda domestic formal pork producers against South African and EU competition	Import parity analysis confirms certified domestic pork competitive within the EAC 25% tariff band; GTTF abattoir investment captures this protected premium permanently	No change required; existing CET provides the price protection within which technology investment creates durable competitiveness

Instrument	Status	Key Provisions for Value - Addition Investment	Alignment Assessment	Required Policy Action
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) HACCP Licensing - Formal Abattoir Standards	Active enforcement (inconsistent)	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) has power to enforce HACCP licensing conditions for pig slaughter; inconsistent enforcement creates competitive disadvantage for formal processors	Consistent HACCP enforcement would eliminate the cost advantage of informal open - air slaughter that undermines formal processor returns	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) to enforce licensing conditions for pig slaughter consistently - creating a level competitive environment that rewards GTTF investment in HACCP abattoir infrastructure

Sources: NDP IV 2025; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Sector Strategic Plan 2023/24 - 2027/28; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/FAO ASF Emergency Response Plan 2024 - 2026; EU Farm to Fork 2020; EAC CET 2022 - 2025.

The two priority policy catalyst actions are: (1) Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) development of a BSF larval meal feed quality standard, the highest - leverage single policy action available; and (2) consistent Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) HACCP licensing enforcement, which eliminates the informal sector's cost advantage and rewards formal processing investment.

6.7.1 MCDA Sector Scoring Summary

Table 6.15 MCDA scoring summary - Uganda commercial piggery sector

Scoring Criterion	Weight	Score	Rationale
Market Growth Potential	25%	8 / 10	CAGR ~6% on herd (NLC 2008 - 2021 implied); urban population share rising steadily (Section 6.0B) as the demand - durability driver; Uganda per capita 3.2 kg nearly 2x Kenya and 3x Tanzania; structural demand advantage unique in EAC
Climate Resilience Impact	20%	9 / 10	Highest circular economy score of any livestock sub - sector: biogas + BSF simultaneously address methane emissions, fishmeal carbon footprint, manure disposal, and energy self - sufficiency; climate - controlled housing addresses heat stress above 25°C

Technology Absorption Readiness	20%	7 / 10	A2i 2024 DGBP BSF project validates Uganda fit; SEGES Innovation East Africa feasibility review reduces housing adoption risk; however Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) BSF larval meal certification absent - limits commercial - scale BSF until standard enacted
Private Co - Investment Potential	15%	8 / 10	aBi ACF confirmed 5:1 leverage for GTTF grants of USD 69K - 111K (UGX 250 - 400 M); UPPA Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) framework documented as bankable; strong commercial returns from BSF (14 - 20 months) and biogas (18 - 28 months) attract private capital once ASF risk is de - risked by biosecurity grant
Export & Value - Addition Viability	10%	7 / 10	DRC export channel viable once HACCP certification achieved; 20 - 35% price premium in Goma/Beni documented; import substitution of premium processed pork (USD 5.0 million - 6.9 million (UGX 18 - 25 B)/year) achievable within GRASP programme cycle
Inclusive Development Impact	5%	8 / 10	1.6 million rural households; 45 - 55% female - led pig keeping; pig savings function = primary financial inclusion mechanism; BSF household - scale model uniquely suited to women - led cooperative enterprise
Danish / EU Technology Match Quality	5%	8 / 10	Frontmatec, BSF suppliers (Bühler/Innovafeed), PlanEnergi/Bigadan, DanBred, FOSS, Skov A/S/SEGES - strong, validated pipeline; SEGES East Africa feasibility review is the most thorough technology readiness assessment of any livestock sub - sector
WEIGHTED TOTAL100%8.1 / 10Chapter - level score, calculated independently within this chapter and carried without adjustment into the cross - sector ranking in Chapter 14. Highest circular economy / climate mitigation score of any value chain in the landscape.			

Source: A2i GRASP MCDA framework, May 2026. Score of 8.1/10 is this chapter's own calculation, carried without adjustment into the cross - sector ranking in Chapter 14.

6.7B SWOT Analysis

STRENGTHS	WEAKNESSES
- Uganda has the highest per capita pork consumption in the EAC at 3.2 kg nearly 2x Kenya and 3x Tanzania. This structural demand advantage, rooted in deep cultural integration in Buganda, Busoga, and Kigezi, is not replicable by competitors and provides a durable domestic demand base for any GTTF - supported processing investment.
- 6% herd CAGR over 2015 - 2025 is the fastest expansion rate of any livestock sub - sector in Uganda, driven by urbanisation (5.2% p.a.) and biological efficiency both structural forces that will continue regardless of programme intervention.
A2i's 2024 DGBP BSF project provides Uganda - validated proof of concept for the single highest - impact technology in the piggery portfolio, reducing first - mover risk to its lowest level of any value chain in the GRASP landscape.
- UPPA's contractual Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) framework has been documented as bankable by aBi Development, and ACF co - financing at 5:1 leverage has been confirmed for GTTF piggery grants the strongest commercial co - financing track record of any value chain in the GRASP livestock portfolio. This rests on aBi/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) documentation rather than independent field corroboration; see the verification flag in Section 6.3 before this is presented as a settled fact.
- The pig's circular economy profile is unmatched in any other livestock sub - sector: a single 500 - pig farm generates USD 97K - 125K (UGX 350 - 450 million) per year in combined biogas, BSF larval meal, and frass fertiliser value from a waste stream that currently imposes disposal costs.
- Denmark's global leadership in intensive pig production at 15 million pigs for 5.9 million people and 31 kg per capita consumption provides a world - class technology base (Frontmatec, SEGES, PlanEnergi, DanBred, Skov A/S) with verified East Africa adaptation capacity.	- No commercially available ASF vaccine exists as of June 2026. With case fatality rates approaching 100% and herd loss rates of 30 - 60% in affected districts, ASF remains the single greatest threat to every investment in the piggery portfolio. There is no technology solution that fully eliminates this risk only biosecurity infrastructure that reduces it.
- Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) has no national feed quality standard recognising BSF larval meal as a certified protein for compound pig feed. Without this standard, commercial - scale BSF deployment cannot legally supply licensed feed mills limiting the most impactful technology to on - farm use until the standard is enacted.
- Less than 15% of Uganda's pork offtake moves through certified formal channels. The cost advantage of informal open - air slaughter zero biosecurity cost, zero HACCP compliance cost creates persistent competitive pressure against formal HACCP processing investment unless Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) consistently enforces licensing conditions.
- Feed constitutes 68 - 73% of pig production costs and is heavily dependent on imported fishmeal at USD 0.97 - 1.17 (UGX 3,500 - 4,200)/kg. Any global fishmeal price spike transmits directly to Uganda farm profitability. BSF investment partially hedges this risk but full deployment is constrained by the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification gap.
- The pig sector has attracted significantly less formal donor investment than dairy or poultry - meaning less institutional infrastructure, less cooperative formalisation, and less financial record - keeping culture among Tier 2 operators, increasing the BDS burden required before capital deployment.

OPPORTUNITIES	THREATS
- The DRC export channel is commercially validated. Kampala - sourced pork sells in Goma and Beni at 20 - 35% above local DRC production prices. Formal HACCP certification unlocks this premium and converts an informal trade flow into a documented, contractual export relationship.
- Import substitution opportunity of USD 5.0 million - 6.9 million (UGX 18 - 25 billion)/year in certified processed pork (sausages, bacon, luncheon meat) currently imported from South Africa, Kenya, and Europe for Kampala hotel and institutional markets that domestic suppliers cannot access due to HACCP non - compliance.
- BSF circular economy model is uniquely suited to women - led cooperative enterprise: low capital entry, manageable at household scale, daily income streams. At 45 - 55% female participation in pig - keeping households, BSF is simultaneously a feed technology investment and a women's financial inclusion intervention.
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) ASF Emergency Response Plan 2024 - 2026 and the National Pig Production and Marketing Policy create an explicitly supportive Government regulatory environment. GTTF enterprises aligning with the ASF plan invest against a documented Government commitment rather than an uncertain policy landscape.
- The EU Farm to Fork Strategy is creating a durable structural premium for antibiotic - reduced, welfare - certified pork in European markets. GTTF technology investment (climate - controlled housing + HACCP certification) positions Ugandan enterprises to satisfy these standards, opening a long - term premium export channel that no competitor in the region is currently targeting.	- ASF epidemic risk is HIGH and SEVERE. A major outbreak in Central Uganda during GTTF implementation could destroy the herd base supplying GTTF - supported abattoir investments and eliminate Tier 1 enterprise balance sheets that serve as the co - financing anchor for 5:1 leverage. This is the dominant portfolio risk with no full mitigation available.
- Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) HACCP enforcement inconsistency means that informal open - air slaughter continues to operate without biosecurity cost, undercutting formal processor margins. If enforcement remains weak, HACCP investment creates a cost disadvantage rather than a premium and enterprises will rationally choose not to invest.
- Currency risk: equipment imports from Denmark and Italy are priced in EUR/DKK. Uganda Shilling depreciation at import creates effective UGX cost overruns above GTTF grant envelopes. This risk is particularly acute for the HACCP abattoir investment at USD 120,000 - 250,000 per unit.
- Technology adoption resistance among Tier 2 operators: BSF and biogas technologies are unfamiliar to most Uganda pig farmers. Without adequate demonstration and BDS support, adoption rates may fall short of the 5:1 leverage target, particularly if the first few installations encounter technical problems under field conditions.
- Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) standard development timeline uncertainty: if BSF larval meal certification takes more than 18 months, the commercial - scale BSF investment case weakens materially because the inability to supply licensed feed mills reduces the BSF value chain to on - farm use only, constraining the addressable market and making GTTF grants harder to justify on commercial grounds alone.

SWOT synthesised from: FAO FAOSTAT 2023; UBOS 2022 and 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA 2024; FAO - ECTAD 2024; Masembe et al. 2021; Sheppard et al. 2020; Dankwa et al. 2021; SEGES Innovation 2024; Frontmatec 2023; PlanEnergi 2024; A2i DGBP 2024; EU Farm to Fork 2020; A2i GRASP KII intelligence to 18 June 2026.

6.7.2 Risk Register

Table 6.16 Risk assessment and mitigation strategy - GTTF piggery portfolio

Risk	Likelihood	Impact	Evidence Base	Mitigation Strategy
ASF Outbreak During Implementation	HIGH	SEVERE	2016 - 2017 ASF: >680,000 pigs lost; USD 45M direct economic losses (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/FAO 2018). 2022 - 2024 cycle: USD 13.9K - 55.6K (UGX 50 - 200M) enterprise asset destruction per event (FAO - ECTAD 2024). No commercially available ASF vaccine as of June 2026.	Biosecurity infrastructure (Skov A/S / SEGES housing; footbath dosing; perimeter control) bundled as mandatory precondition of ALL pig GTTF grants. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/FAO ASF Emergency Response Plan 2024 - 2026 alignment ensures Government support. Business interruption insurance facilitation for Tier 3 enterprises.
Feed Price Volatility - Fishmeal Dependency	MEDIUM	HIGH	Fishmeal at USD 0.97 - 1.17 (UGX 3,500 - 4,200)/kg from global ocean fishery supply dynamics outside Ugandan control. Feed = 68 - 73% of production cost. Any fishmeal price spike directly compresses pig farm profitability.	BSF protein systems provide structural hedge: 25 - 50% fishmeal substitution at 30 - 40% lower cost than fishmeal. UPPA cooperative feed procurement for Tier 2 operators. NIR feed quality testing (FOSS A/S) enables least - cost ingredient substitution in real time.
Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) BSF Larval Meal Certification Absent	MEDIUM	MEDIUM	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) has no national feed quality standard recognising BSF larval meal as certified protein for compound feed. Without this standard, BSF meal cannot legally enter licensed commercial feed mill rations - limiting commercial - scale deployment.	Policy catalyst engagement with Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) for BSF larval meal standard (Section 7.4). BSF industrial systems designated CONDITIONAL until standard enacted. Household - scale BSF adoption unaffected. Household and cooperative - scale BSF can proceed while policy pathway is built.

Risk	Likelihood	Impact	Evidence Base	Mitigation Strategy
Technology Adoption Resistance	MEDIUM	MEDIUM	First - mover risk at commercial scale despite A2i BSF validation. Enterprise management may require proof - of - concept before committing private co - financing for BSF or biogas systems.	A2i 2024 DGBP BSF project creates local proof - of - concept and peer network. Demonstration farm visitor programme. Milestone - linked disbursements reduce upfront perceived risk. SEGES Innovation tropical validation reduces technical uncertainty for housing investment.
Currency Risk on Equipment Imports	MEDIUM	MEDIUM	Equipment capital costs denominated in EUR/DKK. Uganda Shilling depreciation at the point of import can increase effective UGX cost of GTTF - co - financed equipment above budgeted levels.	Phased equipment deployment tied to favourable FX windows. Local assembly and maintenance contracts for biogas units. Import duty waiver application support through Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and URA for qualifying equipment categories.
HACCP Regulatory Approval Delays	LOW	MEDIUM	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) HACCP licensing process can take 12 - 18 months from application to certification. Delays after abattoir capital is deployed create revenue gap risk for commercial debt service.	Proactive Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) engagement before grant disbursement. HACCP certification BDS bundled as mandatory grant deliverable. Pre - clearance engagement leveraging A2i regulatory relationships with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Directorate of Animal Resources.

Risk	Likelihood	Impact	Evidence Base	Mitigation Strategy
Climate Change: Rising Ambient Temperatures	MEDIUM	MEDIUM	CGIAR/ILRI 2024: pig performance declines measurably above 25°C; Uganda's climate trajectory projects increasing frequency of temperatures above this threshold in all three commercial pig production regions.	Climate - controlled pig housing (Skov A/S / Big Dutchman) converts rising temperature from production risk to managed variable. GTTF housing investment is simultaneously a commercial mortality - reduction investment and a climate adaptation investment.

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/FAO 2018; FAO - ECTAD 2024; Masembe et al. 2021; Dixon et al. 2019; SEGES Innovation 2024; CGIAR/ILRI 2024; IPCC AR6 2021.

6.8 Chapter Conclusions

6.8.1 Key Informant Interview Agenda - Field Phase

The KII phase confirms the commercial readiness, financial capacity, and strategic intent of individual anchor enterprises. Given the piggery sector's 8.1/10 MCDA score and USD 146K (UGX 525 million) allocation, KII should prioritise confirming Tier 3 classification for four to five enterprises, establishing ACF co - financing feasibility, and determining whether the BSF cooperative cluster or the HACCP abattoir investment offers the stronger first - deal opportunity.

6.8.2 Investment Sequencing: From Landscape to Funded Case

The KII agenda that follows converts landscape - level findings into individual investment cases through a fixed sequence, stated here so field teams apply it consistently across Tier 2 and Tier 3 targets.

The Embassy has indicated a preference for a small number of larger investments on the order of three over a wide spread of small ticket sizes. Applying that guidance to the hard - gate ranking in Table 6.13C, this chapter's headline recommendation concentrates on three investment cases: ASF biosecurity infrastructure as the foundation layer (Prime Pork Uganda), genetics and feed quality (AI genetics via NAGRC&DB paired with NIR feed testing), and HACCP - certified processing and cold chain (converting the certification gap identified in Section 6.1E into formal - retail and export market access). BSF and biogas circular - economy investment is tracked as a strong complementary case linked to the Waste Management chapter rather than a fourth stand - alone headline task, pending the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) feed - quality standard. Ranchers Finest/Finest Farms, UPPA and the remaining named enterprises remain live KII targets that could substitute into this set as field verification against the hard gates progresses.

Table 6.16B Investment sequencing - piggery pipeline

Step	Decision Question	Minimum Evidence Required
1. Select technology category	BSF protein systems, farm - scale biogas, modular HACCP abattoir, ASF biosecurity infrastructure, or AI genetics?	One category per case; biosecurity is a precondition layered under any of the other four, not a competing category
2. Name the operator	Which enterprise owns, operates, or will service debt - Prime Pork, Ranchers Finest, a UPPA Tier 1 member, or a feed mill (Silverback, Multifeeds)?	Registration, site, confirmed management contact (Mulindwa or Wallace already confirmed for the two Tier 3 targets)
3. Prove the constraint	What loss is currently measurable - ASF loss rate, live - to - processed price spread, fishmeal cost exposure, Feed Conversion Ratio (FCR) gap?	KII - confirmed operating data cross - referenced against NLC 2021 and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UPPA Pork Price Monitoring 2023/24
4. Specify the technology	Which named supplier (Frontmatec, PlanEnergi/Bigadan, Bühler/Innovafeed, Skov A/S/SEGES, DanBred/Topigs Norsvin) resolves this constraint, and at what cost?	Supplier quotation; CapEx/opex; service and spares route confirmed
5. Price the benefit	What is the annual gross benefit - from the price - uplift, loss - avoided, or cost - saved decomposition in 6.5?	Verified throughput (sows, pigs/day, MT feed/year) multiplied by benefit per unit
6. Structure finance	Can the enterprise's balance sheet support the 5:1 leverage ratio?	Audited accounts; ACF/aBi co - financing eligibility (already confirmed feasible for grants of USD 69K - 111K (UGX 250 - 400 M))
7. Clear the hard gates	Does the case pass all eight gates in Table 6.13B, including the ASF biosecurity and Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) certification gates?	Full gate checklist signed off before disbursement recommendation

Note: Mukwano Industries sits outside this sequence entirely as recorded in 6.3B, it is mapped under Ecosystem Mapping as a horizontal feed - ingredient supplier, not an enterprise candidate subject to this investment sequence.

Table 6.17 KII agenda: priority enterprise targets and information sought

Enterprise / Institution	Priority KII Questions	Information Sought	Investment Hypothesis	Confirmation Required
Prime Pork Uganda Limited	1. What is current sow inventory, finishing pig capacity, and annual throughput to formal retail? 2. What is the enterprise's actual Feed Conversion Ratio (FCR) under current feed regime and what is the target under BSF integration? 3. Has Prime Pork assessed HACCP abattoir certification and what is the estimated capital requirement and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) pre - clearance status? 4. Does the enterprise have an existing formal retail Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) (supermarket / hotel) that can serve as a GTTF disbursement precondition?	Production baseline; Feed Conversion Ratio (FCR) data; HACCP pathway; balance sheet; Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) relationships; technology investment appetite	BSF integration; HACCP abattoir upgrade; biogas system; DanBred AI genetics - Tier 3	Audited accounts; Feed Conversion Ratio (FCR) records; HACCP pre - assessment from Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); confirmed Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) from Carrefour or hotel group; site visit for infrastructure assessment
UPPA Secretariat / Tier 1 Member Firms	PRIORITY (elevated July 2026 see 6.3 verification flag): does UPPA in its current form actually exist as an active, coordinated body, and if so, at what scale? 1. How many UPPA Tier 1 members have formal retail or institutional buyer Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) s currently in place? 2. What is the UPPA ACF borrowing experience and at what leverage ratios has ACF co - financing been achieved? 3. Has UPPA assessed a collective HACCP abattoir investment model versus individual enterprise investment? 4. What is UPPA's position on the BSF cooperative cluster model for Tier 2 members?	Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) landscape; ACF co - financing track record; collective investment appetite; BSF cluster organisational readiness	UPPA Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) framework as disbursement precondition; collective HACCP model assessment - Tier 2 - 3	UPPA member enterprise list with contact and financial profile; ACF portfolio documentation; Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) copies; UPPA secretariat contact confirmed via A2i

Enterprise / Institution	Priority KII Questions	Information Sought	Investment Hypothesis	Confirmation Required
Silverback Feeds / Multifeeds Ltd	1. Current annual compound feed throughput (MT/year) and fishmeal consumption per tonne of compound feed? 2. Is the feed mill aware of and interested in BSF larval meal as a fishmeal substitute? Has it assessed cost - in - use vs. fishmeal? 3. What NIR or feed quality testing is currently used? What aflatoxin contamination rate is observed in incoming maize? 4. What minimum contracted larval meal volume would the mill commit to as an offtake buyer?	Feed mill throughput; fishmeal dependency; BSF offtake interest; NIR interest; aflatoxin profile	NIR spectrometry (FOSS A/S); BSF larval meal anchor offtake agreement - Tier 2	Feed procurement records; aflatoxin test data; minimum BSF offtake volume commitment; contact confirmed via A2i
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - Directorate of Animal Resources	1. What is Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s timeline for HACCP certification for Prime Pork or UPPA Tier 1 commercial pig abattoir applicants? 2. What is the status of the ASF Emergency Response Plan compartmentalisation programme? Which districts have achieved or are pursuing ASF - Free Zone designation? 3. What is Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s position on Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) development of a BSF larval meal feed quality standard and what process would a formal policy request trigger? 4. What is the current status of import duty waiver applications for HACCP processing equipment?	HACCP licensing timeline; ASF compartmentalisation status; BSF regulatory pathway; duty waiver process	Policy alignment for HACCP abattoir, biosecurity, and BSF investments	Written HACCP certification timeline for Priority GTTF enterprises; ASF compartmentalisation zoning map; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) process commitment; duty waiver guidance

Enterprise / Institution	Priority KII Questions	Information Sought	Investment Hypothesis	Confirmation Required
NAGRC&DB / NaLIRRI	1. What Feed Conversion Ratio (FCR) improvement and daily weight gain data has NAGRC&DB documented from Large White / Landrace / indigenous crosses vs. unimproved local stock? 2. What AI service network currently exists nationally and what is the throughput capacity? 3. What minimum volume of DanBred or Topigs Norsvin semen doses would be required for a NAGRC&DB AI pilot to be operationally significant? 4. What ASF epidemiological data exists for the three primary commercial pig production regions (Central, Eastern, Western) for 2019 - 2024?	Feed Conversion Ratio (FCR) benchmark data; AI network capacity; semen import logistics; ASF geographic risk data	AI genetics pilot via NAGRC&DB network; technical validation for biosecurity investment design	Published or forthcoming crossbreeding performance data; AI network map; veterinary import certification pathway confirmed; ASF district - level incidence data

Priority Tier 3 KII target: Prime Pork Uganda Limited. Secondary targets: UPPA Secretariat; Silverback Feeds / Multifeeds Ltd; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Directorate of Animal Resources; NAGRC&DB.

Ranchers Finest / Finest Farms - a vertically integrated genetics - to - processing enterprise engaged during the field phase - is added as a priority Tier 3 KII target and deal candidate alongside Prime Pork Uganda Limited (Wallace 2026).

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Chapter 7 : Poultry Value Chain Assessment



Sector context

Uganda's poultry sector is undergoing rapid commercialization and vertical integration, with the commercial Tier 1 segment growing at approximately 8% annually over the past decade and attracting large integrated producers. Uganda has also developed a relatively strong regional poultry trade position, with Kenya and Tanzania among the major destinations and combined exports of poultry meat, eggs and live birds estimated at approximately USD 11 - 15 million in 2024. However, the sector continues to face major productivity, quality and environmental - efficiency gaps, including feed conversion ratios of 2.4 - 3.3:1 against a European standard of approximately 1.6, chick mortality of 15 - 30%, post - slaughter losses of 18 - 25%, and significant aflatoxin contamination of maize.

The green agenda provides an opportunity to address these constraints while improving competitiveness, particularly through renewable energy, resource - efficient feed production, reduced food losses, improved waste management, and circular - economy solutions. The GTTF investment case should therefore focus upstream of already well - capitalized integrators, prioritizing genetics and Day-Old Chicks (DOC) quality and feed quality as the two core productivity levers, complemented by solar - battery hatchery modernization, solar - powered brooding and lighting, NIR feed - quality testing, modular HACCP - certified processing and Black Soldier Fly (BSF) integration. Together, these technologies can reduce energy consumption, production losses and waste, improve feed efficiency and food safety, strengthen climate resilience, and accelerate Uganda's transition toward a more productive, resource - efficient and commercially sustainable poultry value chain.

Key findings:

- Rapid commercialization and vertical integration: Uganda's commercial poultry sector has grown at about 8% annually, supported by rising urban demand and increasing investment by large integrated producers. The national flock reached 57.8 million birds, while exotic/cross - bred birds increased substantially, signaling a shift toward commercial production (UBOS National Livestock Census 2021).

- Major productivity and quality gaps remain: Feed accounts for 65–72% of broiler production costs, while Feed Conversion Ratio (FCR) remains high at 2.4–3.3:1, chick mortality is 15–30%, post - slaughter spoilage is 18–25%, and about 67% of market maize exceeds EU aflatoxin limits (Kamika and Tekere 2019, Food Control). These constraints significantly reduce competitiveness and value capture.

- Strong market and export opportunity, but formalization is incomplete: Uganda has a competitive regional poultry position, with exports primarily serving Kenya and Tanzania, while poultry consumption remains below the Sub - Saharan African and global averages. Only about 25–30% of production is formally processed, highlighting substantial scope for improved processing, cold - chain and food - safety systems.

- GTTF should target shared upstream green - technology bottlenecks: Rather than subsidizing already well - capitalized integrators, the strongest investment case is in feed quality, genetics/day - old - chick (DOC) systems, renewable energy, efficient processing and circular economy solutions. Priority technologies include NIR feed testing, solar - battery hatcheries, solar - powered brooding, HACCP - certified

processing and BSF integration, supporting productivity, resource efficiency, waste reduction and climate - resilient growth

Headline Indicators

Table 7.1 Poultry sector headline indicators

Indicator	Value	Source
National flock, 2024 (estimated)	57.8 million birds (69.9% indigenous; 30.1% exotic/cross)	UBOS National Livestock Census 2021 (NLC 2021)
Commercial broiler production, 2024 (est.)	133,000 MT liveweight (unreconciled; see Table 7.2)	FAOSTAT / Helgi 2024
Commercial layer flock, 2024	~3.5 million birds	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024
Annual egg production, 2024	~44,000 MT (approx. 1.8 billion eggs)	FAOSTAT / Helgi 2024
Sector growth rate (CAGR, commercial segment)	~8% per annum (2014 - 2024)	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); FAOSTAT QCL
Per capita poultry meat consumption, Uganda	2.4 kg/person/year	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); Reportlinker 2024
Sub - Saharan Africa per capita average	3 - 5 kg/person/year	FAO FBS 2023
Global per capita average	15 - 16 kg/person/year	FAO FBS 2023
Feed as % of total broiler production cost	65 - 72%	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; Ssemwanga & Lutalo 2021
Sector average Feed Conversion Ratio (FCR) (open - sided housing, market - quality maize)	2.4 - 3.3:1	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; A2i sector analysis 2026

Indicator	Value	Source
Feed Conversion Ratio (FCR) target under improved genetics and feed quality (attainable)	1.4 - 1.6:1, driven by genetics and feed quality (EU standard: ~1.6)	Big Dutchman; Fancom technical data
Market maize with aflatoxin > EU limit (12 districts survey)	67%	Kamika & Tekere 2019, Food Control
Post - slaughter spoilage (informal open - air processing)	18 - 25% of dressed weight	Nabwire & Kigozi 2022
Hatchery chick mortality, hatch to day 21 (current)	15 - 30%	Ssemwanga & Lutalo 2021; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))
Grid electricity tariff, Uganda	USD 0.22 - 0.26 (UGX 800 - 950)/kWh	ERA 2024
Poultry meat exports (HS 0207), 2024	USD 4.62 million	OEC / WITS / UN Comtrade 2024
Total poultry export value (meat + eggs + live), 2024	USD 10.98 - 15.0 million (meat: USD 4.6M; eggs: USD 6 - 10M est.)	OEC 2024; A2i sector analysis 2026 (egg - export component requires verification)
HACCP / ISO 22000 certification status	Biyinzika and SR Kuku believed to hold management system certifications with verification against Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) List of Certified Systems required before definitive claim	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register (pending verification); A2i KII intelligence 2026
Informal slaughter share (estimated)	40 - 45% of commercial production (formal commercial channel: ~55 - 60%)	A2i sector analysis 2026; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024

Sources: FAOSTAT QCL; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; Helgi Library 2024; ERA 2024; OEC / WITS / UN Comtrade 2024; Kamika & Tekere 2019; Nabwire & Kigozi 2022; Ssemwanga & Lutalo 2021; A2i sector analysis 2026. Feed Conversion Ratio (FCR) data range 2.4 - 3.3 reflects market - quality maize conditions. Trade figures above are drawn from OEC/WITS/UN Comtrade; URA is the preferred authority for Uganda's own trade data under this assessment's citation standard (Section 7.2D, Table 7.19).*

7.1 Pillar 1 - Historical Baseline and Strategic Alignment

Uganda's commercial poultry sector has grown from approximately 450 registered producers in 2015 to over 1,200 by 2024, with the national flock standing at 57.8 million birds (per UBOS National Livestock Census 2021). Data quality for the period 2015 - 2019 is lower than for 2020 onwards, where UBOS data is more reliable. The 2015 figure is used as the analytical start point even where data quality is reduced, consistent with the ten - year baseline requirement adopted for this study. Uganda's 2024 production estimate of 133,000 MT liveweight carries a verification flag and requires confirmation against The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024 bulk download.

Data note on poultry meat production statistics (Uganda and regional comparators, 2015 - 2024)

A methodological limitation should be flagged for this sub - section. The Ministry of Agriculture, Animal Industry and Fisheries' *Statistical Abstract 2024* - the primary domestic source for livestock statistics - does not publish a poultry meat production series in metric tonnes. Its livestock chapter reports chicken *population* figures (44.2 million in 2020, rising to 58.3 million by 2024) and a comparable beef *production* series in MT, but no equivalent tonnage series exists for poultry meat.[1] This is a genuine gap in Uganda's official statistical output, not an oversight in this review.

In the absence of a Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - published series, the standard reference for cross - country poultry meat production comparisons is FAOSTAT's Livestock Primary dataset [2] Selected FAOSTAT - derived figures for Uganda were cross - checked against secondary aggregators (Knoema, ReportLinker) and are broadly consistent: approximately 69,000 MT (2019), 70,000 MT (2020), 72,000 MT (2021), and 70,488 MT (2022). [3] A complete, verified 2015 - 2024 series for Uganda alongside Kenya, Tanzania, Rwanda, and Burundi should be pulled directly from FAOSTAT's Production > Livestock Primary module before finalizing the chapter, as automated retrieval tools could not extract the full filtered dataset with confidence sufficient for report - grade citation.

Table 7.2 Poultry meat production: Uganda and regional comparators, 2015 - 2024 (metric tonnes)

Year	Uganda MT	Kenya MT	Tanzania MT	Rwanda MT	Uganda Growth	Source note
2014	n/r	~70,000	~65,000	~8,000	Baseline	FAOSTAT QCL
2015	n/r	~73,000	~67,000	~9,000	n/a	FAOSTAT QCL
2016	n/r	~77,000	~70,000	~11,000	n/a	FAOSTAT QCL
2017	n/r	~80,000	~73,000	~12,500	n/a	FAOSTAT QCL
2018	n/r	~83,000	~77,000	~14,000	n/a	FAOSTAT QCL
2019	n/r	~86,000	~80,000	~15,000	n/a	FAOSTAT QCL
2020	69,991	~89,000	87,500	~16,000	Baseline	FAOSTAT / Helgi
2021	68,400	89,500	87,500	19,900	- 2.3%	Helgi / FAOSTAT

1 m [1](https://docs.google.com/document/d/1NkYgj1ygXkiUHdjcso943q1ctzLNV4C5/edit#bookmark=id.cr2hz1pqgjpa)

2 m (item: "Meat, poultry").[2](https://docs.google.com/document/d/1NkYgj1ygXkiUHdjcso-943q1ctzLNV4C5/edit#bookmark=id.flipsx6a46pf)

3 m .[3](https://docs.google.com/document/d/1NkYgj1ygXkiUHdjcso943q1ctzLNV4C5/edit#bookmark=id.9txrju2b6531)

Year	Uganda MT	Kenya MT	Tanzania MT	Rwanda MT	Uganda Growth	Source note
2022	70,500	110,000	92,700	n/r	\+3.1%	Helgi 2022
2023	~76,000	123,000	n/r	n/r	~7.8%	FAOSTAT estimate
2024	82,000 - 91,000 (reconciled)*	96,937	n/r	15,000	8 - 20%	FAOSTAT / Helgi; USDA

Sources: FAOSTAT QCL; Helgi Library 2021 - 2024; USDA FAS 2025. Data quality for 2015 - 2019 is lower than for 2020 onwards. n/r = not reliably retrieved. The FAOSTAT - derived 2024 figure of 133,000 MT (a ~75% jump over 2023) is not reconciled with sector - player growth reporting and has been replaced above with a reconciled range applying the 8% conservative / 20% maximum - observed growth band reported by commercial players to the 2023 base of ~76,000 MT. The unreconciled 133,000 MT figure most likely reflects a series - definition change (e.g. inclusion of layer - flock egg - mass or live - bird - equivalent tonnage not previously counted as meat production) rather than genuine output growth; this must be confirmed with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/FAOSTAT before either figure is used externally, and meat - bird (broiler) production should be reported separately from egg - layer output going forward.*

TAKEAWAY: Uganda is growing off a smaller production base than Kenya and closing the gap, but the 2024 figure should be read as a reconciled 82,000 - 91,000 MT range, not the unreconciled 133,000 MT headline number, pending Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) confirmation (see footnote).

Figure 7.1 Poultry Meat Production 2024: Uganda and Regional Comparators

Metric tonnes (liveweight). Sources: FAOSTAT QCL; Helgi Library 2024; USDA/FAS 2025.

Figure 7.1 Poultry Meat Production 2024: Uganda and Regional Comparators (metric tonnes). Sources: FAOSTAT QCL; Helgi Library 2024; USDA/FAS 2025.

7.1.1 Comparative Baseline: Poultry Production Structure, 2008 - 2021

The decadal baseline below reconciles two independent UBOS - derived sources. The National Livestock Census 2021 provides the production - and - structure spine of the poultry flock; the World Bank Country Climate and Development Report (2025) supplies the sector macro - frame and the climate - exposure layer drawn on in Pillar 5. Where 2008 figures are unavailable for an indicator, the cell is marked " - ". All figures remain subject to confirmation against the formal UBOS data request (ref. A2i/GRASP/GTTF/UBOS/2026/04) and cross - validation with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), FAOSTAT and UN Comtrade.

Table 7.3 Comparative poultry baseline: NLC 2021 and World Bank CCDR 2025

Indicator	2008	2021	Source
Flock structure			
National chicken flock (million birds)	37.4	**57.8**	*NLC 2021, §7.3, p. 92*

Indicator	2008	2021	Source
Indigenous chicken (million birds)	32.8	**40.4**	*NLC 2021, §7.4, p. 94*
Exotic / cross - bred chicken (million birds)	4.6	**17.6**	*NLC 2021, §7.4, p. 94*
Indigenous share of total flock (%)	87.7	**69.9**	*NLC 2021, §7.4, p. 94*
Households & access			
Chicken - keeping households (million)	3.2	**4.8**	*NLC 2021, §7.2, p. 89*
Poultry - keeping HHs as % of all HHs	-	**75.4**	*NLC 2021, §7.1, p. 89*
Poultry HHs accessing extension (%)	-	**42**	*World Bank CCDR 2025, p. 21*
Eggs & layers			
National laying - hen flock (million)	3.2	**6.4**	*NLC 2021, §7.6, p. 97*
Eggs produced per day (million)	1.97	**4.2**	*NLC 2021, §7.6, p. 97*
Exotic share of laying hens (%)	-	**65.5**	*NLC 2021, §7.6, p. 98*
Sector macro frame			
Livestock sector, % of national GDP	-	**4**	*World Bank CCDR 2025, p. 3*
Livestock sector, % of agricultural GDP	-	**17**	*World Bank CCDR 2025, p. 3*

Reading the table. The single most important structural signal is the near - quadrupling of exotic/cross - bred stock (4.6 17.6 million birds) against a falling indigenous share (87.7% 69.9%). Read with the doubling of the laying - hen flock and the 132% rise in daily egg output, the data describe a sector in active, demand - pulled commercialisation concentrated in the Central region and the Buganda sub - regions, which together hold the overwhelming majority of exotic stock and laying hens. This corroborates, from the census side, the consolidation trajectory set out in 7.1A.

7.1.2 Industry Consolidation: The Structural Trajectory

The most analytically significant development in Uganda's poultry sector over the past three years is not the headline production data, but the structural shift toward large - scale vertical integration that is reshaping the competitive landscape. The UK poultry industry offers the relevant historical analogue: dispersed smallholder production across thousands of independent farms in the 1950s gave way, within four decades, to a market dominated by a small number of vertically integrated mega - producers supplying national retail chains under HACCP - certified, branded, cold - chain - delivered product. Uganda is at the early stage of precisely this transition.

Four developments signal the consolidation trajectory, each now with more specific evidence than the initial framework carried. First, Kenchic Uganda a subsidiary of Kenya's Kenchic Limited officially launched its Ugandan operation in November 2023, with Prime Minister Robinah Nabbanja presiding at the opening; the US$3.5 million Petersime - equipped hatchery at Namanve (Namilyango) gives it a capacity of 300,000 - 500,000 day - old chicks per week, positioned to dominate DOC supply at a price point smaller domestic hatcheries cannot match. Kenchic Uganda's general manager has publicly stated the entry decision reflects confidence in the market's growth trajectory despite claims of saturation, a data point corroborating the consolidation thesis even though it does not itself validate a specific growth percentage (see the 7.0 Chapter Summary scope note

on the 8% figure).

Secondly, Biyinzika Poultry International, the incumbent market leader, Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS)/ISO 22000 - certified as detailed in Section 7.1D is deepening vertical integration across feed, DOC, grow - out, and processing, running an automated abattoir processing over 90,000 birds per week under its Pearl Chicken brand.

Thirdly, SRR Uganda (SR Afro Chicks & Breeders Ltd, also Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/ISO 22000 - certified per Section 7.1D) is expanding its commercial processing ambitions, per the SRR Uganda KII.

Fourth, the De Haas/Irving partnership signals the entry of South African integrated poultry capital into Uganda, importing management systems, genetics, and production standards from one of Africa's most mature integrated poultry industries; this remains a KII - sourced lead not yet independently corroborated in public reporting and should be treated accordingly pending further verification. Set against this new - entrant activity, Ugachick Poultry Breeders established 1992, and the longest - standing vertically integrated incumbent operates a hatchery capacity exceeding 2 million day - old chicks annually and a feed mill producing over 50,000 tonnes of poultry feed a year, with existing export operations to Kenya and Tanzania; Ugachick is the baseline the new entrants are consolidating against, not a passive incumbent being displaced.

SECTOR STRUCTURAL OBSERVATION: The investment case for the poultry value chain is not about building a sector from scratch, but about accelerating and deepening a consolidation trajectory that is already underway, anchoring the technology and value creation in Ugandan enterprises rather than yielding it to foreign capital entrants. The right investment target, however, is not any single integrator's balance sheet, since Uganda's largest players are already well - capitalised and already sourcing equipment commercially. The stronger target is the feed and genetics supply chain that every integrator depends on: quality raw material into the mills, and day - old - chick genetics out of the hatcheries. Strengthening that shared upstream base lets Ugandan enterprises of every size, not only the largest three or four, absorb green technology at commercial scale and retain value domestically.

7.1.3 EAC Regional Context

Kenya's structural domestic deficit of over 100,000 MT annually against domestic demand of approximately 200,000 MT is the primary regional export signal. Uganda's poultry exports currently go primarily to Kenya and Tanzania, with the DRC, South Sudan, and Rwanda accounting for smaller volumes, and combined export value of approximately USD 10.98 - 15.0 million annually the strongest export position of any EAC poultry producer.

Table 7.4 EAC poultry sector comparison, 2024

Indicator	Uganda	Kenya	Tanzania	Rwanda
Poultry meat production 2024 (MT)	133,000 (unreconciled est.; see Table 7.2)	96,937	~92,700 (2022)	15,000
Per capita consumption (kg/person/yr)	2.4	2.5	n/r	~1.8
Egg production 2024 (MT)	44,000	n/r (221.7M trays KNBS)	322,000	7,750

Indicator	Uganda	Kenya	Tanzania	Rwanda
Formal processing rate (approx.)	~25 - 30%	~35 - 40%	~15%	~10%
Poultry meat exports 2024 (USD)	4,620,000	362,000	9,300	0
Live poultry exports 2024 (USD)	3,830,000	4,220,000	n/r	63,400
Egg exports 2024 (USD)	2,530,000	n/r	n/r	n/r
HACCP - certified processors	2 (verified)[1]	Partial (KMC only)	0	0
Net poultry trade position	Exporter	Structural importer	Marginal	Net importer

Sources: FAOSTAT QCL; OEC / WITS / UN Comtrade 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; USDA/FAS Kenya 2025; IATP Kenya livestock analysis 2023.

[1] Uganda figure independently verified against the live Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register (cims.Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS).go.ug/api/website/sc - register.php), checked, and confirmed currently valid. Kenya, Tanzania, and Rwanda figures have not been checked against their respective national standards bodies' registers and are carried forward from desk sources only.

***TAKEAWAY:** Kenya's structural deficit, not Uganda's own production scale, is the primary demand signal driving Uganda's export case Uganda is filling a gap next door, not yet competing on its own consumption base.**

7.1.4 Per Capita Consumption: The Supply - Side Gap and the Growth Projection

Uganda's total per capita poultry meat consumption of all birds consumed, including subsistence backyard birds that never enter a formal market is estimated at approximately 2.4 kg per person per year (FAOSTAT FBS). This total figure should not be read as the addressable commercial market: Ugachick's Managing Director (KII) estimates commercial/formal - channel per capita consumption at approximately 1.3 kg per person per year the two figures are not in conflict once subsistence consumption is separated from commercial off - take, and both should be carried in the report with this distinction stated explicitly. The commercial figure is the relevant base for sizing GTTF - supported formal - channel investment; the total figure is the relevant base for describing overall protein security.

Uganda's 2.4 kg total falls well below the Sub - Saharan Africa average of approximately 3 to 5 kg, the global average of approximately 15 to 16 kg, and far below South Africa's approximately 39 kg the regional leader on the back of its fully consolidated, vertically integrated broiler industry. The gap is not a reflection of dietary preference but of supply - side price and quality constraints. Urban population growth at 5.2 percent per annum and a growing middle class with rising disposable incomes are pulling demand faster than the formal sector can respond.

Population and urbanization. Uganda's urban population is growing at 5.2% per annum. Urban consumers spend a higher proportion of food budget on poultry than rural households and have greater access to formal retail channels (Ref). At 5.2% urbanisation, the urban consumer base grows by approximately 650,000 people per year each shifting toward higher per capita poultry consumption (Ref).

Income growth. NDP IV projects real (economy - wide) GDP growth of 7 - 8% per annum. UBOS National Household Survey data consistently shows that poultry demand is income - elastic in Uganda's urban consumer seg-

ments a 1% increase in real household income generates more than a proportional increase in formal poultry demand among the growing middle class.

Price reduction from production efficiency. The sector's consolidation toward larger integrated producers with lower cost - of - production per Kg will reduce formal retail prices for certified chilled poultry. The Kenchic entry is already driving DOC prices down: from USD 1.25 (UGX 4,500) for layers and USD 0.83 (UGX 3,000)for broilers (local producers) to USD 0.75 (UGX 2,700) (Kenchic). Lower DOC and feed costs translate to lower retail prices, expanding the addressable demand base.

The 2030 per capita poultry consumption projection is estimated at 3.5 kg, driven by two quantified factors: urbanization (UBOS - sourced) and income growth (NDP IV/UBOS - sourced). A third potential driver a price - reduction effect from sector consolidation is not incorporated into this figure, as it currently rests on a single anecdotal day - old - chick price data point from the Kenchic KII rather than a modelled pass - through to retail chilled - poultry prices or a quantified consumer demand response. The projection is built only from drivers that are sourced and quantified. Should the price - reduction pathway be substantiated ideally through a retail price elasticity estimate drawn from the Kenchic KII or an equivalent formal - retail data source the projection would be revised upward accordingly, with that evidence stated explicitly at the point of revision.

Figure 7.2 Per Capita Poultry Consumption: Uganda in Global Context

kg/person/year, poultry meat. Sources: FAO FBS 2023; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; IATP Kenya analysis 2023.

Figure 7.2 Per Capita Poultry Consumption: Uganda in Global Context (kg/person/year). Sources: FAO FBS 2023; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; IATP Kenya analysis 2023.

Figure 7.2 presents the reconciled 2015 - 2024 poultry production and consumption series (Tables 7.2 and 7.4), moving beyond aggregate percentage growth to two concrete, dated markers of sector expansion. The first is the Parish Development Model's effect on rural household cash income, which has fed through into formal poultry off - take. The second is capacity expansion at the processing level: Kenchic's Namilyango hatchery, operating at 300,000 - 500,000 day - old chicks per week since September 2023, and Biyinzika's deepening vertical integration. Together these markers ground the sector's growth trajectory in specific, verifiable events rather than in a smoothed trend line alone.

Table 7.5 Production projections to 2030, three scenarios

Year	Conservative (5% CAGR)	Base Case (8% CAGR)	Optimistic (12% CAGR)	(MAAIF) Target	Note
2024	133,000	**133,000**	133,000	-	FAOSTAT / Helgi 2024 est. (baseline, unreconciled - see Table 7.2)
2025	140,000	**144,000**	149,000	-	GTTF investments commence
2026	147,000	**155,000**	167,000	-	Feed Conversion Ratio (FCR) gains from first NIR installations
2027	154,000	**168,000**	187,000	-	HACCP processing lines operational

Year	Conservative (5% CAGR)	Base Case (8% CAGR)	Optimistic (12% CAGR)	(MAAIF) Target	Note
2028	162,000	**181,000**	209,000	-	Export corridor to DRC / South Sudan opens
2029	170,000	**195,000**	234,000	250,000	NDP IV target year
2030	179,000	**211,000**	262,000	-	NDP IV +1 horizon

Conservative = 5% CAGR; Base Case = 8% (consistent with recent commercial sector trajectory); Optimistic = 12%. Not endorsed by NPA or Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) as official projections. The 2024 baseline (133,000 MT) is the unreconciled FAOSTAT - derived figure discussed in Table 7.2; if the reconciled 82,000 - 91,000 MT range is used instead, all three scenario trajectories shift downward proportionally from a lower starting point.

Table 7.5 Poultry consumption benchmarks - CURRENT (2024), Uganda and comparators

Indicator	Uganda	Kenya	SSA Average	Global Average
Per capita poultry meat (kg/yr)	2.4	2.5	3 - 5	15 - 16
Per capita eggs (kg/yr)	~1.2	~1.4	~2.1	~9.3
Urban poultry expenditure (% food budget)	~8 - 12%	~10 - 15%	~8 - 14%	-
Gap to SSA average (2024)	2.1 kg (47%)	2.0 kg (44%)	-	-
Gap to global average (2024)	11.1 kg (82%)	11.0 kg (81%)	9.0 kg (67%)	-

Sources: FAOSTAT FBS 2021 - 2023; IATP Kenya 2023; FAO global aggregates 2023. All figures on this table are current (2024) observed data.

Table 7.5B Per - capita consumption - PROJECTED SCENARIOS TO 2030 (not current data)

Scenario	Uganda	Kenya	SSA Average	Global Average
2030 projection (no GTTF)	~3.2	~3.0	~5.5	~14.2
2030 projection (with GTTF)	~3.5	~3.4	~5.5	~14.2

The 2030 projection scenarios shown in this table keeps the current and forward - looking figures visually and structurally separate.

These are modelled 2030 scenarios, not observed data 'no GTTF' extrapolates the current CAGR forward unchanged; 'with GTTF' assumes the technology interventions in this chapter are deployed at the scale costed in Section 7.6. Neither scenario should be read alongside the current - year figures in Table 7.5 above as if directly comparable observations; they are a separate, assumption - dependent forecast and are presented in their own table for that reason.

7.1.5 HACCP and ISO 22000 Certification Status

Contrary to earlier findings in this assessment, active food safety management system certification does exist among Uganda's poultry processors. Direct verification against the live Uganda National Bureau of Standards (UNBS) Certified Systems Register, conducted on 10 August 2026, confirms currently valid Hazard Analysis Critical Control Point. (HACCP) and/or ISO 22000 certification for two enterprises central to this value chain.1 This finding revises the chapter's earlier position, which had stated that no HACCP - certified poultry processor operates in Uganda. Throughout this section, certification status is reported only where it has been independently confirmed against the Uganda National Bureau of Standards (UNBS) register; claims drawn from desk sources alone are identified as such and are not presented as verified.

The practical consequence of this gap is concrete rather than abstract: a Ugandan poultry processor without independently verified HACCP or ISO 22000 status cannot place chilled or frozen product on a modern retail shelf, supply a hotel group's institutional kitchen, or bid into an institutional buyer's tender each of these buyer categories requires certified chain - of - custody documentation as a condition of listing (Section 7.4C). That gap is the entry point for a foreign technical or financial partner to add value: certification is a defined, fundable scope of work covering food - safety systems, cold - chain integrity and processing - line upgrades rather than an open - ended sector problem, and it converts directly into formal - retail access for whichever enterprise closes it first.

This Uganda National Bureau of Standards certification gap should not be read as implying named enterprises operate unregulated. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Directorate of Animal Resources, acting through the Commissioner for Animal Health as Uganda's Veterinary Competent Authority, runs a separate poultry/abattoir licensing and meat - inspection regime under animal - health and public - health law, distinct from Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)'s voluntary systems - certification scheme checked above. Where a named enterprise holds a Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) operating licence, that licence is real and legally sufficient to operate; it is not, however, an equivalent - rigor substitute for Uganda National Bureau of Standards (UNBS)/ISO systems certification. Published food - safety research on Uganda's meat sector documents inconsistent enforcement and generally weak hygiene performance under Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) licensing in practice, and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) licensing is not the specific credential modern - retail, hotel - group, or WFP/institutional buyers require as a listing condition. NAGRC&DB was also considered as a possible alternative certifying body and ruled out: its statutory mandate under the Animal Breeding Act, 2001 is animal genetics and breeding AI services, breed conservation, hatchery genetics support with no food - safety, HACCP, or processing - certification function of any kind. A Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Licensed Establishments Register equivalent to Uganda National Bureau of Standards (UNBS)'s public API was not identified as part of this verification; obtaining it directly from Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and checking it against the named poultry enterprises is the recommended next step to bring Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - side evidence to the same standard as the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) finding above.

Preliminary desk findings, by enterprise:

- **Ugachick Poultry Breeders.** A third - party quality - management consultancy (QAM Consultants) states publicly that Ugachick holds ISO 9001:2015 and ISO 22000:2018 certification, alongside documented HACCP training. This is a reasonably specific, third - party - sourced claim rather than the enterprise's

own marketing material, and represents the strongest public evidence found for any enterprise in this review. The enterprise's own website hosts a dedicated certifications page (ugachickpoultrybreeders.com/certifications/) which could not be retrieved directly (blocked to automated access) this should be checked manually to confirm which certifying bodies and standards are actually displayed there. A separate, lower - reliability tertiary source (Wikipedia) additionally states Ugachick is Halal - certified by the Uganda Muslim Supreme Council and claims HACCP certification for its processing facilities; per the certification - type discipline below, the Halal claim is a distinct certification category and should not be read as corroborating the ISO 9001/22000 claim.

- **Biyinzika Poultry International. Re - verified directly against the live Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) register:** Biyinzika holds two active certificates, both currently showing register status VALID. Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/HC/0009 (HACCP, US 130:2017) covers production of mashed and pelleted poultry feeds; originally certified 2016 - 08 - 11, current validity period 2024 - 11 - 22 to 2027 - 08 - 10. Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/FSMS/0017 (Food Safety Management System, US ISO 22000:2018) covers dressed whole chicken processing (Food chain sub - category C0 Animal primary conversion) and dressed chicken portion processing (sub - category CI Processing of perishable animal products); originally certified 2019 - 09 - 04, current validity period 2025 - 11 - 21 to 2028 - 09 - 03. Both certificates carry a renewal status of 'NA' (not currently in a renewal process), i.e. neither is flagged as lapsing imminently. This settles the point on primary - source register data, not marketing material.

- **Kenchic Uganda.** The Kenchic group (parent company Kenchic Ltd/Kenchic PLC, Kenya) confirms via its own corporate Food Safety Policy (kenchic.com) that it "follows internationally recognised standards, including the FSSC 22000" and that "our Hatchery holds ISO 9001 certification" stronger, primary - source corroboration than the previously cited press coverage. However, this policy statement is issued at Kenchic PLC/group level from the Nairobi head office and makes no reference to Uganda operations; it does not distinguish whether the ISO 9001 - certified hatchery is the established Kenyan facility, the newly established Uganda hatchery (commissioned 2023 - 24), or both. No evidence was found that these certifications have been separately audited or extended to the Uganda hatchery specifically. Kenchic Uganda's certification status should therefore still be treated as unconfirmed and distinct from the parent group's documented certifications, pending direct confirmation at the Kenchic KII.

- **SR Kuku (SR Afro Chicks & Breeders Ltd / SRR Uganda):** Verified directly against the live Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) register, the register lists the holding company as 'SR Afro Chicks & Breeders Limited', matching SR Kuku (SRR Uganda) Ltd. Two active certificates, both currently VALID: Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/HC/0012 (HACCP, US 130:2017), egg production, originally certified 2016 - 11 - 23, current validity period 2025 - 03 - 20 to 2027 - 12 - 31; and Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/FSMS/0037 (Food Safety Management System, US ISO 22000:2018), dressed chicken processing (sub - categories C0 and CI), originally certified 2024 - 11 - 11, current validity period 2024 - 11 - 11 to 2027 - 11 - 10. Both carry renewal status 'NA'.

- **Sekajja Agro Farms (Abbas Chicken).** Publicly documented Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) and Halal certification (Uganda - Europe Business Forum investment profile, 2022). This appears to be Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product/Qmark certification rather than a HACCP or ISO 22000 management - system certification and should not be read as equivalent to the certification category this section addresses. A July 2026 check of the enterprise's current live website (sekajjaagrofarms.com) found only a Halal certification

claim for its dressed chicken line; no Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS), ISO, or HACCP claim currently appears on the site, in contrast to the 2022 investment - profile statement above and to a 2021 founder statement (Food Business Africa) that new investment would fund the enterprise's move to "embrace industry standards and certifications like ISO, Halal Bureau, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS), and National Environment Management Authority" implying these were aspirational rather than achieved at that time. Current Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/ISO/HACCP status should be treated as unconfirmed and clarified directly with the enterprise rather than assumed from either the older or newer source

Certification - type discipline. This review surfaced repeated conflation, both in public sources and in prior drafts of this chapter, between distinct certification categories: Halal certification, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product (Qmark) certification, and HACCP/ISO 22000/FSSC 22000 management - system certification are not interchangeable. A claim of one should not be read as evidence of another. Any certification statement in the integrated report must specify which category is being claimed.

Certification in Uganda's poultry sector currently runs on two parallel, currently valid regulatory tracks rather than a single hierarchy. Biyinzika and SR Kuku hold live Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) management - system certification (HACCP/ISO 22000/FSSC 22000). Ugachick and Kenchic rely on Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s separate abattoir/processing licensing regime, administered by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Directorate of Animal Resources through the Commissioner for Animal Health as Uganda's Veterinary Competent Authority, plus third - party or parent - group quality claims not yet independently verified against the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) register.

An enterprise holding current Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) licensing but not Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) management - system certification should not be read as less regulated or lower - quality on that basis alone: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) licensing is a legitimate, separately administered track addressing animal health and abattoir hygiene, distinct from but not subordinate to Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)'s food - safety - management - system certification. Conflating the two or treating Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification as the only marker of a credible enterprise, would unfairly disadvantage Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - licensed players in GTTF screening and buyer perception alike.

This fragmentation is itself scheduled for resolution: Cabinet approved the Food and Agriculture Regulatory Authority Bill, 2026 on 6 July 2026, and it was tabled for first reading in Parliament on 25 August 2026, where it now sits with the Committee on Agriculture. The Bill proposes a single regulatory authority consolidating food safety, veterinary medicines, and agricultural input regulation, replacing the current fragmented arrangement split across Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS), the National Drug Authority, and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)). Once enacted, this chapter's dual - track certification picture should consolidate under one authority; until then, this chapter treats current Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) status as parallel and independently valid, not as a single ranked scale.

Sources: Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register (cims.Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS). go.ug/api/website/sc - register.php), live register re - verified directly 10 August 2026 (certificates Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/HC/0009, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/FSMS/0017 Biyinzika Poultry International Limited, both status VALID; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/HC/0012, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/FSMS/0037 SR Afro Chicks & Breeders Limited, both status VALID); QAM Consultants, "Ugachick Poultry Breeders finds market niche in product consistency" (n.d.); Biyinzika Poultry International/Poultry Uganda Ltd corporate website (biyinzika.co.ug); Kenchic PLC, "Food Safety Policy" (kenchic.com/food - safety - objective, accessed July 2026); Kenchic Ltd group communications and Daily Nation, "Kenchic: Where chickens are bred with safety in mind" (7 June 2023); Sekajja Agro Farms Ltd corporate website (sekajjaagrofarms.com, accessed July 2026); Uganda - Europe Business Forum, Sekajja Agro Farms Ltd investment profile (2022); Food Business Africa, "Ugandan poultry farm Sekajja Agro clinches US$1.8m investment from Yield Uganda Investment Fund" (2021); American Halal Foundation, "Halal and FSSC 22000 Certification: Similarities and Differences" (halalfoundation.org, 2024); Kenchic Uganda KII (cleaned meeting summary).

7.1.6 NDP IV Strategic Alignment

NDP IV designates agro - industrialisation as a primary growth driver and explicitly identifies livestock and poultry as a priority value chain. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Poultry Sector Investment Plan identifies three primary constraints to sector formalisation: hatchery capacity, climate - controlled production infrastructure, and formal processing capability. The sector's documented consolidation trajectory reinforces this alignment: the policy environment and the commercial environment are moving in the same direction simultaneously.

The Tenfold Growth Strategy and the ATMS Framework

This alignment is not incidental. NDP IV (2025/26 - 2029/30) is the first of three consecutive five - year plans designed to deliver Uganda's Tenfold Growth Strategy the national ambition to expand the economy roughly tenfold, from approximately USD 50 billion in FY 2023/24 to USD 500 billion by 2040, by doubling the size of the economy every five years. The strategy rests on four anchor growth sectors, captured in the official Agro-industrialisation, Tourism, Minerals (including oil and gas), and Science, Technology and Innovation (ATMS) framework: Agro - industrialisation, Tourism, Minerals (including oil and gas), and Science, Technology and Innovation. Agro - industrialisation is the first - named and most labour - intensive of the four, and the poultry value chain sits squarely within it.

The significance for GTTF positioning is direct. In the FY 2026/27 budget, the Government committed approximately 95.6 percent of discretionary resources to the four ATMS anchor sectors. Poultry is therefore not a peripheral agricultural activity competing for marginal attention; it is a named sub - component of the single highest national economic - transformation priority. Any GTTF poultry investment can be positioned as a direct private - capital contribution to the Tenfold Growth Strategy precisely the kind of leveraged, value - adding, export - oriented investment the strategy depends on, given that public resources alone cannot finance the ambition.

The Funding Gap as Investment Rationale

A structural funding gap reinforces, rather than weakens, the investment case. Agriculture remains the backbone of the economy employing roughly 70 percent of the working population and contributing approximately 24 percent of GDP yet the Agro - industrialisation Programme has been consistently underfunded relative to

its NDP IV target. The programme's share of the national budget fell from about 2.9 percent in FY 2024/25 to approximately 2.4 percent in FY 2025/26, leaving the allocation at roughly 70 percent of the level NDP IV envisaged. The gap between the policy mandate for agro - industrialisation and the public financing available to deliver it is exactly the space a blended - finance instrument such as the GTTF is designed to occupy.

STRATEGIC ALIGNMENT SUMMARY: NDP IV names agro - industrialisation as the first of four ATMS anchor sectors driving the Tenfold Growth Strategy, and identifies poultry within it. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Poultry Sector Investment Plan names three sector constraints hatchery capacity, climate - controlled production, and formal processing that map one - to - one onto the three GTTF technology pillars. With the Agro - industrialisation Programme funded at roughly 70 percent of its NDP IV target, GTTF private - capital leverage closes a documented public - financing gap rather than duplicating state effort. Policy direction, commercial consolidation, and the financing instrument are aligned on the same trajectory.

Sources: National Planning Authority, NDP IV 2025/26 - 2029/30; Ministry of Finance, Planning and Economic Development, National Budget Framework Paper FY 2025/26 and Budget FY 2026/27; Parliament of Uganda, Budget Committee report on agro - industrialisation funding, 2025; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Poultry Sector Investment Plan. Budget - share and GDP/employment figures are subject to confirmation against final Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and MoFPED published abstracts.

7.1.6 Forward - Looking Outlook: 10 - , 20 - and 30 - Year Horizon and International Benchmarks

The projections elsewhere in this chapter are built to a 2030 horizon, consistent with NDP IV and the GTTF programme period. Read against Denmark's Africa strategy which frames engagement in generational terms, noting that Africa's working - age population will not peak until well past mid - century the sector's trajectory is better understood across three horizons: the 2030s (10 years), the 2040s (20 years) and the 2050s (30 years).

10 - year horizon (to the mid - 2030s)

The consolidation trajectory documented in Section 7.1A Kenchic, Biyinzika, SRR Uganda and the De Haas/Irving partnership deepening vertical integration around genetics, feed and processing is expected to continue on its current path. On the UN population projection cited in Section 7.5, Uganda's urban population continues to grow through this decade at a rate materially faster than the national average, sustaining the demand - side case for formal - channel poultry documented in Section 7.1C. This is the horizon over which the feed - and - genetics investment case set out in this chapter should mature from KII candidate to funded, operating enterprise.

20 - year horizon (to the mid - 2040s)

Two regional comparators are instructive for what a mature Ugandan poultry sector could look like on this horizon. Ghana's poultry sector has pursued a deliberate import - substitution and local - feed strategy since the mid - 2010s, targeting domestic broiler production to displace frozen imports; Ethiopia's poultry sector has grown around a state - supported genetics and breeding programme (including public investment in parent - stock multiplication) alongside private commercial integration. Both illustrate a pathway Uganda's sector could plausibly follow over the next two decades: Ghana shows what import - substitution policy can achieve when paired with local feed - quality investment of the kind this chapter recommends; Ethiopia shows what a genetics - led productivity strategy can achieve when Government and private investment are sequenced together. Neither comparator is offered as a precise quantitative benchmark for Uganda the underlying production data for both is held by their respective national statistics offices and was not verified as part of this assessment but

both support the chapter's central argument that genetics and feed quality, not processing capacity alone, are the levers that determine how far a consolidating sector can go.

30 - year horizon (to the mid - 2050s)

At this distance the specific figures in this chapter are illustrative rather than forecast, but the direction is robust to the underlying demographic and climate trends documented elsewhere in this assessment: continued urbanisation, a national flock and consumer base that will be substantially larger than today's, and a climate that IPCC AR6 projects will be 1.5 - 2.5°C warmer across East Africa. On that trajectory, the climate - adaptation case for closed, ventilated housing (Section 7.5A) strengthens rather than weakens over time, and the genetics - and - feed foundation recommended in this chapter is the precondition for the sector absorbing that additional demand competitively rather than ceding it to imports.

This outlook is directional, not a substitute for the 2030 - horizon financial modelling in Sections 7.2 and 7.6, which remains the basis for the investment case put to the Call. It is included to show that the underlying rationale - genetics and feed quality as the structural levers, climate adaptation as a growing rather than static concern - holds beyond the GTTF programme period.

Sources: UN Population Prospects 2022; IPCC AR6 (2021); Africa's Century: Strategy for Strengthened Danish Engagement with African Countries, August 2024; sector characterisation of Ghana and Ethiopia poultry policy drawn from published programme documentation, not independently verified national statistics.

7.2 Pillar 2 - Market Dynamics, Pricing, and Supply Chain Architecture

7.2.1 Import Parity Price Construction

This subsection is a standalone import parity analysis and is kept separate from the export trade flow discussion in 7.2D below. Uganda operates under import parity pricing dynamics: the domestic producer price ceiling is anchored to the landed cost of importing comparable product from Brazil and other third - country suppliers. The analysis below is disaggregated by product type finished broiler meat and eggs are priced separately, since they face different tariff lines, different competitor cost structures, and different degrees of import exposure and excludes poultry - keeping inputs (hatchery machinery, feed premixes), which are analysed separately in the trade flow tables in 7.2D and are not part of the finished - product import parity calculation.

Table 7.7 Import parity price construction: Kampala, Uganda (broiler and eggs)

Cost Component	Broiler (Brazil FOB)	Eggs (India FOB)	Unit	Notes
FOB Price - Country of Origin	USD 1.00 - 1.20	USD 0.80 - 1.00 per tray	USD/kg or USD/tray	Brazilian frozen broiler FOB Paranaguá / Santos
Sea Freight to Mombasa	**+ USD 0.10 - 0.15**	**+ USD 0.08 - 0.12**	per kg / tray	Containerised East Africa rate
Port Handling - Mombasa	\+ USD 0.03 - 0.05	\+ USD 0.02 - 0.04	per kg / tray	Port and documentation costs

Cost Component	Broiler (Brazil FOB)	Eggs (India FOB)	Unit	Notes
Inland Freight: Mombasa Kampala	**+ USD 0.08 - 0.12**	**+ USD 0.06 - 0.10**	per kg / tray	Road freight approx. USD 80 - 120/MT
EAC Common External Tariff (35% CET)	\+ USD 0.30 - 0.38	\+ USD 0.24 - 0.31	of landed cost	EAC CET on processed poultry products
IMPORT PARITY PRICE - KAMPALA	**USD 1.51 - 1.90/kg**	**USD 1.20 - 1.57/ tray**	USD	Price ceiling protecting domestic producers
Uganda farm - gate equivalent	USD 1.56 - 1.94 (UGX 5,600 - 7,000)/kg	USD 1.22 - 1.61 (UGX 4,400 - 5,800)/tray	@ UGX 3,600/ USD	Current Uganda farm - gate: USD 1.81 - 2.36 (UGX 6,500 - 8,500)/kg - within parity band

Sources: USDA FAS 2025; OEC / WITS trade data 2024; EAC CET schedule 2022 - 2025; standard East Africa containerised freight rates.

TAKEAWAY: Uganda's cost of production sits close to the import parity floor the investment case survives on the current tariff margin, not on a decisive underlying cost advantage; see 7.2B(i) on tariff dependency.

ANALYTICAL FINDING: Uganda's cost of production at USD 1.7/kg liveweight sits at or slightly above the import parity floor of USD 1.5 - 1.9/kg, as derived from the import - parity construction in this chapter. Feed Conversion Ratio (FCR) improvement through better feed (NIR technology) and housing (climate control) would reduce this, creating a durable competitive margin independent of tariff protection.

7.2.2 Trade Policy: The EAC Common External Tariff Floor

The import parity construction in 7.2A depends directly on the tariff applied to poultry meat entering the East African Community from third countries such as Brazil. That tariff is set by the EAC Common External Tariff (CET), and its treatment of poultry changed materially in 2022 in a way that strengthens the protection available to Ugandan producers.

Effective 1 July 2022, the EAC replaced its previous three - band CET (0 / 10 / 25 percent) with a four - band structure adding a 35% top band for finished products that the region can produce in sufficient quantity. Poultry meat falls squarely in this band. Under the 2022 CET schedule, fresh, chilled or frozen poultry meat (HS 0207) imported from outside the EAC attracts a 35% ad valorem duty and not the 25% applied under the former regime. All meat imports now carry this uniform 35% fourth - band rate.

STRENGTHENED FINDING: The import parity table at 7.2A applies a 25% CET, reflecting the pre - 2022 three - band regime. The current applicable rate on imported poultry meat (HS 0207) is 35 percent under the EAC CET 2022 fourth band. Re - running the parity construction at 35% raises the Kampala import parity ceiling from roughly USD 1.51 - 1.90/kg to approximately USD 1.67 - 2.10/kg. This **widens**, rather than narrows, the protected band: Uganda's current cost of production (USD 1.77 - 2.13/kg) sits more comfortably within a 35 percent - protected ceiling, and the GTTF - target cost (USD 1.32 - 1.59/kg) falls even further below it. The competitiveness case is therefore stronger than the 7.2A table implies. The table should be updated to the 35 percent rate in

the next revision.

Two qualifications apply. First, the protection is real but not absolute: EAC partner states routinely file Stays of Application and country - specific duty remissions that temporarily vary the headline CET rate, so the effective applied tariff in any given year should be confirmed against the current EAC Gazette rather than assumed. Second, the strategic implication is unchanged from 7.2A. Tariff protection raises the ceiling under which domestic producers operate, but it does not create cost competitiveness by itself; a sustained margin still depends on closing the feed - efficiency and processing gaps. The CET buys time and headroom. GTTF technology investment is what converts that headroom into a durable, tariff - independent cost advantage.

Why this matters for the investment case. A higher tariff floor reduces the risk that subsidised Brazilian or other third - country product can undercut Ugandan producers during the payback period of a GTTF - financed processing or feed - efficiency investment. It does not remove the imperative to invest: intra - EAC trade is duty - free, so Kenyan, Tanzanian and incoming regional product faces no CET at all, and competitiveness against those producers depends entirely on cost structure, not tariffs. The 35 percent CET protects against extra - regional imports; only Feed Conversion Ratio (FCR) and processing investment protects against regional ones.

Sources: EAC Common External Tariff 2022 (Legal Notice EAC/117/2022, in force 1 July 2022), Schedule 1, Chapter 2 (HS 0207 poultry meat, 35%); East African Business Council, CET application analysis 2024; IATP, Kenya Livestock Sector Value Chain Analysis 2025 (confirming 35% uniform meat - import duty). Effective applied rates subject to annual EAC Gazette Stays of Application and duty - remission notices.

7.2.3 Import Protection: Tariff and Duty Policy as the Competitive Barrier

Two competitive threats define what the sector is actually being protected from, and both must be named explicitly rather than left implicit in the tariff discussion above. Brazil is the world's lowest - cost maize and soybean producer and the largest global exporter of frozen poultry portions; subsidised Brazilian broiler product wiped out Ghana's domestic poultry industry during the 2000s once Ghana's applied tariff fell to a level that could not offset Brazil's landed cost advantage the same mechanism that keeps Uganda's own investment case dependent on tariff protection holding. China is the second named threat, but through a different channel: Chinese manufacturers already dominate Uganda's poultry housing and hatchery equipment market on price, and the same low - cost manufacturing base could extend to frozen/cold - storage chicken exports if China chooses to compete on product rather than only on equipment.

The EAC's four - band Common External Tariff (35% on finished poultry meat, HS 0207, effective 1 July 2022) is what currently keeps Brazilian and other subsidised third - country product out of the formal Ugandan market at a price domestic processors can match. This is a tariff - margin - dependent investment case, not a structurally durable one: the Ghana precedent shows that GTTF - supported technology investment in feed conversion and processing efficiency is necessary to narrow the underlying cost gap, because tariff protection alone is a policy decision that can be reversed, reduced through regional trade negotiations, or eroded through duty remission requests. EAC partner states already routinely file Stays of Application and country - specific duty remissions on individual tariff lines. GTTF investment should therefore be judged on whether it closes the cost gap to a level that survives a lower tariff floor, not only on whether it is commercially viable at the current 35% rate.

7.2.4 World Price Benchmarks

Table 7.7 Broiler meat: Uganda domestic prices vs. world benchmarks (USD/kg)

Price Point / Market	USD/kg	UGX/kg (approx.)	Quality Standard	Direction	Source
Brazil FOB - frozen broiler	**USD 1.00 - 1.20**	-	Frozen, bulk	Export origin	USDA FAS 2025
Thailand FOB - frozen portions	**USD 1.30 - 1.60**	-	HACCP, some EU SPS	Export origin	USDA FAS 2025
East Africa import parity (Kampala)	**USD 1.51 - 1.90**	USD 1.56 - 1.94 (UGX 5,600 - 7,000)	Frozen, bulk	Import ceiling	Derived, Table 7.6
Uganda farm gate - live broiler	**USD 1.75 - 2.30**	USD 1.81 - 2.36 (UGX 6,500 - 8,500)	Liveweight	Domestic baseline	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024
Uganda informal wet market	**USD 2.70 - 3.50**	USD 2.78 - 3.61 (UGX 10,000 - 13,000)	Dressed, uncertified	Domestic	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024
Uganda formal retail - fresh/chilled	**USD 4.00 - 5.40**	USD 4.17 - 5.56 (UGX 15,000 - 20,000)	Chilled, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) graded	Domestic premium	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024

Price Point / Market	USD/kg	UGX/kg (approx.)	Quality Standard	Direction	Source
Uganda HACCP - certified (export grade)	**USD 5.95 - 8.10**	USD 6.11 - 8.33 (UGX 22,000 - 30,000)	HACCP, cold chain	Target post - GTTF	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / trade est.
Kenya formal retail (Nairobi)	**USD 3.50 - 4.80**	-	KEBS graded, chilled	Regional benchmark	USDA FAS Kenya 2025
EU retail - fresh chicken (Netherlands)	**USD 5.00 - 6.50**	-	EU SPS, chilled	Export benchmark	Eurostat 2024

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; USDA FAS Kenya 2025; Eurostat Agricultural Prices 2024; USDA FAS World Production Reports 2025.

TAKEAWAY: Uganda is not yet price - competitive against Brazil or EU benchmarks on an unprotected basis; the gap has to be closed through Feed Conversion Ratio (FCR) and processing efficiency, not assumed away.

Cost of Production vs. Import Parity Competitiveness Analysis

Derived from Table 7.6 (import parity) and Table 7.8 (cost of production). Gap and premium columns are live formulas.

Metric	Low (USD/kg)	High (USD/kg)	Midpoint	Note
Import parity ceiling (Kampala)	$1.51	$1.90	**1.705**	Landed Brazil FOB + freight + EAC 35% CET
Uganda cost of production - current (open - sided, Feed Conversion Ratio (FCR) 2.4 - 3.3)	$1.77	$2.13	**1.95**	At/above parity floor - fragile margin
Uganda cost of production - GTTF target (Feed Conversion Ratio (FCR) 1.9 - 2.0)	$1.32	$1.59	**1.455**	Below parity floor - durable margin

Metric	Low (USD/kg)	High (USD/kg)	Midpoint	Note
Uganda farm gate - live broiler	$1.75	$2.30	**2.025**	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024 domestic baseline
Uganda informal wet market	$2.70	$3.50	**3.1**	Dressed, uncertified
Uganda formal retail - chilled, Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) graded	$4.00	$5.40	**4.7**	Domestic premium channel
Uganda HACCP - certified - export grade	$5.95	$8.10	**7.025**	Post - GTTF target channel
Current CoP vs parity (midpoint gap)	**14%**	*Positive = Uganda cost sits ABOVE the import parity ceiling (fragile).*		
GTTF - target CoP vs parity (midpoint gap)	**- 15%**	*Negative = Uganda cost FALLS BELOW the parity floor - durable competitive margin.*		
Cost reduction: current GTTF target	**25%**	*Estimated 20 - 25% reduction via climate - controlled housing + NIR feed quality.*		
HACCP/formal premium over informal market	**127%**	*Price uplift from informal wet market to HACCP - certified export grade.*		

Figure 7.5 Broiler Price Positioning: Uganda Domestic vs. World Benchmarks

USD per kg. Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; USDA FAS 2025; Eurostat 2024.

Figure 7.3 Broiler Price Positioning: Uganda Domestic vs. World Benchmarks (USD/kg). Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; USDA FAS 2025; Eurostat 2024.

7.2.5 Export Trade Flows

Uganda has the clearest poultry export trajectory of any EAC comparator. Total HS 0207 poultry meat exports reached USD 4.62 million in 2024, with egg exports estimated at USD 6 - 10 million and live poultry exports at USD 3.83 million. Confirmed URA trade data for the broader live poultry, hatching/table egg, and poultry - input basket (HS 0105, 0407, 8436.21/29/91; 2015 - 2025 cumulative) shows Kenya and Tanzania as overwhelmingly the primary destinations, with the DRC, South Sudan, Rwanda, and Somalia together accounting for roughly 3 percent of export value see Table 7.19. A destination breakdown specific to the HS 0207 meat line remains a separate outstanding request to URA.

Table 7.9 Export corridor: URA - confirmed destinations, live poultry / eggs / poultry - inputs basket (HS 0105, 0407, 8436.21/29/91), 2015 - 2025 cumulative

Country	Share of Corridor Value, 2015 - 2025 (cumulative)	Share of Total
Kenya	1,230.6	69.8%
Tanzania	468.4	26.6%
DRC (Congo)	52.9	3.0%
South Sudan	5.1	0.3%
Rwanda	4.5	0.3%
Somalia	0.9	0.1%
TOTAL	**1,762.4**	**100%**

The same URA dataset also shows Uganda flipping from a persistent net importer of this basket to a net exporter from 2022 onward: net trade moved from a deficit of roughly USD 36.9 million - 93.9 million (UGX 133 - 338 billion) per year across 2019 - 2021 to a surplus of USD 61.2 million (UGX 220.5 billion) in 2022, USD 117.4 million (UGX 422.5 billion) in 2023, and USD 41.2 million (UGX 148.2 billion) in 2024. This is consistent with the day - old - chick and hatching - egg trade driven by Kenchic's regional hatchery capacity coming online, rather than a shift in finished meat export volumes.

Source: Uganda Revenue Authority (URA), Import/Export Data 2015 - 2025, provided to A2i, July 2026. Basket covers live poultry (HS 0105), hatching/table eggs (HS 0407), and poultry feed premixes and poultry - keeping machinery/incubators (HS 8436.21/29/91). Does not include HS 0207 (poultry meat); a meat - specific destination breakdown remains a separate outstanding request to URA.

Figure 7.4 Poultry Meat Export Values 2024 (HS 0207): EAC Comparators (USD thousands). Sources: OEC / WITS / UN Comtrade 2024.

Figure 7.5 Uganda Total Poultry Export Value 2024: Product Breakdown

USD. Primary destinations (live poultry/eggs/inputs basket, 2015 - 2025 cumulative): Kenya and Tanzania; DRC, South Sudan, Rwanda, and Somalia combined under 5%. Sources: OEC / WITS / UN Comtrade 2024; URA Import/Export Data 2015 - 2025; A2i sector analysis 2026.

Scenario A - UN Comtrade reported actuals (Table 7.4)			
Product (HS)	**Export Value (USD)**	**Share**	**Source**

Poultry meat (HS 0207)	$4,620,000	42%	OEC / WITS / UN Comtrade 2024
Live poultry (HS 0105)	$3,830,000	35%	OEC / WITS / UN Comtrade 2024
Eggs (HS 0407/0408)	$2,530,000	23%	OEC / WITS / UN Comtrade 2024
TOTAL (Scenario A)	**$10,980,000**	**100%**	

Scenario B - report headline range (egg - export component estimated, requires verification)

Product (HS)	**Low (USD)**	**High (USD)**	**Basis**
Poultry meat (HS 0207)	$4,620,000	$4,620,000	Comtrade actual
Live poultry (HS 0105)	$3,830,000	$3,830,000	Comtrade actual
Eggs (HS 0407/0408)	$6,000,000	$10,000,000	A2i estimate - requires verification
TOTAL (Scenario B range)	**$14,450,000**	**$18,450,000**	*Report cites ~USD 10.98 - 15.0M total*

Figure 7.5 Uganda Total Poultry Export Value 2024: Product Breakdown. Primary destinations (live poultry/eggs/inputs basket, 2015 - 2025 cumulative): Kenya and Tanzania; DRC, South Sudan, Rwanda, and Somalia combined under 5%. Sources: OEC / WITS / UN Comtrade 2024; URA Import/Export Data 2015 - 2025; A2i sector analysis 2026.

Export destination breakdown for the live poultry, egg, and poultry - input basket obtained from URA (2015 - 2025) and incorporated into 7.2D and Table 7.19. Kenya and Tanzania are confirmed as the dominant corridors; the DRC/Burundi/Kenya framing used in earlier drafts is not supported by the URA data and has been corrected throughout. A destination breakdown specific to HS 0207 poultry meat exports remains outstanding and is a separate request to URA.

7.2E The Feed - Feed Conversion Ratio (FCR) Compound Burden

Uganda's animal feed base is large in aggregate but tightly constrained where it matters for poultry. A 2023 feed inventory and balance assessment conducted for FAO and the IGAD Centre for Pastoral Areas and Livestock Development (ICPALD) put Uganda's potential feed basket at 121.2 million tonnes (dry matter basis) in 2022, of which only 48.3 million tonnes about 40% was realised as usable feed. Within that actual basket, poultry competes directly with pigs for the monogastric - feed share: the same assessment recorded annual feed demand for pigs under intensive systems at 747,723 tonnes against a combined monogastric (pig and poultry) requirement of 1,463,674 tonnes, with maize grain supplying 76 percent of the whole - grain cereal monogastrics consume. Every tonne of maize grain diverted to human food value chains the assessment estimates 185,725 tonnes of maize flour reaches the human food market from this same maize base, leaving only the bran fraction (26,744 tonnes) for livestock feed tightens the maize supply available to commercial poultry at exactly the volumes and quality grade broiler and layer operations need. This structural feed - basket tightness is the upstream cause of the aflatoxin and price - volatility problems documented below, not merely a downstream symptom of poor storage practice.

Feed represents 65 - 72 percent of total broiler production cost. Uganda's commercial sector Feed Conversion Ratio (FCR) figures require harmonisation: the desk - review range of 2.4 - 3.3:1 reflects average market - quality maize conditions across the sector as a whole, including smaller and less biosecure operations, whereas key

informant data from major Tier 1 commercial players (Ugachick, Biyinzika) reports Feed Conversion Ratio (FCR) in the 1.2 - 1.6 range under controlled feeding and improved genetics closer to, and in places better than, the European standard of ~1.6. Both figures are retained: the wider 2.4 - 3.3 range describes the sector - wide baseline the investment case targets, while the 1.2 - 1.6 KII range describes what is already achievable in Uganda under current management at the leading enterprises. Read together, they set the working GTTF target at 1.4 - 1.6:1 attainable not primarily through housing investment on its own, but through the two levers that the KII evidence shows already move a Ugandan flock into this range: improved genetics (commercial day - old - chick quality and hatchery capacity) and consistent, aflatoxin - controlled feed. A caveat applies to both figures: low - nutrition or aflatoxin - compromised feed inflates Feed Conversion Ratio (FCR) independent of housing or genetics, so Feed Conversion Ratio (FCR) alone should not be read as a pure technology - gap metric without controlling for feed quality.

Figure 7.6 Feed Conversion Ratio: Uganda Current vs. Investment Target vs. International Benchmarks

kg feed / kg liveweight gain. Feed Conversion Ratio (FCR) 2.4 - 3.3 reflects market - quality maize. EU standard ~1.6. Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; Big Dutchman tropical data; FOSS Analytical A/S; USDA FAS.

Benchmark	Feed Conversion Ratio (FCR) Low	Feed Conversion Ratio (FCR) High	Midpoint	Range	Note
EU / Netherlands	1.60	1.60	**1.6**	0	Best - practice global standard
Brazil (world reference)	1.60	1.80	**1.7**	0.2	Lowest - cost world exporter
Uganda GTTF target	1.90	2.00	**1.95**	0.1	Attainable: closed housing + NIR feed
Kenya benchmark	2.00	2.20	**2.1**	0.2	Regional comparator
Uganda current (open - sided)	**2.40**	**3.30**	**2.85**	0.9	Market - quality maize conditions
Feed Conversion Ratio (FCR) improvement: current GTTF target	**32%**	*Reduction in feed - per - kg from open - sided baseline to GTTF target (drives the 20 - 25% cost cut).*			
Remaining gap: GTTF target vs EU standard	**22%**	*How far the attainable Uganda target still sits above the EU ~1.6 best - practice standard.*			

Figure 7.6 Feed Conversion Ratio: Uganda Current (2.4 - 3.3) vs. Investment Target vs. International Benchmarks. Feed Conversion Ratio (FCR) range 2.4 - 3.3 reflects market - quality maize conditions. EU standard ~1.6. Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; Big Dutchman tropical data; FOSS Analytical A/S; USDA FAS.

Table 7.10 Feed Conversion Ratio (FCR) and Cost of Production: Uganda vs. Attainable vs. International Benchmarks

Cost Component (USD/kg LWG)	Uganda Open - Sided	Uganda Investment Target	Kenya Benchmark	Brazil World Ref.	EU / Netherlands	Unit
Feed cost	$1.32	$1.00	$1.60	$0.82	$0.91	per kg LWG
Chick / DOC cost	$0.26	$0.21	$0.51	$0.15	$0.13	per kg LWG
Energy cost	$0.17	$0.06	$0.29	$0.07	$0.11	per kg LWG
Labour + overhead	$0.16	$0.16	$0.35	$0.12	$0.35	per kg LWG
TOTAL COST OF PRODUCTION	**1.905**	**1.422**	**2.75**	**1.15**	**1.5**	**per kg LWG**
Feed Conversion Ratio (FCR) (kg feed/ kg LWG)	*2.9*	*2.0*	*2.1*	*1.7*	*1.6*	midpoint
GTTF cost reduction vs. UG baseline		**25.4%**	*Report states 20 - 25% reduction*			

USD per kg liveweight gain (LWG) unless noted. Total and reduction rows are live formulas. Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; Big Dutchman; FOSS Analytical A/S; USDA FAS Kenya 2025; Eurostat 2024.

Table 7.10 Feed conversion ratio and cost of production: Uganda current vs. attainable vs. international benchmarks

Cost Component	Uganda Open - Sided	Uganda - National Target (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Poultry Sector Investment Plan; pending confirmation)	Kenya Benchmark	Brazil World Ref.	EU / Netherlands	Unit
Feed conversion ratio (Feed Conversion Ratio (FCR)) market - quality maize	2.4 - 3.3	1.9 - 2.0	2.0 - 2.2	1.6 - 1.8	~1.6	kg feed/ kg LWG
Feed cost (at Feed Conversion Ratio (FCR) x feed price)	USD 1.30 - 1.52 (UGX 4,680 - 5,460)	USD 0.97 - 1.14 (UGX 3,510 - 4,095)	KES 190 - 220 (~USD 1.48 - 1.71)	BRL 4.20 - 4.80 (~USD 0.77 - 0.87)	EUR 0.75 - 0.95 (~USD 0.80 - 1.02)	per kg LWG
Chick / DOC cost	USD 0.23 - 0.29 (UGX 840 - 1,050)	USD 0.19 - 0.24 (UGX 700 - 880)	KES 55 - 75 (~USD 0.43 - 0.58)	BRL 0.70 - 0.90 (~USD 0.13 - 0.16)	EUR 0.10 - 0.14 (~USD 0.11 - 0.15)	per kg LWG
Energy cost	USD 0.15 - 0.20 (UGX 540 - 720)	Not yet sourced - GTTF - assumed figure struck; see energy - assumption note below	KES 30 - 45 (~USD 0.23 - 0.35)	BRL 0.30 - 0.45 (~USD 0.05 - 0.08)	EUR 0.08 - 0.12 (~USD 0.09 - 0.13)	per kg LWG
Labour + overhead	USD 0.13 - 0.18 (UGX 480 - 660)	USD 0.13 - 0.18 (UGX 480 - 660)	KES 35 - 55 (~USD 0.27 - 0.43)	BRL 0.55 - 0.75 (~USD 0.10 - 0.14)	EUR 0.25 - 0.40 (~USD 0.27 - 0.43)	per kg LWG
TOTAL COST OF PRODUCTION	**USD 1.82 - 2.19 (UGX 6,540 - 7,890) per kg LWG; approximately USD 2.9 per kg dressed weight at ~65% dressing yield**	**Pending Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) confirmation**	**KES 310 - 395 (USD 2.41 - 3.07)**	**BRL 5.75 - 6.90 (USD 1.05 - 1.25)**	**EUR 1.18 - 1.61 (USD 1.25 - 1.71)**	**per kg LWG**

Cost Component	Uganda Open - Sided	Uganda - National Target (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Poultry Sector Investment Plan; pending confirmation)	Kenya Benchmark	Brazil World Ref.	EU / Netherlands	Unit
GTTF cost reduction potential	-	**Not stated pending national target confirmation**	-	-	-	**% of total cost**

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; Big Dutchman technical performance data; FOSS Analytical A/S Uganda reference data; USDA FAS Kenya 2025; Eurostat Agricultural Prices 2024. Feed Conversion Ratio (FCR) range 2.4 - 3.3 reflects market - quality maize conditions.

KENYA BENCHMARK JUSTIFICATION: Kenya, not an arbitrarily chosen neighbour, is used as the primary regional cost comparator because URA trade - flow data confirms Kenya as the dominant destination for Uganda's poultry and poultry - input exports accounting for the large majority of cumulative corridor value 2015 - 2025 (Table 7.19) and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/FAOSTAT bird - population data confirms Kenya as the largest commercial poultry producer among Uganda's immediate EAC neighbours. Kenya is therefore both Uganda's main trading partner and its most directly comparable regional producer, which is why it is retained as the benchmark rather than Tanzania or Rwanda.

CORE INVESTMENT FINDING: Uganda's commercial sector Feed Conversion Ratio (FCR) of 2.4 - 3.3:1 under market - quality maize conditions generates a cost of production at or above the import parity floor of USD 1.5 - 1.9/kg. Reducing Feed Conversion Ratio (FCR) to the 1.4 - 1.6 range - achievable through improved genetics (day - old - chick quality and hatchery capacity) and consistent, aflatoxin - controlled feed, with climate - controlled housing as a supporting rather than primary lever - reduces total cost of production by an estimated 20 - 25%, creating a durable competitive margin. Because both levers sit upstream of any single integrator, this is the shared investment narrative linking the poultry sector analysis with the feeds value chain, and the basis for framing the GTTF poultry play around feed and genetics rather than around subsidising already - capitalised integrators.

7.2F Node - by - Node Supply Chain Analysis

Table 7.9 Value chain node analysis: current status, bottleneck, and technology entry point

Value Chain Node	Current Status	Key Bottleneck	Potential Green Technology Entry Point (linked to the bottleneck at left)	Technology Investment Opportunity
Genetics & Parent Stock	Near - total import dependency: Ross 308, Cobb 500 parent/grandparent breeding stock from South Africa and UK, at approximately USD 1,800 - 3,500 per breeding female - this figure describes the cost of an imported parent - stock breeding hen used to produce hatching eggs, and must not be confused with the cost of a commercial day - old chick (broiler or layer) sold to growers, which runs approximately USD 3 - 5 per bird. [Figure requires verification against Christopher Mulindwa's data - external KII source, not a GRASP team member.]	Currency risk; supply chain disruption; biosecurity hazard from live imports; avian influenza outbreaks in source countries cause supply shocks	To address currency risk and biosecurity exposure from imported parent stock: Solar hatchery enabling domestic parent stock multiplication (Petersime; HatchTech; Pas Reform)	Hatchery grants at Ugachick and Biyinzika; domestic parent flock multiplication reduces structural import dependency
Hatchery & DOC Production	15 - 30% chick mortality hatch to day 21; diesel - generator - dependent incubation; spray vaccination at 85 - 92% coverage only	Generator outage temperature fluctuations lethal during critical embryo developmental windows; low ND coverage drives catastrophic field mortality	To address generator - outage - driven chick mortality: Solar - battery incubation; in - ovo vaccination (99.5% coverage); precision humidity / CO2 control (Petersime; HatchTech; Pas Reform)	Matching grant (25 - 30%) for solar hatchery upgrade at 4 - 6 commercial hatcheries; in - ovo vaccination bundled as biosecurity precondition
Feed Manufacturing	Feed = 65 - 72% of production cost; 67% of market maize contaminated with aflatoxins above EU limits; Feed Conversion Ratio (FCR) 2.3 - 2.8:1	Aflatoxin suppresses immunity and degrades Feed Conversion Ratio (FCR); no real - time ingredient quality testing at any Uganda commercial feed mill	To address aflatoxin - degraded feed and inconsistent Feed Conversion Ratio (FCR): NIR spectrometry for real - time ingredient testing (FOSS Analytical A/S, Denmark); precision least - cost formulation software; BSF larval meal	NIR system grants at 2 - 3 mills; projected 12 - 20% feed cost reduction per kg LWG; 8 - 14 month payback - fastest in GRASP landscape

Value Chain Node	Current Status	Key Bottleneck	Potential Green Technology Entry Point (linked to the bottleneck at left)	Technology Investment Opportunity
On - Farm Production	Grid electricity USD 0.22 - 0.26 (UGX 800 - 950)/kWh among East Africa's highest; open - sided housing dominant; no biosecurity at 70% of farms	Energy = 2nd largest variable cost; ND biosecurity failures cause periodic catastrophic losses; heat stress above 30°C depresses Feed Conversion Ratio (FCR) and egg production	To address high grid energy cost and biosecurity failures: Solar - LED lighting; solar electric brooding panels; IoT biosecurity monitoring (RFID access control, footbath dosing, air quality sensors)	Solar packages at 8 - 12 commercial farms; IoT biosecurity at 5 - 8 Tier 1 farms; 9 - 16 month solar payback
Slaughter & Processing	Formal commercial channel ~55 - 60% of commercial production; informal open - air slaughter prevalent; 18 - 25% post - slaughter spoilage; Biyinzika and SRR believed to hold ISO 22000/HACCP management certifications - verification against Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register required	Excludes producers from formal retail (15 - 40% premium) and from all export markets; spoilage destroys value created at every upstream node	To address exclusion from formal retail and export markets: Modular containerised HACCP processing lines (Meyn; Stork / Marel; Baader); solar chilling (Danfoss / Gram)	De - risking grant (20 - 25%) for 1 - 2 modular HACCP lines; mandatory Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) from formal institutional buyer as disbursement precondition
Cold Chain & Distribution	Zero solar cold - store penetration; minimal refrigerated transport; 18 - 25% additional spoilage between processing and retail	Quality degradation limits institutional buyer and export access; chilled export to DRC/South Sudan impossible without cold chain	To address quality degradation in distribution: Solar - powered cold hubs (3 locations); electric refrigerated last - mile distribution; insulated solar - compatible transport containers	Solar cold chain at 3 strategic hubs; 3 - 5 year payback from combined processing premium and spoilage elimination

Value Chain Node	Current Status	Key Bottleneck	Potential Green Technology Entry Point (linked to the bottleneck at left)	Technology Investment Opportunity
Poultry Litter & Waste	10,000 - bird house generates ~547 MT litter/year; majority dumped informally; methane emissions; disease pressure	Environmental liability; missed revenue from fertiliser and protein value; disease vector amplifying ND and other pathogens	To address unused litter as an environmental liability: BSF bioconversion: 80 - 92 kg larval meal per MT litter (USD 0.89 - 1.06 (UGX 3,200 - 3,800)/kg) + 350 - 380 kg frass fertiliser per MT	BSF units at 3 - 5 commercial farms; 14 - 20 month payback; triple - revenue circular economy model

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; Nabwire & Kigozi 2022; Ssemwanga & Lutalo 2021; ERA 2024; A2i GRASP KII intelligence 2026.

A - Commercial production (the figure): formal 55 - 60% / informal 40 - 45%

Channel	Low	High	Midpoint (chart)	Note
Formal commercial channel	55%	60%	**57.50%**	HACCP/Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - graded; formal retail & export route
Informal open - air slaughter	40%	45%	**42.50%**	Wet - market; 18 - 25% post - slaughter spoilage
TOTAL (check)	**95.00%**	**105.00%**	**100.00%**	*Midpoints sum to ~100%*

B - Contrast: TOTAL national slaughter incl. subsistence (prior basis): informal ~70 - 75%

Channel	Low	High	Midpoint	Basis
Informal (incl. subsistence)	70%	75%	**72.50%**	Published research on total national slaughter
Formal commercial	25%	30%	**27.50%**	Residual of total national throughput

Figure 7.7 Uganda Poultry Market: Formal vs. Informal Slaughter Share

Figure 7.7 Uganda Poultry Market: Formal vs. Informal Slaughter Share. Formal commercial channel revised to approximately 55 - 60% of commercial production. Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; A2i KII intelligence 2026.

7.3 Pillar 3 - Ecosystem Mapping and Investment Space

Table 7.12 Active donor programme matrix and investment additionality

Programme / Funder	Scale	Period	Current Focus	Complementarity Gap
USAID Feed the Future SIA / Chemonics	National	2019 - 2025	BDS for agri - SMEs; investment readiness; transaction advisory	No poultry - specific green technology; no hatchery, NIR or HACCP processing focus. GTTF occupies the technology investment space this programme did not enter.
A2i Solar Incubators (DMDP / DGBP)	Multi - district Uganda	2021 - 2022	22 solar - powered incubators deployed for rural DOC production	Direct predecessor validates solar hatchery technology under Ugandan conditions. GTTF commercial - scale hatchery investment builds directly on this proven base. DMDP closed; gap is real.
A2i BSF Animal Feed Value Chains (DGBP)	Central Uganda	2024 (active)	BSF protein production from livestock waste for animal feed	Direct predecessor - Uganda - specific BSF performance data validated. GTTF poultry BSF investment extends this to 10x commercial throughput.
FAO - ECTAD Uganda	National	Ongoing	Newcastle Disease surveillance; emergency response; vaccination campaigns	Surveillance and emergency response only; no capital investment in biosecurity infrastructure. GTTF addresses the capital gap FAO - ECTAD cannot.
aBi Development - Agribusiness Grants	National	Ongoing	Matching grants for agribusiness SMEs across multiple value chains	Grants not targeted at green technology; no processing line or cold - chain green investment track. GTTF provides the green technology transfer dimension absent from aBi's standard instrument.
SNV INCLUDE Programme	21 districts	2024 - 2029	Layer cooperative development; farmer productivity; market linkage	SNV addresses people (farmer behaviour, extension). GTTF addresses technology (capital equipment). Non - overlapping; complementary.
IFC / PrOff-take Partnership Agreement (Off-take Partnership Agreement (OPA))rco	East Africa	Active	Commercial debt to large agro - processors; no grant component	Validates senior debt availability for Tier 1 processors. GTTF grant is marginal de - risker alongside commercial capital not a substitute.

Sources: Programme documentation as cited; A2i GRASP KII intelligence to June 2026.

Investment White Space

- Commercial - scale transfer of European green processing technology. No active programme finances HACCP - certified modular processing lines, solar cold chain, or NIR feed quality systems at enterprise scale in Uganda.
- BSF circular economy at poultry farm scale. A2i's 2024 DGBP project validated BSF performance under Ugandan conditions. No instrument currently finances commercial - scale BSF deployment as part of a poultry enterprise capital package. This is the same alternative - protein supply constraint addressed at municipal scale in the Waste Management (Municipal Bio - waste) chapter, where an estimated 1,000 tonnes per day of organic waste in Kampala currently has no end destination; poultry - farm - scale BSF deployment and the municipal systems - approach investment case should be read together as upstream and downstream ends of the same alternative - protein supply chain, rather than as two unconnected technology lines.
- IoT biosecurity infrastructure at commercial farm level. FAO - ECTAD provides epidemic surveillance; no programme finances the on - farm biosecurity hardware that prevents ND epidemic cycles.

7.4 Pillar 4 - Enterprise Profiling and Technology Matching

7.4.1 Technology Matching Assessment

Demonstrating a credible European/Danish supply - side match to Uganda's poultry demand is treated here as a precondition for Royal Danish Embassy backing of this sector, given the repositioning toward feed and circular economy in Section 7.6. Both legs of that case are established in this chapter. On the input side: FOSS Analytical A/S (Denmark) supplies the NIR feed - quality testing technology that is now the largest single category in the rebalanced investment portfolio (35% of envelope, Table 7.16); Buhler AG and Innovafeed supply BSF circular - economy processing equipment; Danish biogas technology providers active elsewhere in this study's livestock and piggery chapters (PlanEnergi, Bigadan A/S) are directly transferable to poultry - dropping bio - digestion, since the underlying anaerobic digestion technology is feedstock - agnostic.

On the domestic - and - export demand side: Uganda's per capita poultry consumption is projected to reach approximately 3.5 kg by 2030 (Section 7.1C) against a supply - side gap, not a demand gap (see Section 7.6), while the EAC Common External Tariff (35% on poultry meat since July 2022, Section 7.2B) protects the domestic price floor that makes formal - channel investment bankable, and the export corridor to Kenya and Tanzania (Section 7.2D) provides a second demand channel beyond the domestic market. Matched scalability follows from this pairing: the same Danish/EU suppliers already active in this study's other value chains (feed testing, circular - economy processing, biodigestion) can scale their Uganda poultry engagement using equipment and commercial models already proven at Tier 1 enterprises in this sector, rather than requiring a new, unproven technology introduction.

Table 7.13 Technology matching assessment: Uganda poultry sector

Technology Gap	Danish/EU Provider(s)	Country	Performance Data	Uganda Fit Assessment
Solar hatchery & in - ovo vaccination	Petersime N.V.; HatchTech B.V.; Pas Reform	BE / NL	In - ovo: 99.5% flock coverage vs. 85 - 92% spray; payback 13 - 20 months per 100,000 - DOC unit at Uganda chick prices	PASS - A2i 22 - unit DMDP deployment validates Uganda fit; Ugachick at 60% capacity due to climate control failure - direct match to documented bottleneck
NIR feed quality testing	FOSS Analytical A/S; Bruker	DK / DE	2 min per test; 0.3 - 0.5 Feed Conversion Ratio (FCR) point recovery from aflatoxin rejection; 8 - 14 month payback at 5,000 MT/yr mill	PASS - FOSS has active East Africa service network; 67% maize aflatoxin contamination = highest - impact single technology on cost - per - kg - LWG terms
Closed ventilated broiler housing	Big Dutchman; Fancom; Roxell	DE / NL / BE	Mortality: 10 - 15% to <5%; Feed Conversion Ratio (FCR): 2.6 to 2.0; heat stress above 30°C eliminated	PASS - direct response to Uganda open - sided housing Feed Conversion Ratio (FCR) penalty; converts climate variability from production risk to controlled variable
HACCP processing lines (modular)	Meyn Food Processing B.V.; Stork/ Marel; Baader	NL / IS / DE	500 - 4,000 birds/hr; operational in 8 - 12 weeks; USD 250K (UGX 900 M)/ yr additional revenue per 2,000 - bird/day line at Uganda formal retail premium	PASS - Meyn and Stork have active sub - Saharan Africa deployments; containerised format compatible with Uganda infrastructure constraints
Cold chain: blast chillers, refrigerated logistics	Danfoss (DK); Gram Commercial (DK)	DK	Solar - compatible; 6+ hr thermal retention at <6°C in tropical ambient	PASS - Danfoss and Gram have East Africa distribution and service networks; solar compatibility critical given Uganda grid tariff
Biogas / litter management	SEGES Innovation; Skov A/S; BioStar	DK	85 - 95% COD reduction; methane capture; nutrient - rich effluent	PASS - Uganda's litter management gap entirely unaddressed by any active donor programme; A2i DGBP BSF project validates circular economy performance
BSF waste - to - protein circular economy	Buhler AG; Innovafeed; BioCycle	CH / FR / NL	80 - 92 kg dried larval meal per MT fresh litter; USD 0.89 - 1.06 (UGX 3,200 - 3,800)/kg (fishmeal equivalent); triple - revenue model	PASS - A2i DGBP validated Uganda climate performance; BSF model uniquely suited to female - led cooperative enterprise at Tier 2
IoT biosecurity monitoring	GreenIQ; Dutch integrators	NL / EU	RFID access; footbath dosing; air quality sensors; GSM remote monitoring	CONDITIONAL - requires mobile network connectivity assessment per site before deployment; bundled with hatchery grants as precondition

Technology Gap	Danish/EU Provider(s)	Country	Performance Data	Uganda Fit Assessment
In - ovo sex determination (layer hatchery)	In Ovo B.V.	NL	Determines chick sex at approx. day 9 of incubation, before hatch; eliminates male - layer - chick culling	A new candidate, raised by Kenchic during its July 2026 KII. It hasn't yet been assessed for Uganda service - network coverage or hatchery - line compatibility, so it needs supplier engagement and a proper feasibility check before it can be rated.
Poultry slaughter/grading automation (named Danish supplier)	El Anker (DK) - contact referenced as "Kent"	DK	Cited by SR Kuku supporting abattoir automation for expansion from approx. 5,000 to 10,000 birds/hour	A pass - SR Kuku confirmed this as an already - active Danish relationship at the July 2026 KII, at a Tier 1 processor. It adds to, rather than duplicates, the Meyn/Stork/Baader category above.

Sources: Petersime 2023; HatchTech 2023; Pas Reform 2023; FOSS Analytical A/S 2024; Big Dutchman 2023; Fancom 2023; Meyn 2023; Stork/Marel 2023; Danfoss 2024; Gram 2024; Buhler AG 2024; A2i DMDP 2022; A2i DGBP 2024; Kenchic Uganda KII (meeting notes), July 2026 (in - ovo sexing candidate); SR Kuku Meeting Minutes, July 2026 (El Anker/Denmark abattoir automation candidate) - both new entries require standard supplier/origin verification before formal inclusion in a GTTF technology match.

7.4.2 Investment Blueprints by Technology Category

The technology - category blueprints below are deliberately kept narrative and do not repeat the figures already tabulated in Table 7.9 (value chain node analysis), Table 7.11 (technology matching assessment), or Table 7.14 (investment portfolio by technology category) readers should refer to those tables for the underlying figures. Each blueprint below states which specific entity needs which specific investment, cross - referenced against the Hard - Gate screening framework (Table 7.14B) and informed by key informant interviews conducted to date, rather than restating sector - wide averages.

Solar - Powered Hatchery and In - ovo Vaccination

Precision incubation technology (Petersime N.V., HatchTech B.V., Pas Reform Belgian and Dutch EU - 27 suppliers) addresses the highest - priority technology gap, and the value case rests on two distinct benefits that should not be conflated. The primary value driver is hatchability efficiency, not the solar power source: Kenchic's 29 Petersime AirStreamer incubators at Namilyango are achieving 86% hatchability for broilers and 91% for coloured birds since commissioning in September 2023 a gain of approximately 3 to 5 percentage points more chicks hatched per setting compared to the diesel - generator - dependent incubation typical of smaller Ugandan hatcheries, which is the real commercial return. Solar power is a separate, secondary benefit: it removes exposure to grid outages and diesel cost volatility during the critical embryo - development window but does not by itself improve hatchability a solar - powered incubator with poor setter - hatcher technology hatches no better than a grid - powered one. A specifically Danish hatchery - technology option has not been confirmed for this chapter - Petersime (Belgium), HatchTech and Pas Reform (Netherlands) are the EU - 27 partnership - tier suppliers currently referenced - and should be verified during the European supply - side engagement (Eksportrådet/DI) rather than assumed.

NIR Feed Quality Testing and Precision Formulation

NIR spectrometry from FOSS Analytical A/S is the fastest - payback technology in the sector: 8 - 14 months. The Feed Conversion Ratio (FCR) improvement potential is amplified in Uganda by the wide range (2.4 - 3.3) driven largely by market - quality maize variability. NIR addresses both the aflatoxin rejection problem and the seasonal ingredient substitution problem simultaneously, and the investment narrative is shared with the feeds value chain. Coordination with the feeds value chain on the joint feeds - poultry Feed Conversion Ratio (FCR) argument is an outstanding action point.

Modular HACCP Processing Lines, Blast Freezing, and Cold Storage

Meyn and Stork/Marel modular processing lines at USD 120,000 - 250,000 per unit unlock the 2 - 3x price premium between informal slaughter and certified formal retail. Cold chain, not slaughter capacity, is the sector's real growth constraint: approximately 90 percent of one major processor's output currently moves through the fresh (unfrozen) channel because slow chest - freezer technology degrades product quality and shelf life to a level that formal retail and export buyers will not accept. The technology intervention is therefore blast freezing and dedicated cold storage not chest freezing at the abattoir and distribution stage, since blast freezing preserves texture and shelf life at the speed formal buyers require. Solar power has a role in reducing running cost for cold storage, but solar has real storage - capacity limits (battery bank sizing constrains how much cold storage volume can run on solar alone overnight or during extended cloud cover) and should be sized as a cost - reduction layer on top of blast - freezing and cold - storage capacity, not as the primary technology decision. The mandatory disbursement precondition for any processing line investment remains a documented Off - take Purchase Agreement from an institutional buyer before capital is deployed.

Circular Economy Integration: BSF, Biogas, Fertiliser, and Value - Added Products

This is now the primary GTTF technology category for poultry, per the Validation Workshop repositioning (Section 7.6), and covers four distinct value streams rather than BSF alone. A2i's 2024 DGBP project validated BSF larval bioconversion under Ugandan climate conditions. Poultry litter is currently an unused resource at commercial scale: a 10,000 - bird layer house generates approximately 547 metric tonnes of litter per year, the great majority of which is dumped informally rather than converted to protein or fertiliser value. Farm - scale BSF unit capital cost: USD 20,000 - 35,000. Payback: 14 - 20 months. The BSF route should be assessed jointly with bio - waste work, and the cost of BSF - derived larval - meal protein production should be tested explicitly against substitute feed proteins (soybean meal, fishmeal) before being presented as a settled cost - saving case this comparison has not yet been run for this chapter.

Second, solar/biogas energy from anaerobic bio - digesters fed by poultry droppings: a commercial - scale farm visited during the workshop week demonstrates this pathway directly dropping - fed biodigesters generating biogas for on - site energy use, reducing grid dependency and diesel backup cost in the same way already costed for solar brooding systems elsewhere in this chapter. Site - specific capacity, enterprise name, and cost figures for this example remain subject to confirmation against the field KII record; the pathway itself is well - established regionally. Third, organic fertiliser production from digester slurry and composted litter: this closes the nutrient loop back into crop agriculture (maize, the same crop whose quality constraints drive the feed - cost case in Section 7.2E), displacing synthetic fertiliser demand and giving poultry enterprises a second revenue stream from the same waste input. Fourth, value addition beyond raw output egg - to - egg - powder processing was specifically flagged at the workshop as an underexploited opportunity: egg powder has a materially longer shelf life and lower transport cost per unit of protein than shell eggs, opening institutional and export buyer categories (bakery and food - manufacturing inputs, WFP - type institutional procurement) that fresh shell egg supply cannot reach. None of the specific capital costs or throughput figures for egg - powder processing have been established for this chapter and should be treated as an identified opportunity for further KII scoping, not a costed investment case at this stage.

7.4.3 Comprehensive Sector Actor Landscape

Table 7.14 Comprehensive sector actor landscape: Uganda commercial poultry value chain

ANALYTICAL FOCUS: Systemic impact and volume in the poultry sector are concentrated in the Tier 1 □ enterprises principally Ugachick Poultry Breeders and Biyinzika Poultry International, with Kenchic Uganda and the De Haas/Irving partnership as the consolidation - driving new entrants. The full actor landscape below is retained for ecosystem completeness and KII targeting, but the enterprise profiling, investment blueprints, and financial return analysis elsewhere in this chapter concentrate deliberately on these Tier 1 players, since they carry the balance - sheet strength, throughput, and market position to absorb GTTF technology transfer at the scale that produces sector - wide, rather than single - farm, impact.

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Category	Investment Hypothesis
A - HATCHERIES AND INTEGRATORS						
Ugachick Poultry Breeders Ltd	Hatchery / Integrator	~2M DOC/yr; ~60% capacity; integrated feeds	Managing Director (confirmed)	Namanve IEZ, Kampala	**Tier 3 □**	Solar hatchery climate control; in - ovo vaccination; NIR feed quality. Payback 13 - 20 months. aBi Development co - financing precedent confirmed.
Biyinzika Poultry International	Integrator / Hatchery	~500,000 DOC/ yr; broiler and layer; Government distribution	Chief Executive Officer (confirmed)	Namanve IEZ, Kampala	**Tier 3 □**	Solar incubation upgrade; HACCP processing line; NIR feed quality. 25% matching grant. Confirmed aBi co - financing precedent.
NSPF Nucleus Scheme	Nucleus / Out - grower	Multi - district; 200+ satellite growers; out - grower model	TBC via A2i	Central & Western Uganda	**Tier 2**	Collective solar incubation across nucleus network; solar packages at hub farms.
B - FEED MILLS						
Ugachick Feeds Division	Feed Manufacture	~5,000 MT/ yr; integrated with DOC supply chain	As above - Ugachick group	Namanve IEZ	**Tier 3 □**	NIR spectrometry (FOSS A/S) for aflatoxin control and least - cost formulation. Fastest payback in portfolio: 8 - 14 months.
Roofings Feeds / NUVITA	Feed Manufacture	~15,000 MT/ yr; largest independent feed miller	TBC via A2i	Namanve IEZ	**Tier 2**	NIR feed quality; BSF protein integration; mycotoxin management programme.

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Category	Investment Hypothesis
Uganda Grain Traders Ltd (UGT)	Feed / Grain aggregation	Grain aggregation and feed; cooperative grower network	TBC via A2i	Kampala / Mbale	**Tier 2**	Upstream maize quality certification integrating with NIR - equipped mills.
C - PROCESSING AND COLD CHAIN						
Hariss International (Kenchic Uganda)	Integrator / Processor	Imported frozen and growing domestic processing; Nairobi wholesale linkage	TBC via A2i	Kampala	**Tier 2 - 3**	HACCP processing upgrade; cold chain; regional export route via Kenya partnership.
Quality Cuts Ltd / City Abattoir	Broiler Processing	Kampala formal retail supply; emerging export interest	TBC via A2i	Kampala	**Tier 2**	HACCP processing line; solar cold hub. Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) brokerage - Carrefour, Serena, Radisson confirmed procurement interest.
D - Government AND RESEARCH INSTITUTIONS						
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - Poultry Division	Government Regulator	National policy and licensing authority	Director, Animal Production - TBC	Kampala	-	ND vaccination enforcement; national poultry grading standard; GTTF policy alignment. Key: SI for national quality grading standard.

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Category	Investment Hypothesis
NaLIRRI (National Agricultural Research Organisation (NARO))	Research Institution	Poultry genetics; disease research; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - linked	Director (confirmed) ed)	Nakyesasa, Wakiso	-	Breed improvement; ND vaccine efficacy data; BSF larval meal trials; aflatoxin district - level survey data.
CoVAB - Makerere University	Academic / Research	Poultry health; food safety; zoonotic disease	Dean (confirmed)med)	Makerere, Kampala	-	HACCP pre - certification training; aflatoxin surveillance partnership; academic validation for NIR investment case.
SNV Uganda (INCLUDE)	Development Partner	Layer cooperative development; market linkage; 21 districts	Country Director (confirmed) ed)	Kampala	-	Complementary programme - GTTF addresses technology; SNV addresses people. Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) brokerage synergy for processing investment.
E - INSTITUTIONAL BUYERS (Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) TARGET COUNTERPARTS)						
Carrefour Uganda / Majid Al Futtaim	Modern Retail	2 stores Kampala; formal certified supply procurement	Procurement Manager - TBC	Kampala	**Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target**	HACCP - certified chilled chicken; certified tray - pack eggs. Critical Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) anchor for HACCP processing line disbursement precondition.

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Category	Investment Hypothesis
Serena / Protea / Radisson Hotels	Hotel / Institutional	200 - 500+ rooms each; weekly procurement volumes	Procurement Managers - TBC	Kampala	**Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target**	Certified fresh/chilled poultry; HACCP chain - of - custody documentation. Hotel group Off-take Partnership Agreement (Off-take Partnership Agreement (OPA))s bundled for single HACCP processor.
WFP Uganda / School Feeding	Institutional Buyer	Government school feeding; egg procurement at national scale	WFP Supply Chain - TBC	National	**Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target**	Tray - pack eggs from certified layer cooperatives; anchor volume for NIR investment. WFP procurement standards require certified supply.

Tier 3 □ = Priority KII target. Confirmed contacts held in programme records by role (Ugachick MD; Biyinzika CEO; NaLIRRI Director; CoVAB Dean; SNV Uganda Country Director) - individual names are held internally and are not reproduced in this external - facing chapter.

7.5 Pillar 5 - Impact Metrics, Rural Incomes, and Gender

Poultry is the most widely distributed livestock enterprise in Uganda, with approximately 4.2 million rural households keeping birds under extensive backyard management. Women manage the majority of household chicken flocks and control a significant share of income from egg sales and live - bird trading.

IPCC AR6 projects East Africa temperatures rising 1.5 - 2.5°C by 2050. Open - sided housing heat stress above 30°C already depresses Feed Conversion Ratio (FCR) and egg production at the upper end of Uganda's current 2.4 - 3.3 Feed Conversion Ratio (FCR) range. Climate - controlled housing investment functions simultaneously as a commercial Feed Conversion Ratio (FCR) improvement and a climate adaptation investment.

CLIMATE EXPOSURE: POULTRY VERSUS RUMINANTS

The World Bank climate model projects, for the period **2041 - 2050 with no intervention**, a **−2% shock to egg production** under both the dry/hot and wet/warm scenarios. This is **lower than the modelled −3% peak for cattle meat and milk** (World Bank CCDR 2025, Figure 16, p. 29).

Critically, the impact *pathway* differs. Poultry losses arise principally through **heat stress**, whereas cattle losses

run through the pasture - and - water channel that dominates the report's ruminant analysis. Heat and water effects fall hardest on **West Nile and Northern Uganda** (World Bank CCDR 2025, Figure 17, p. 29).

Investment implication. Heat - stress mitigation through climate - controlled housing, mechanical ventilation and evaporative cooling is the defining climate - resilience technology for Ugandan poultry. It maps directly onto the Tier 3 commercial - intensification thesis and the Danish - first technology - sourcing protocol, rather than the smallholder - adaptation framing the report applies to cattle.

This climate - exposure finding draws on the World Bank CCDR (2025) and is cross - referenced in the comparative baseline at 7.1F. A scope caveat applies: the World Bank report's quantified productivity models (breed improvement, valley - dam returns, vaccination effects) are run almost entirely on cattle and are not transferable to poultry. This chapter cites that source for poultry on four points only the sector GDP frame, the 2% egg - production shock, the recommended transition of land - constrained farmers into poultry, and the 42% poultry - extension - access gap.

Each impact vector in Table 7.13 below decomposes into one or more of three underlying value components: price uplift captured, loss avoided, or cost saved. Processing premium revenue and export trade - balance improvement represent price uplift; hatchery mortality reduction and spoilage loss elimination represent loss avoided; feed cost reduction and energy cost saving represent cost saved. Employment creation and GHG emissions reduction are downstream consequences of the same three mechanisms operating at portfolio scale rather than a fourth independent category. Stating this decomposition makes explicit the logic already embedded in the metric construction, and gives the integrated report a consistent basis for comparing impact claims across the poultry, piggery, and livestock chapters.

Table 7.15 Impact assessment across investment vectors in the poultry sector

Impact Vector	Metric	Projection (Portfolio Envelope)	Methodology / Evidence Base
Hatchery Mortality Reduction	DOC survival: ~22% to <7% mortality	USD 88K (UGX 315 M)/ year per 100,000 - DOC hatchery; 4 - 6 hatcheries targeted	Chick price x mortality differential x annual cycle volume. Source: Ugachick operating data; Petersime/HatchTech tropical deployment performance.
Feed Cost Reduction	Feed Conversion Ratio (FCR) improvement 0.3 - 0.5 pts; aflatoxin rejection; least - cost formulation	12 - 20% feed cost reduction per kg LWG; USD 12K - 18K (UGX 45 - 65 M)/year per 5,000 MT mill	FOSS Analytical A/S Uganda reference customer data; Kamika & Tekere 2019 (aflatoxin Feed Conversion Ratio (FCR) impact); A2i KII intelligence 2026.
Processing Premium Revenue	UGX/kg premium: HACCP certified over informal market	USD 250K (UGX 900 M)/year additional gross revenue per HACCP line at 2,000 birds/day	Kampala market price survey: informal wet market ~USD 3.19 (UGX 11,500)/kg vs HACCP retail ~USD 7.22 (UGX 26,000)/ kg. Source: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024.

Impact Vector	Metric	Projection (Portfolio Envelope)	Methodology / Evidence Base
Spoilage Loss Elimination	18 - 25% post - slaughter spoilage eliminated by cold chain	USD 111K - 181K (UGX 400 - 650 M)/year per processing line from spoilage value recovery	Current spoilage rate x dressed weight x formal retail price. Source: Nabwire & Kigozi 2022; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) market price data.
Energy Cost Saving (Solar)	USD 0.22 - 0.26 (UGX 800 - 950)/kWh grid tariff eliminated for solar - equipped farms	USD 38K (UGX 135 M)/year per 10,000 - bird house from electricity cost elimination	25,000 kWh/cycle x USD 0.25 (UGX 900)/kWh x 6 cycles/year. Source: ERA 2024 tariff; Big Dutchman tropical energy consumption data.
Employment Creation	Direct FTE jobs in HACCP processing and BSF operations	220 - 320 FTE jobs across GTTF poultry portfolio enterprises	8 - 15 FTE per modular processing unit; 6 - 10 per commercial BSF unit; 4 - 6 per solar hatchery upgrade. Source: Meyn; A2i DGBP project data.
GHG Emissions Reduction	tCO2e/year from solar + BSF litter valorisation + Feed Conversion Ratio (FCR) improvement	2,400 - 3,200 tCO2e/year (poultry GTTF portfolio)	Solar diesel displacement; BSF methane prevention from litter decomposition; Feed Conversion Ratio (FCR) improvement GHG efficiency. IPCC Tier 1 emission factors.
Trade Balance Improvement	Import substitution; DRC/South Sudan export development	USD 3.3 million - 5.0 million (UGX 12 - 18 billion)/year import substitution at HACCP portfolio scale by year 3	UBOS import data; KII intelligence on hotel procurement volumes; DRC/South Sudan market sizing from OEC trade data.

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; Nabwire & Kigozi 2022; ERA 2024; Petersime/HatchTech deployment data; FOSS Analytical A/S 2024; Meyn 2023; A2i DGBP 2024; Sheppard et al. 2020; IPCC AR6 emission factors.

7.5.1 Green Agenda Adoption

Uganda's poultry value chain has significant potential to strengthen food security, create employment, increase household incomes, and support agro - industrialisation while improving environmental sustainability and climate resilience. The sector's rapid expansion in demand for poultry meat and eggs creates opportunities to transition toward more efficient, resource - efficient and commercially integrated production systems. The Green Agenda Adoption pillar promotes climate - smart poultry production, processing and waste - management practices that reduce resource use, operating costs and environmental impacts while improving productivity and resilience.

Priority interventions include solar - powered poultry housing and processing, energy - efficient ventilation and cooling systems, improved feed efficiency and locally sourced feed ingredients, poultry litter and manure

valorisation, biogas and other renewable - energy solutions, water - efficient production systems, climate - resilient housing, and strengthened biosecurity and disease monitoring**.** Particular emphasis should be placed on converting poultry manure and other organic waste into biogas, fertiliser or other productive inputs; improving feed - conversion efficiency to reduce the environmental footprint of poultry production; and adopting energy - efficient housing and processing technologies that reduce exposure to heat stress and climate variability.

These interventions align with Uganda's National Development Plan IV (NDP IV), the Agro - industrialisation Programme, the National Climate Change Act (2021), Uganda's Nationally Determined Contributions (NDCs), and the Green Growth Development Strategy**,** while supporting increased poultry productivity, lower production costs, circular - economy development, rural employment, competitiveness and compliance with emerging environmental and food - safety standards.

7.5.2 Rio Marker Scoring and Danish/EU Engagement Modality

Denmark's Africa strategy directs at least 75 percent of GTTF funding toward activities that address a climate challenge, and every recommended activity is scored against the OECD DAC Rio markers for climate change adaptation and mitigation before it reaches ministerial review (Africa's Century: Strategy for Strengthened Danish Engagement with African Countries, August 2024; OECD DAC Rio Markers for Climate Handbook). The scoring below applies the OECD DAC decision tree - does the activity meet the marker's eligibility criteria; would it have been undertaken, or designed the same way, without that objective - to the poultry sector's headline interventions, each scored 0 (not targeted), 1 (significant) or 2 (principal). A double - principal score on the same activity is applied only on explicit justification, consistent with OECD DAC guidance.

Table 7.15A Rio marker scoring - poultry sector headline interventions

Intervention	Adaptation	Mitigation	Rationale
Genetics and feed quality (NIR testing, DOC/hatchery genetics)	1 - Significant	1 - Significant	Formulated primarily as a commercial productivity investment, but reduces feed - per - kg output and the associated emissions intensity (mitigation), and lowers vulnerability to aflatoxin - and heat - linked feed - quality shocks that are expected to worsen under a changing climate (adaptation). Neither objective is the sole design driver, so both score Significant rather than Principal.
Closed, ventilated broiler housing with evaporative cooling	2 - Principal	0 - Not targeted	IPCC AR6 projects East Africa temperatures rising 1.5 - 2.5°C by 2050; this investment is designed specifically to eliminate heat - stress - driven production loss under that trajectory, meeting the Principal threshold because the activity would not be justified in its current form without the climate - vulnerability rationale. No material direct GHG mitigation effect.
Solar energy for hatchery, brooding and lighting	0 - Not targeted	1 - Significant	Displaces diesel - generator and grid electricity use, a direct emissions - reduction effect; not designed as a climate - adaptation measure in itself.

Intervention	Adaptation	Mitigation	Rationale
Modular HACCP processing lines and solar cold chain	1 - Significant	1 - Significant	Solar - compatible cold chain reduces energy - related emissions (mitigation) and builds resilience of processing infrastructure against grid - reliability and heat - related spoilage risk (adaptation); commercial market - access is the primary driver, so both score Significant.
BSF circular economy integration	1 - Significant	2 - Principal	Litter valorisation and avoided - emissions pathway (methane prevention from uncontrolled decomposition, feed - import displacement) is a core, not incidental, design objective - meeting the Principal threshold for mitigation. Diversified, climate - resilient feed sourcing is a secondary adaptation benefit.

Sources: OECD DAC Rio Markers for Climate Handbook (decision tree and eligibility criteria); World Bank CCDR 2025 (temperature projection); A2i GRASP sector analysis 2026.

No poultry intervention in this chapter scores 0 on both markers simultaneously; on a funding - weighted basis (Table 7.14A investment allocation), the portfolio comfortably clears the 75 percent climate - relevant funding threshold, with the housing, solar and BSF categories alone accounting for 50 percent of the allocated envelope. Biodiversity is not separately scored here: none of the five interventions meets the Rio biodiversity marker's eligibility criteria (ecosystem, habitat or species - level conservation objective), so a biodiversity claim is not made for this sector, consistent with the discipline of scoring only where the eligibility criteria are met rather than defaulting to a score for every marker on every activity.

Danish and EU engagement modality

Each headline intervention is mapped against the four Danish and EU engagement modalities set out for the Call, so the reader can see which lever - rather than a generic grant - each investment case depends on.

Table 7.13B Danish/EU engagement modality by intervention

Intervention	Investment / exploration	Equipment	Technical assistance	Financial instrument
Genetics and feed quality (NIR, hatchery genetics)	-	Primary - NIR spectrometers, hatchery equipment	Feed formulation and quality - control training	Matching grant against verified capital stack
Closed, ventilated broiler housing	-	Primary - climate control and evaporative cooling systems	-	Matching grant
Solar energy systems	Exploration - fund eligible for a Danish/EU developer	Primary - solar - battery packages	-	Matching grant; Impact Fund Denmark eligible

Intervention	Investment / exploration	Equipment	Technical assistance	Financial instrument
HACCP processing and cold chain	Danish/EU private - sector investment or partnership	Primary - processing lines, blast chillers	HACCP pre - certification and food - safety systems training	Danida Business Instrument; matching grant
BSF circular economy	Danish/EU private - sector partnership (exploration/ incubation)	BSF production units	Technical transfer from validated A2i Danida Green Business Partnerships (DGBP) model	Matching grant; Government - to - Government instrument for municipal linkage

Source: Danish and EU engagement modalities as defined for the GTTF Call, August 2026; A2i GRASP sector analysis.

Complementarity with the Dutch and Danish sector programmes

The Dutch Government's roughly EUR 6 million enabling - environment programme and new EUR 12 million seed instrument, and Denmark's EUR 12 million programme on inputs, fish - feed processing and the enabling environment, sit alongside the donor programmes already mapped in Table 7.10. None of these three programmes currently carries a poultry - specific hatchery, feed - quality or HACCP - processing line item, so the GTTF poultry investment case remains additional to rather than overlapping with them; where the Dutch or Danish instruments finance enabling - environment work (certification systems, feed - sector regulation) that poultry processors also depend on, the two should be sequenced together during implementation rather than treated as independent tracks.

Development bottom line: jobs and women's participation

Beneath the trade and climate framing, the sector's development case rests on two standard metrics carried through from Section 7.5 above: 220 - 320 direct FTE jobs across the GTTF poultry portfolio (Table 7.13), concentrated in HACCP processing and BSF operations, and the fact that women manage the majority of Uganda's 4.2 million backyard poultry - keeping households and control a significant share of egg and live - bird trading income. Framing the investment case around feed and genetics rather than around integrator subsidy widens rather than narrows this reach: feed - quality and hatchery - genetics investment benefits the out - grower and smallholder tier that supplies the integrators, not only the integrators themselves, which is the segment where women's participation in the value chain is highest.

The Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification gap identified earlier in this chapter is a technical capability gap as much as a financing one: a processor can be fully capitalised for a Meyn or Stork/Marel processing line and still fail to achieve HACCP or ISO 22000 status without structured technical support to build the quality management systems those standards require. Every capital stack modelled in this section should carry an explicit technical assistance component tied to certification readiness, not assume that certification follows automatically once equipment is installed.

7.6 Pillar 6 - Investment Structuring and Financial Returns

This section sets out the financial return architecture for investment in the Uganda poultry sector. It does not

pre - assume or specify a programme funding allocation the purpose of this landscape document is to make the investment case and let the investment case justify the allocation, not the reverse.

The poultry sector already attracts substantial private equity and private investment; the consolidation trajectory documented in Section 7.1A (Kenchic, Biyinzika, SR Kuku, the De Haas/Irving partnership) is proceeding on private capital, not donor capital. On that basis, GTTF's role in this sector is positioned away from direct production investment (hatchery capacity, on - farm grow - out infrastructure, processing lines) and toward two specific interventions where private capital is not already flowing at scale: (a) the availability, volume, and quality of feed and its raw - material supply chain, and (b) processing of the sector's dense organic waste stream into a circular economy droppings converted to energy and to organic fertiliser returned to agriculture. This represents a deliberate positioning choice: earlier analysis in this study weighted hatchery and processing technology as the largest single categories in the investment portfolio; that allocation has been revised below (Table 7.16) to reflect this positioning, which is treated as a precondition for Royal Danish Embassy backing of this sector.

With GTTF's resources spread across many sectors, the programme's comparative advantage in poultry specifically is feed volume and waste management the circular economy rather than production or processing capacity, where private capital is already active. The rebalanced Table 7.16 allocation is the direct expression of that focus.

The evidentiary basis for this positioning is unchanged from the rest of this chapter: the sector's constraint is supply - side, not weak demand (Section 7.1C); the EAC Common External Tariff of 35 percent on poultry meat, effective July 2022, protects local producers' price floor (Section 7.2B); genetics, day - old - chick quality, and feed quality are the productive levers that determine whether that price floor translates into competitive margin (Sections 7.2E, 7.4B); and per capita consumption is projected to reach approximately 3.5 kg by 2030 (Section 7.1C). What has changed is not the underlying findings but which technology categories GTTF resources should target to act on them.

7.6.1 Leverage Mechanics

Each primary technology category in the investment pipeline generates verifiable short - term financial returns that support commercial debt service independently of any programme grant. Hatchery solar systems: 13 - 20 month payback from mortality reduction. NIR feed quality systems: 8 - 14 month payback from Feed Conversion Ratio (FCR) improvement and aflatoxin rejection. Solar energy systems: 9 - 16 month payback from grid electricity cost elimination. HACCP processing lines: 3 - 5 year payback from combined certification premium and spoilage elimination. At these payback periods, commercial debt service is viable at Uganda's prevailing agricultural lending rates (18 - 24 percent per annum), and the programme's matching grant functions as a first - mover de - risker rather than a primary capital provider which is the instrument design that achieves a genuine 5:1 leverage ratio.

Table 7.16 Investment portfolio by technology category - poultry sector

Technology Investment Category	% Envelope	Grant:Total Ratio	Private:Grant Ratio	Scale / Units	Payback	Primary Enterprise Targets
Solar Hatchery & In - ovo Vaccination (Petersime / HatchTech / Pas Reform)	30%	1 : 5	4 : 1	4 - 6 hatcheries	1.1 - 1.7 yrs	Ugachick; Biyinzika; (hatchery phase)
NIR Feed Quality & Precision Formulation (FOSS Analytical A/S)	15%	1 : 5	4 : 1	2 - 3 feed mills	0.7 - 1.2 yrs	Ugachick Feeds; Roofings NUVITA; UGT
Solar Energy Systems - On - Farm Brooding & Lighting	15%	1 : 5	4 : 1	8 - 12 packages	0.75 - 1.3 yrs	Biyinzika grow - out farms; NSPF nucleus
Modular HACCP Processing + Solar Cold Chain (Meyn / Stork; Danfoss / Gram)	25%	1 : 5	4 : 1	1 - 2 lines + 3 cold hubs	3 - 5 yrs (combined)	City Abattoir / Quality Cuts; Hariss / Kenchic
BSF Circular Economy (Buhler / Innovafeed / BioCycle)	10%	1 : 5	4 : 1	3 - 5 farm units	1.2 - 1.7 yrs	Biyinzika; NSPF out - grower cooperatives
IoT Biosecurity & BDS	5%	1 : 5	4 : 1	5 - 8 farms	Risk mitigation	Ugachick; Biyinzika; HACCP - line farms
TOTAL PORTFOLIO	**100%**	**1 : 5**	**4 : 1**	-	-	**5:1 leverage ratio**

Sources: Petersime/HatchTech/Pas Reform pricing data; FOSS Analytical A/S pricing; Big Dutchman tropical installation costs; Meyn/Stork turnkey pricing; Buhler/Innovafeed BSF unit costs; A2i DMDP installation experience. All figures indicative at June 2026.

7.6.2 Investment Screening: Hard Gates

This section sets out eight sequential screening gates applied to every enterprise before a GTTF matching grant is recommended. The gates formalise screening logic already present but distributed across this chapter the Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) precondition in 7.4B, the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) verification requirement in 7.1D, the audited - accounts and technology - inventory requirements in Table 7.18 as a single consolidated instrument.

Table 7.16B Hard - gate screening framework - poultry investment pipeline

Gate	Test	Failure Consequence
Operator identity	Named, legitimate enterprise with confirmed management and site (e.g. SR Kuku, Kenchic, Sekajja Agro, Ugachick, and Biyinzika confirmed)	All of them were confirmed.
Buyer / Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) route	Confirmed offtake agreement from formal retail, hotel group, or institutional buyer before capital deployment	No HACCP processing - line grant disbursed without a signed Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) non - negotiable, per 7.4B
Throughput and capacity fit	Technology sized to verified DOC volume, flock size, or feed mill tonnage not nameplate/designed capacity	Resize, phase, or defer pending site visit (e.g. Ugachick's ~60% capacity utilisation must be diagnosed before any hatchery grant is sized)
Monetisable constraint	Technology addresses a priced, documented loss mortality differential, Feed Conversion Ratio (FCR) gap, spoilage rate, energy cost not a generic upgrade request	Redirect to BDS support if the request is not a quantifiable GTTF case
Certification claim discipline	Any HACCP/ISO 22000 status verified against the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register before appearing in a published deliverable	Statement withheld or flagged pending verification the existing 7.1D rule for Biyinzika and SR Kuku, now applied as a standing gate rather than a one - off caveat
Denmark/EU technology fit	Supplier route serviceable in Uganda local agent, spares, warranty (Petersime, FOSS, Meyn, Danfoss, Big Dutchman all confirmed with East Africa service networks)	Do not match technology until service network is confirmed
Capital stack	Credible 4:1 private co - financing evidence audited accounts, ACF eligibility, or aBi Development co - financing precedent	Do not count toward the 5:1 leverage ratio without verified financial evidence
Post - grant sustainability	Enterprise demonstrates capacity to maintain, staff, and finance operations independently after the grant period	Defer or restructure the investment package

Application note: These eight gates formalise screening logic already present but distributed across this chapter the Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) precondition in 7.4B, the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) verification requirement in 7.1D, the audited - accounts and technology - inventory requirements in Table 7.18. Presenting them as a single sequential screen gives the field team, and any external reviewer, one consolidated instrument for moving an enterprise from KII candidate to funded investment, rather than requiring the discipline to be inferred from scattered footnotes across the chapter.

7.6.3 Enterprise Ranking Against the Hard Gates

Table 7.14C applies the eight hard gates in Table 7.14B to the five enterprises named in the actor landscape (Section 7.4C) that have live KII engagement or confirmed operator identity, to produce the ranking this chapter feeds into the cross - consultant enterprise - prioritisation exercise. The ranking is a snapshot against currently available desk and KII evidence, not a funding decision; gates marked CONDITIONAL identify the specific verification step - an Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)), a capacity diagnostic, a disambiguation - that must clear before an enterprise can move from KII candidate to funded case.

Table 7.16C Enterprise ranking against the hard - gate screening framework

Enterprise	Identity	Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) route	Capacity fit	Certification	Capital stack	Overall status
Ugachick Poultry Breeders	PASS	CONDITIONAL - no confirmed Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) on file	CONDITIONAL - ~60% capacity utilisation must be diagnosed before hatchery grant sizing	N/A - no certification claim currently made	PASS - confirmed aBi co - financing precedent	CONDITIONAL PASS, pending capacity diagnostic
Biyinzika Poultry International	PASS	CONDITIONAL - no confirmed Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) on file	PASS - no capacity constraint flagged	PASS - independently verified (Section 7.1D)	PASS - confirmed aBi co - financing precedent	PASS, pending Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) confirmation
Kenchic Uganda (Hariss International)	PASS	CONDITIONAL - Nairobi wholesale linkage confirmed; formal domestic Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) not yet documented	PASS - Namilyango hatchery at design capacity	N/A - no certification claim currently made	CONDITIONAL - financing structure (FDI - backed) not yet confirmed against GTTF leverage terms	CONDITIONAL, strongest technology fit

SR Kuku / SRR Uganda	HOLD - SR Kuku / Yo Kuku disambiguation outstanding (Section 7.8)	Not assessed pending identity resolution	Not assessed pending identity resolution	PASS, conditional on disambiguation (Section 7.1D)	Not assessed	HOLD pending disambiguation

Sources: Sections 7.1D, 7.4B, 7.4C, 7.6B, 7.8; A2i GRASP KII intelligence to August 2026.

Read against the cross - consultant scale - over - spread guidance, this ranking supports concentrating the poultry investment case on Biyinzika and Ugachick as the two enterprises closest to a fundable position, with Kenchic Uganda tracked as a strong technology - fit candidate pending financing - structure confirmation, rather than spreading matching - grant commitments across all five named enterprises at this stage.

7.7 Pillar 7 - Policy Alignment, Regulatory Framework, and Post - Investment Sustainability

Table 7.17 Legislative and regulatory mapping: Uganda commercial poultry sector

Instrument	Status	Key Provisions for Value - Addition Investment	Alignment Assessment	Required Policy Action
NDP IV (2025/26 - 2029/30)	Enacted	Agro - industrialisation as primary growth driver; livestock and poultry as priority value chain	Full alignment - GTTF investment directly advances NDP IV livestock sub - sector targets	No action required; GTTF positions within existing NDP IV mandate
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Poultry Sector Investment Plan	In implementation	Hatchery capacity, climate - controlled production, and formal processing identified as three primary constraints	Direct alignment - matches exactly the three technology pillars GTTF targets	Formal alignment letter; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) endorsement of GTTF technology pipeline as implementing partner
National Livestock Policy 2020	Current	Beef value addition, cold - chain infrastructure, protein security; livestock as primary pastoral income source	Partial alignment - poultry explicitly referenced in protein security provisions	No action required; existing policy framework supports GTTF investment trajectory

Instrument	Status	Key Provisions for Value - Addition Investment	Alignment Assessment	Required Policy Action
EU - Uganda Economic Partnership Agreement	In force	Regulatory framework for certified Ugandan exports to EU market; SPS compliance pathway	HACCP certification investment directly enables EU SPS compliance; alignment strong	Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) national poultry grading standard required to operationalise EU pathway
Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) - National Poultry Quality Grading Standard	Does not yet exist	No national quality grading standard creating a certified product category currently exists	HACCP investment cannot command certification premium without grading standard; regulatory gap blocks market premium	Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) to develop and enforce national grading system: defined chilling, hygiene, packaging standards 12 - 18 month timeline
EAC Common External Tariff (35% CET)	In force	EAC CET on processed poultry (HS 0207) provides the import parity price floor protecting domestic producers	Import parity analysis confirms Uganda within protected band; GTTF investment widens this margin permanently	No change required; CET provides the price protection GTTF competitiveness investment builds upon
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) ND Vaccination Enforcement	Weak enforcement	Mandatory vaccination policy exists; enforcement at commercial farm level inconsistent, this is a direct cause of periodic epidemic cycles	Strengthening enforcement is the single highest - return policy action to protect GTTF investments	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) to implement mandatory verifiable ND vaccination protocol for licensed commercial operations above 1,000 birds

Instrument	Status	Key Provisions for Value - Addition Investment	Alignment Assessment	Required Policy Action
EAC Duty Remission Scheme	Partial application	Duty waivers for agricultural processing equipment available in principle; inconsistent application for poultry processing technology	Duty remission on modular HACCP equipment would reduce landed cost of GTTF - supported investment by 5 - 10%	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and URA to extend EAC Duty Remission to modular poultry processing equipment and solar hatchery systems
Uganda Climate-Smart Agricultural Transformation Project (UCSATP) (World Bank, USD 354.7m, 2024 - 2030)	Under implementation	Component 2 (climate - smart technology upscaling, mechanisation centres) and Component 3 (cold - chain and value - addition equipment purchase) directly cover hatchery and processing technology categories; poultry is one of 13 designated value chains, active in at least 24 districts across Busoga, Bukedi, Teso, and Lango	Potential single - buyer alignment Uganda Climate-Smart Agricultural Transformation Project (UCSATP) procures inputs through a centralised e - voucher and supplier - accreditation system (MCash Uganda platform) under the Public Procurement and Disposal of Public Assets Act, rather than farm - by - farm purchasing; this could function as an anchor institutional buyer for GTTF - matched hatchery/cold - chain equipment rather than enterprise - level sales alone	Confirm with Uganda Climate-Smart Agricultural Transformation Project (UCSATP) Secretariat / Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) procurement unit whether hatchery and cold - chain equipment are scheduled in the current Livestock Value Chain Item Specification, whether non - Ugandan suppliers are eligible for accreditation, and indicative volumes; not yet confirmed

Sources: NDP IV 2025; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Poultry Sector Investment Plan; National Livestock Policy 2020; EU - Uganda EPA; EAC CET 2022 - 2025; A2i GRASP KII intelligence 2026.

The most consequential regulatory action required to unlock processing investment returns is the development of a national poultry quality grading standard by Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS). Without it, HACCP investment cannot command a certified product premium in the domestic formal retail market and the Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) mechanism cannot reference a recognised product category.

7.7.1 MCDA Sector Scoring Summary

Table 7.18 MCDA scoring summary - Uganda commercial poultry sector

Scoring Criterion	Weight	Score	Rationale
Market Growth Potential	25%	9 / 10	Highest growth rate of any protein sector; urban demand at 5.2% p.a. urbanisation; per capita gap to SSA average (2.1 kg) is the supply - side opportunity
Climate Resil- ience Impact	20%	8 / 10	Solar energy + BSF circular economy; NIR feed efficiency reduces GHG per kg output; closed housing eliminates heat stress vulnerability to rising temperatures
Technology Ab- sorption Readi- ness	20%	8 / 10	A2i 22 - unit solar incubator track record reduces first - mover risk; Ugachick and Biyinzika have management capacity and precedent for external financing
Private Co - In- vestment Poten- tial	15%	9 / 10	Short payback periods (8 - 20 months for NIR and solar) create commercially bankable returns; Tier 1 integrators have ACF and aBi Development co - financing track records
Export & Value - Addition Viability	10%	7 / 10	DRC/South Sudan export corridor opens once HACCP certifi- cation achieved; Kenya structural deficit >100,000 MT/year is primary export signal; import substitution strong in formal retail
Inclusive Devel- opment Impact	5%	8 / 10	Out - grower model; women's cooperatives; BSF suited to female - led enterprise; 4.2 million rural households with poultry broadest rural reach of any livestock sub - sector
Danish / EU Tech- nology Match Quality	5%	9 / 10	Petersime, FOSS, Meyn, HatchTech, Danfoss, Gram - world - leading in every technology gap identified; A2i prior Uganda deployment experience across solar and BSF
WEIGHTED TOTAL	100%	**8.35 / 10**	Highest - priority investment corridor in the GRASP landscape on recomputed scoring. Strongest post - grant sustainability profile and most commercially bankable return.

Source: A2i GRASP MCDA framework, May 2026.

Figure 7.9 MCDA Scoring: Uganda Poultry Value Chain (score per criterion and criterion weight). Source: A2i GRASP MCDA framework, May 2026.

Figure 7.8 Broiler Production Cost Composition: Commercial Uganda Sector. Feed 65 - 72%; NIR technology targets the dominant cost item. Feed Conversion Ratio (FCR) range 2.4 - 3.3 reflects market - quality maize conditions.

7.7.2 SWOT Analysis

STRENGTHS	WEAKNESSES
• Clearest poultry export signal in the EAC: USD 4.62M HS 0207 meat exports and USD 10.98M total poultry export value in 2024 — over 12× Kenya's meat export value• 8% commercial - sector CAGR, the fastest of any livestock sub - sector; urban population growth of 5.2% p.a. adds structural demand independent of income growth• Kenya's documented structural deficit (>100,000 MT/yr vs. ~200,000 MT domestic demand), plus chronic DRC/South Sudan deficits currently filled by live - animal imports at commodity prices• A2i Uganda - validated proof of concept lowers technology - adoption risk: 22 solar incubators (DMDP 2021 - 22) and the 2024 DGBP BSF project• NIR feed - quality testing has the fastest payback of any agri - technology in Uganda (8 - 14 months) — a commercially self - financing investment where the GTTF grant is a marginal de - risker• EAC 35% CET on imported processed poultry provides a price floor within which GTTF technology investment builds durable cost competitiveness	• Zero HACCP - certified processors systemically excludes the sector from formal - retail premiums (15 - 40% above informal prices) and Kenya's formal export channels• 18 - 25% post - slaughter spoilage under open - air processing — the single most commercially damaging bottleneck in the chain• 67% of market maize exceeds EU aflatoxin limits: a chronic, invisible cost burden compounding through immune suppression, Feed Conversion Ratio (FCR) degradation, and mortality• Current Feed Conversion Ratio (FCR) of 2.3 - 2.8:1 yields a cost of production (USD 1.77 - 2.13/kg) dangerously close to the import parity ceiling (USD 1.51 - 1.90/kg) — no buffer against Brazilian subsidy escalation• Hatchery chick mortality of 15 - 30% from hatch to day 21; Ugachick operating at only 60% capacity due to diesel - generator - dependent incubation climate control• Grid electricity (USD 0.22 - 0.26/kWh) among East Africa's highest as a share of per capita income, eroding margins at every energy - dependent node
OPPORTUNITIES	**THREATS**
• Per capita consumption gap to the SSA average (- 2.1 kg, - 47%) is a supply - side constraint, not a preference gap — closing it requires roughly doubling formal production, achievable within the NDP IV horizon with GTTF investment• DRC and South Sudan's chronic poultry deficits, currently filled by live - animal exports at commodity prices, can shift to higher - value HACCP - certified chilled portions once processing certification is achieved• BSF circular economy: A2i - validated larval meal (USD 0.89 - 1.06/kg) converts a litter liability into a triple - revenue asset with a 14 - 20 month payback, well suited to female - led cooperative enterprise• NDP IV agro - industrialisation mandate and The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Poultry Sector Investment Plan create explicit policy demand for the exact technologies GTTF targets• European processing lines (Meyn, Stork) built to EU SPS standards create a built - in EU export pathway that Asian equipment alternatives cannot offer	• Subsidised Brazilian frozen broiler (USD 1.51 - 1.90/kg) sits within range of Uganda's current cost of production (USD 1.77 - 2.13/kg) — currency or subsidy shifts can close the gap; structurally fragile at current Feed Conversion Ratio (FCR)• Newcastle Disease epidemic cycles: the 2019 - 2021 outbreak destroyed >3 million birds and USD 12 million in assets — nearly half the entire GTTF livestock - and - poultry tranche — the highest - probability, high - impact sector risk• Chinese housing and processing equipment at significantly lower capital cost may limit European technology uptake for enterprises not targeting EU SPS export channels, absent GTTF de - risking• IPCC AR6 projects East Africa temperatures rising 1.5 - 2.5°C by 2050, amplifying the competitive disadvantage of open - sided housing without ventilation investment• Informal slaughter (70 - 75% of the total) sustains persistent pricing pressure, with cash - immediacy competing against formal - channel quality premiums, particularly as price spikes narrow the differential

SWOT synthesised from: FAOSTAT QCL 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of

Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; OEC / WITS 2024; Kamika & Tekere 2019; Nabwire & Kigozi 2022; ERA 2024; FAO - ECTAD 2021; A2i DMDP 2022; A2i DGBP 2024; Big Dutchman / FOSS / Meyn technical data; A2i sector analysis 2026.

7.7.3 Risk Register

Table 7.17 Risk assessment and mitigation strategy - poultry investment portfolio

Risk	Likelihood	Impact	Evidence Base	Mitigation Strategy
Newcastle Disease Epidemic	HIGH	HIGH	2019 - 2021 ND cycle: >3 million birds lost; USD 12 million direct economic loss (FAO - ECTAD 2021). ND remains the single highest - probability catastrophic risk to commercial sector capital.	In - ovo vaccination (99.5% coverage) bundled with all hatchery grants; IoT biosecurity as disbursement precondition; FAO - ECTAD early warning linkage; business interruption insurance facilitation.
Feed Price and Aflatoxin Volatility	MEDIUM	HIGH	67% of market maize above EU aflatoxin limits (Kamika & Tekere 2019). Feed = 65 - 72% production cost. Aflatoxin suppresses immunity and degrades Feed Conversion Ratio (FCR) - compound economic burden largely invisible to operators.	NIR systems address both price risk (least - cost formulation) and quality risk (aflatoxin rejection). BSF larval meal provides structural hedge against fishmeal price volatility. Feed cooperative formation facilitated by A2i for Tier 2 clusters.
Brazilian / South African Import Competition	MEDIUM	MEDIUM	Brazilian frozen broiler landed East Africa at USD 1.51 - 1.90/ kg. Uganda farm - gate cost USD 1.77 - 2.13/kg at current Feed Conversion Ratio (FCR) - within range but dangerously narrow margin against subsidy escalation.	GTTF Feed Conversion Ratio (FCR) improvement reduces Uganda cost of production to USD 1.32 - 1.59/kg - below import parity floor, creating a durable competitive margin independent of tariff protection.

Risk	Likelihood	Impact	Evidence Base	Mitigation Strategy
Market Access Risk (post - HACCP investment)	MEDIUM	MEDIUM	No Uganda processor currently holds HACCP certification; institutional buyer commitments untested at commercial scale.	Mandatory Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) from Carrefour, hotel group, or WFP before GTTF processing line grant disbursement; HACCP certification support in BDS; A2i market linkage to documented procurement - ready institutional buyers.
Technology Adoption Resistance	LOW - MEDIUM	MEDIUM	First - mover risk at commercial scale despite A2i solar incubator track record. Enterprise management may require proof - of - concept before committing private co - financing.	A2i 22 - unit solar incubator deployment creates local proof - of - concept and peer network; demonstration farm visitor programme; milestone - linked disbursements; FOSS A/S East Africa customer reference visits.
Climate Change: Rising Ambient Temperatures	MEDIUM	MEDIUM	IPCC AR6: East Africa temperatures projected +1.5 - 2.5°C by 2050. Open - sided housing heat stress above 30°C already depresses Feed Conversion Ratio (FCR) and egg production consistently.	Closed ventilated housing with evaporative cooling (Big Dutchman; Fancom) converts rising temperature from production risk to managed variable. GTTF housing investment is simultaneously a commercial and climate adaptation investment.
Grid Electricity Policy Risk	LOW	LOW	ERA tariff changes cannot eliminate solar economics at current USD 0.22 - 0.26 (UGX 800 - 950)/kWh. Any future tariff reduction improves hybrid economics further.	Solar energy investment is commercially superior to grid at any credible future tariff level. No downside scenario identified in ERA regulatory trajectory.

Sources: FAO - ECTAD 2021; Kamika & Tekere 2019; USDA FAS 2025; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; ERA 2024; IPCC AR6 2021; A2i GRASP KII intelligence 2026.

7.7.4 Single - Buyer Potential: Uganda Climate-Smart Agricultural Transformation Project (UCSATP) as an Institutional Procurement Channel

Table 7.17 above treats Uganda Climate-Smart Agricultural Transformation Project (UCSATP) primarily as a policy - alignment instrument. It merits closer attention because it may also function as something more specific and more valuable: a single - buyer channel for some of the hatchery and cold - chain technology categories GTTF

is designed to bring to market, rather than a purely enterprise - by - enterprise sales proposition.

Uganda Climate-Smart Agricultural Transformation Project (UCSATP) is a six - year, USD 354.7 million programme (USD 325 million World Bank loan, USD 25 million IDA grant, USD 4.7 million Government of Uganda counterpart contribution), implemented by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) through National Agricultural Research Organisation (NARO), NAGRC&DB, and the Department of Meteorology, across 69 districts in Uganda's agroecological zones. Poultry is one of thirteen value chains explicitly designated for support, active in at least 24 districts spanning the Busoga, Bukedi, Teso, and Lango sub - regions.

Two of the programme's five components map directly onto GTTF's technology pillars. Component 2 (Promoting Adoption of Climate - Smart Agriculture Technologies and Practices) finances upscaling of climate - smart technologies, including construction and equipping of mechanisation centres and animal disease control investment. Component 3 (Market Development and Linkages) finances cold - chain and value - addition equipment purchase as part of its market - access objective the same processing and cold - chain category that HACCP - certified poultry processing depends on. Uganda Climate-Smart Agricultural Transformation Project (UCSATP) has already issued a public call for applications to upscale hatcheries as part of its input - supply pipeline, and it procures inputs at scale through a centralised e - voucher and supplier - accreditation system operated on the MCash Uganda platform, under formal bidding rules set by the Public Procurement and Disposal of Public Assets Act, rather than through fragmented farm - by - farm purchasing.

That combination a formally accredited supplier list, centralised procurement rules, and a programme budget an order of magnitude larger than GTTF's own poultry technology allocation creates the structural possibility that Uganda Climate-Smart Agricultural Transformation Project (UCSATP) itself, rather than any single Tier 1 enterprise, could function as the anchor buyer for some GTTF - matched hatchery or cold - chain equipment categories. If Danish or EU suppliers of climate - controlled hatchery or cold - chain systems can achieve accreditation under Uganda Climate-Smart Agricultural Transformation Project (UCSATP)'s Livestock Value Chain item specification, the addressable market for a single successful technology match could extend well beyond an individual enterprise deal to a multi - district public procurement volume.

OUTSTANDING VERIFICATION: This single - buyer possibility is not yet confirmed and should not be presented as such in any external - facing material until validated. A KII with the Uganda Climate-Smart Agricultural Transformation Project (UCSATP) Secretariat or Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) procurement unit is required to establish (i) whether hatchery and cold - chain equipment are currently scheduled in the Livestock Value Chain item specification, (ii) whether non - Ugandan suppliers are eligible for accreditation, and (iii) indicative volumes and pricing terms. Until verified, this is a lead to pursue through the field phase, not a confirmed procurement channel.

7.7.5 Investment Sequencing: From Landscape to Funded Case

This sequencing converts landscape - level findings into individual investment cases through a fixed sequence, stated explicitly here so that field teams apply it consistently across all Tier 2 and Tier 3 targets. KII targets referenced below remain valid as field - verification substitutes for the hard - gate sequence.

As shown in Table 7.16C, this chapter's headline recommendation concentrates on three investment cases: genetics and feed quality (NIR testing and hatchery upgrade, spanning Ugachick and Biyinzika); HACCP - certified processing and cold chain (converting the certification gap identified in Section 7.1D into formal - retail market access); and BSF circular - economy integration (linked to the Waste Management chapter's municipal - scale systems approach). Kenchic Uganda, SR Kuku and Sekajja Agro Farms remain live KII targets that could substi-

tute into this set as field verification against the hard gates progresses, rather than being added as additional, smaller commitments alongside it.

Table 7.20B Investment sequencing - poultry pipeline

Step	Decision Question	Minimum Evidence Required
1. Select technology category	Which of the six technology categories in Table 7.14 is being tested - hatchery, feed, on - farm energy, processing/cold chain, BSF, or biosecurity?	One category per case; no overlapping investment logic within a single enterprise assessment
2. Name the operator	Which enterprise owns, operates, or will service the debt on this technology?	Registration, site, confirmed management contact, site visit scheduled
3. Prove the constraint	What loss is currently measurable - mortality rate, Feed Conversion Ratio (FCR) gap, spoilage percentage, energy cost, aflatoxin rejection rate?	KII - confirmed operating data; cross - referenced against Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UBOS baseline where available
4. Specify the technology	Which named supplier (Petersime, FOSS, Meyn, Big Dutchman, Danfoss, etc.) resolves this constraint, and at what cost?	Supplier quotation; CapEx/opex; service and spares route confirmed
5. Price the benefit	What is the annual gross benefit - from Table 7.13's price - uplift, loss - avoided, or cost - saved decomposition?	Verified throughput (birds/year, DOC/week, MT feed/year) multiplied by benefit per unit
6. Structure finance	Can the enterprise's balance sheet support the 4:1 private co - financing share?	Audited accounts; ACF or aBi Development credit - line eligibility; bank terms where available
7. Clear the hard gates	Does the case pass all eight gates in Table 7.14B?	Full gate checklist signed off before disbursement recommendation

This sequence applies to every enterprise in Table 7.18 below. Ugachick and Biyinzika (Tier 3) are furthest advanced against Steps 1 - 4; SR Kuku, Kenchic, and Sekajja Agro Farms remain at Steps 1 - 2 pending confirmed contacts via A2i.

Table 7.21 KII agenda: priority enterprise targets and information sought

Enterprise	Priority KII Questions	Information Sought	Technology Investment Opportunity	Confirmation Required
Ugachick Poultry Breeders Ltd	1. What is the primary cause of ~40% capacity underutilisation in incubation halls? 2. What is actual Feed Conversion Ratio (FCR) and hatch - to - day - 21 mortality rate? 3. What capital investment is planned in the next 24 months and what financing is in place? 4. Has Ugachick accessed ACF credit and at what terms?	Hatchery climate control failure modes; actual vs. designed capacity; feed mill NIR interest; balance sheet position; existing technology supplier relationships	Solar hatchery upgrade; in - ovo vaccination; NIR at feeds division Tier 3	Audited accounts; technology inventory; ACF eligibility; Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) with downstream buyer confirmed
Biyinzika Poultry International	1. Current DOC volume and capacity utilisation? 2. Feed Conversion Ratio (FCR) performance on grow - out farms? 3. Is HACCP certification in Biyinzika's 24 - month investment plan? 4. Current primary market channel and average selling price?	Production baseline; financial history; export market interest; technology investment appetite; co - financing capacity	HACCP processing line; solar incubation; NIR feed quality Tier 3	Audited accounts; management capacity assessment; confirmed offtake from formal retail or export buyer
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - Poultry Division	1. What is Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s timeline for a national poultry quality grading standard? 2. What is the status of ND vaccination enforcement at commercial farm level? 3. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s position on EAC Duty Remission for HACCP processing equipment?	Policy timeline for grading standard; enforcement roadmap for ND vaccination; duty remission pathway	Policy alignment for processing certification investment	Written confirmation of Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) support for GTTF pipeline; grading standard timeline commitment
NaLIRRI / CoVAB Makerere	1. Documented Feed Conversion Ratio (FCR) improvement from closed ventilation under Uganda conditions? 2. Aflatoxin survey data for maize - producing districts supplying major feed mills? 3. Status of BSF larval meal regulatory certification for poultry compound feed?	Technical validation data; aflatoxin geography; BSF regulatory status	Technical validation; HACCP pre - certification training programme partnership	Published or forthcoming data; MOU for HACCP training programme; BSF feed certification advocacy pathway

Enterprise	Priority KII Questions	Information Sought	Technology Investment Opportunity	Confirmation Required
SR Kuku (SRR Uganda) Ltd	1. What is current commercial processing throughput and installed line capacity? 2. Is SR Kuku's ISO 22000 / HACCP management certification current, and at what scope (verifiable against the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register) 3. What is the present and planned market split between domestic formal retail and regional export (principally Kenya and Tanzania)? 4. What cold - chain infrastructure is in place, and what is the 24 - month capital investment and co - financing plan?	Processing capacity and utilisation; verified certification scope; export - channel readiness; cold - chain inventory; balance sheet and co - financing appetite; existing European equipment supplier relationships	Modular HACCP processing - line expansion; solar cold chain (Danfoss / Gram); regional chilled - export route Tier 3	Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) certification verification (precondition for any certified - processor claim); audited accounts; confirmed institutional or export Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)); site visit for line and cold - chain assessment
Kenchic Uganda (Hariss International)	1. What hatchability and throughput is the 29 - unit Petersime Air-Streamer hatchery at Namilyango achieving against its 300,000 - 500,000 DOC/week design capacity? 2. What is the current domestic processing volume versus imported frozen product, and the HACCP status of any domestic line? 3. How is the Kenchic DOC price point (≈USD 0.75 (UGX 2,700)) affecting independent hatcheries, and is further price - led expansion planned? 4. What is the structure of the Nairobi wholesale linkage and the appetite for a Uganda - anchored HACCP processing investment?	Hatchery performance benchmark (Uganda - validated); DOC pricing strategy and market impact; domestic vs. imported processing mix; Kenya group financing relationship; technology supplier terms (Petersime)	HACCP processing upgrade and cold chain; regional export route via Kenya partnership Tier 2 - 3	Audited accounts and group financing structure; domestic - processing HACCP status verification; confirmed Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) for any certified - processing grant; clarity on Ugandan value - retention versus Kenya parent

Priority Tier 3 □ targets: Ugachick Poultry Breeders (Managing Director); Biyinzika Poultry International (Chief

Executive Officer). Consolidation - driver targets added to the KII programme: SR Kuku (SRR Uganda), Kenchic Uganda (Hariss International). All contacts scheduled through A2i programme coordination.

7.8 Chapter Conclusion

Overview: Uganda's commercial (Tier 1, vertically integrated) poultry sector has grown at approximately 8 percent per annum for a decade a trajectory now being accelerated by the entry of vertically integrated mega - producers including Kenchic Uganda, SR Kuku, and the De Haas/Irving partnership from South Africa. The country runs a stronger poultry export position than any of its East African comparators: confirmed URA trade data for the live poultry, egg, and poultry - input basket (2015 - 2025) shows Kenya and Tanzania as the dominant destinations, with combined poultry export value across meat, eggs, and live birds reaching approximately USD 10.98 - 15.0 million in 2024. This destination breakdown applies to the broader basket, not to HS 0207 poultry meat specifically a meat - specific export destination breakdown remains a separate outstanding request to URA (see Section 7.7E), and the USD 4.62 million HS 0207 meat - export figure itself should be read as a national total without a confirmed destination split until that data is returned.

Sector Dynamics: The structural constraint lies in the quality and processing infrastructure gap between what the sector produces and what it captures in value. Uganda's commercial sector operates at a feed conversion ratio of 2.4 - 3.3:1 under current conditions with market - quality maize as compared to a European standard of approximately 1.6 and an attainable target of 1.9 - 2.0 under climate - controlled housing with quality feed. Post - slaughter spoilage runs at 18 - 25 percent of dressed weight. Chick mortality between hatch and day 21 runs at 15 - 30 percent. Sixty - seven percent of market maize carries aflatoxin contamination above EU safety limits.

Opportunity to Scale: The sector's structural trajectory is towards large - scale vertical integration. The pattern mirrors the UK poultry industry's transformation from dispersed smallholder production in the 1950s to consolidated, technology - intensive mega - producers by the 2000s. That trajectory is already underway in Uganda: Kenchic's entry with a Petersime - equipped hatchery at Namilyango, Biyinzika's growing integration, SR Kuku's processing ambitions, and the De Haas/Irving partnership establishing a South African - anchored vertically integrated model. These enterprises confirm that Uganda's commercial tier already has the scale and management capacity to absorb technology at throughput levels that make EU equipment commercially rational - but that capacity absorption is not, on its own, the GTTF investment case. Kenchic, Biyinzika and Ugachick are already well - capitalised and already sourcing equipment on commercial terms; a grant that simply co - finances their next hatchery or processing line displaces private capital rather than adding to it.

The GTTF entry point instead sits one node upstream, in the supply of quality raw material - grain and feed - into the mills these integrators depend on, where the underlying constraint (aflatoxin - compromised maize, inconsistent feed formulation) is shared across the whole sector rather than solved by any single integrator's balance sheet. Genetics (commercial day - old - chick quality and hatchery capacity) and feed quality are the two productivity levers that determine how much of this constraint reaches the farm gate, and they are the two levers this chapter's investment case is built around.

Comparative Advantage: Uganda's underlying competitive advantage is that chicken remains the cheapest source of animal protein available to Ugandan consumers on a per - kilogram basis, ahead of beef, pork, and (for now) most farmed fish - though fish (tilapia and catfish aquaculture) is catching up in price as aquaculture technology improves, and should be tracked as a medium - term competitive constraint rather than assumed static. This price advantage, combined with rapid urbanisation - urban centres are the fastest - growing consumption base and the primary channel through which formal, certified poultry product reaches paying customers - is the structural reason poultry, rather than red meat, is the leading candidate for GTTF - supported formal - channel investment in animal protein.

Technology Adoption: Five technology investments address the sector's compounding constraints simultaneously, led by the two levers with the greatest effect on productivity - genetics and feed quality - with processing, energy and circular - economy investment built on top of that base:

- NIR feed quality testing (feed lever)
- Solar - battery hatchery modernisation and genetics upgrade (DOC quality lever)
- Solar energy for on - farm brooding and lighting
- Modular HACCP - certified processing lines
- BSF circular economy integration

Together they represent a technology pathway that accelerates and deepens the structural consolidation already underway, rather than building a parallel system from scratch.

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Chapter 8 : Grain and Animal Feeds Value Chain Assessment

Sector Context

Grain and animal feed sits at the foundation of Uganda's food system and cross - cuts the livestock, poultry and aquaculture value chains, making the sector a strong candidate for Priority 1 status in the GTTF portfolio. Key findings from the landscape study include post - harvest losses averaging 20–30% of production, equivalent to approximately 1.2–1.5 million MT of maize annually; persistent aflatoxin contamination and high grain rejection rates; and limited access to commercial drying and quality - control infrastructure. The Green Agenda strengthens this investment case by promoting solar - powered and low - energy drying, hermetic and climate - smart storage, energy - efficient milling and feed processing, improved mycotoxin testing, and the conversion of agricultural residues and processing by - products into feed, bioenergy and organic fertiliser. Alongside these measures, precision feed formulation and local production of concentrates can improve feed - conversion efficiency, reduce dependence on imported feed components and lower production costs, while addressing the structural commercial animal - feed supply gap of approximately 36–45% of market demand. Together, these interventions can reduce food and feed losses, lower energy and environmental impacts, improve livestock and aquaculture productivity, strengthen climate resilience and create a more resource - efficient, circular and competitive grain and animal - feed sector.

Key findings

1. Grain production is growing slowly while major post - harvest losses persist. Maize production grew by only 1.81% annually between 2015 – 2025**,** while an estimated 1.2 – 1.5 million MT of maize is lost each year**,** equivalent to about 20 – 30% of production. Soybean is growing faster, but demand is outpacing supply, creating a structural processing deficit.

2. The biggest bottleneck is grain quality rather than production capacity. Only about 20 – 25% of Uganda's grain passes through commercial drying and cleaning**,** leaving much of the harvest exposed to moisture, aflatoxin contamination and quality rejection. Commercial drying and cleaning therefore represents a critical investment point for reducing losses and improving access to formal and export markets.

3. Uganda has a substantial and growing animal - feed supply deficit. Formal domestic feed production was about 262 million kg in 2023**,** against estimated demand of 410 million kg, leaving a 36% supply gap**.** By 2028, demand is projected to reach 550 million kg, with the gap potentially widening to about 39% as livestock and aquaculture production expand.

4. The strongest investment opportunity is in green processing and quality technologies. Priority areas include solar/energy - efficient grain dryers, cleaning and sorting, aflatoxin testing/decontamination, improved oilseed processing, efficient feed mills and pelleting, and circular use of agricultural residues**.** The report indicates that existing programmes have largely addressed production and aggregation, leaving a significant gap in industrial processing and green technology adoption

8.1 Pillar 1 Historical Baseline and Strategic Alignment

8.1.1 Uganda's Grain Sector: A Decade in Perspective

Uganda's agricultural sector contributes approximately **26.2% of GDP** and employs more than 68% of the working - age population. Within this broad base, the grain sub - sector - principally maize and soybean - the two commodities of primary commercial significance - occupies a dual role: feeding households directly and underpinning the commercial animal feed industry that sustains the livestock sector valued at 4.3% of GDP. (Okia et al., 2024)

The decade spanning 2015 to 2025 was one of structural ambition punctuated by operational disruption. Annual maize production - measured on UBOS probability - based survey baselines - ranged from a verified low of **2.2 million MT in 2021** (UBOS UHIS - AAS 2021/22, reflecting the combined impact of Fall Armyworm infestations, El Niño disruption, and the COVID trade shock) to peak survey highs of **4.56 million MT in both 2018 and 2020** (UBOS AAS). Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024 estimates 2024 production at 3.1 million MT, while the Grain Council of Uganda (KII, 30 July 2026) places the industry estimate at ~5.7 million MT annually - a divergence rooted in methodology: UBOS uses probability sampling, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) uses administrative extension returns, and the GCU relies on member trade intelligence. The 10 - year maize production CAGR (2015 - 2025) stands at **+1.81%** - modest headline growth that masks extraordinary year - on - year volatility driven by rainfall shocks, pest outbreaks, and export ban disruptions. The national maize yield gap remains severe: farm - level yields of 1.5 - 2.5 MT/Ha against an agronomic potential of 6.8 MT/Ha under optimal rainfed management. Soybean expanded at a stronger **+5.62% production CAGR** over the same decade, driven by commercial processing demand; demand outpaced supply at +10.38% CAGR, generating a structural processing deficit by 2019 that reached - 65,000 MT by 2025. (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2024a) (UBOS, 2022a) (A2i, 2026l)

Post - Harvest Losses (PHL) remain the sector's most persistent drag on commercial viability. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) field assessments conducted between 2019 and 2023 estimate that **approximately 1.2 - 1.5 million MT of maize is lost annually** to poor harvesting practices, inadequate drying, and contamination before grain reaches a formal market - equivalent to 20 - 30% of production in a typical year (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) counts losses only once grain has left the field). These losses are not random: they concentrate in the 24 - 72 hour window between harvest and first point of sale, when grain moisture above 14% and field - level storage create the conditions for aflatoxin fungal growth. The FAO estimates aflatoxin contamination alone costs Uganda approximately **US$ 9.2 million in annual tax revenue losses** through rejected export consignments. (FAO, 2025)

NDP IV Alignment

NDP IV (2025/26 - 2029/30) targets increasing processed agricultural exports toward **US$ 2.7 billion**; reducing post - harvest losses to below 10% by 2030; expanding domestic animal feed manufacturing; and integrating smallholder grain producers into formal commercial supply chains. (NPA, 2024a) (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / AAIN, 2025)

Table 8.1a - Maize Production, Area & Yield, Uganda 2015 - 2025

Year	Est. Planted Area ('000 Ha)	Avg. Yield (MT/Ha)	Production ('000 MT)	Primary Source
2015	1,120	2.50	2,800	UBOS Historical Baseline Estimates
2016	1,160	2.50	2,900	FAOSTAT PSAC / Bank of Uganda Trade Series
2017	1,280	2.50	3,200	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / Bank of Uganda Formal Trade
2018	1,854	2.46	4,560	UBOS Annual Agricultural Survey (AAS) 2018
2019	1,480	2.30	3,400	UBOS Annual Agricultural Survey (AAS) 2019
2020	1,850	2.46	4,560	UBOS Annual Agricultural Survey (AAS) 2020
2021	1,500	1.47	2,200 *	UBOS UHIS - AAS 2021/22 Final Report
2022	1,510	1.70	2,570	UBOS Statistical Abstract 2022
2023	1,550	1.81	2,800	UBOS Statistical Abstract 2024 / AAS 2023/24
2024	1,600	1.94	3,100	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024
2025†	1,650	2.03	3,350	Ministry Estimates / Baseline Projection

▲ *Peak survey years.* ▼ *Survey - verified low: UBOS UHIS - AAS probability sampling.* 2021 drop driven by Fall Armyworm, El Niño, and COVID trade disruption. 2025 is a ministerial baseline projection. Sorghum, Millet and Rice excluded. 10 - Yr Production CAGR (2015 - 2025): +1.81%. (USDA - FAS, 2024) (UBOS, 2018 - 2020)*

DATA NOTE: FAOSTAT vs. UBOS Maize Production Estimates - Explaining the Divergence Three institutional data streams produce materially different national maize production estimates. The divergence is structural and methodological - not a data error:**UBOS AAS / UHIS - AAS (lowest; most statistically rigorous):** Probability - based household sampling nationwide. The 2021/22 UHIS - AAS verified 2.2 million MT from 1.5 million Ha. UBOS survey data serves as the definitive lower - bound anchor for this study's production modelling.**Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Administrative Data (mid - range):** Aggregated from District Agricultural Officers (DAOs) and extension returns. FAOSTAT aggregates from Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) national submissions. These administrative estimates tend to overestimate cultivated area and production due to compounding optimistic assumptions - Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024 places 2024 output at 3.1 million MT.**GCU KII Estimate (highest; industry - based):** The Grain Council of Uganda (KII, 30 July 2026) reported ~5.7 million MT annually based on member trade intelligence and physical throughput at commercial aggregation points. This upper - bound figure captures informal and subsistence production that probability - based surveys may not fully enumerate. *This study uses UBOS AAS / UHIS - AAS data as the primary production baseline. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and FAOSTAT figures provide contextual upper - bound estimates. Investment analysis references UBOS - verified data for supply - demand modelling; GCU KII intelligence informs informal market sizing. A further more granula anchor was proposed during the 28 August 2026 sector validation workshop; the tonnages of the 37 largest grain - producing districts, on which the Grain Council of Uganda holds member - level visibility. This study does not have access to district - disaggregated tonnage date at the time of drafting; obtaining and cross validating it against the UBOS/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/GCU ranges above is flagged as the priority task for the Draft Report.*

Table 8.1b - Soybean Production, Area & Yield, Uganda 2015 - 2025

Year	Est. Planted Area ('000 Ha)	Avg. Yield (MT/Ha)	Production ('000 MT)	Primary Source
2015	210	0.52	110	FAOSTAT PSAC Baseline / Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Records
2016	212	0.51	108	FAOSTAT Production Statistics (PSAC) 2024
2017	225	0.51	115	FAOSTAT / Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract
2018	240	0.51	122	UBOS Annual Agricultural Survey (AAS) 2018
2019	250	0.51	128	UBOS Annual Agricultural Survey (AAS) 2019
2020	265	0.51	135	UBOS Annual Agricultural Survey (AAS) 2020
2021	316	0.45	142	UBOS UHIS - AAS 2021/22 Final Report
2022	320	0.47	150	UBOS Statistical Abstract 2022

2023	335	0.48	162	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract / FAOSTAT PSAC 2024
2024	350	0.50	175	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024 / URA
2025†	365	0.52	190	Ministry Estimates / Baseline Projection

† 2025 is a ministerial baseline projection. 10 - Yr Production CAGR (2015 - 2025): +5.62%. Demand CAGR (2015 - 2025): +10.38% - generating structural processing deficit from 2019; estimated at - 65,000 MT by 2025. Soybean FAOSTAT figures for 2015 - 2017 may diverge from UBOS survey data due to different coverage of informal production. (A2i, 2026k)

8.1.2 Animal Feed Consumption by Species: Poultry, Cattle, Pigs and Fish

Uganda's livestock and aquaculture sectors each carry distinct feed formulation requirements, stocking densities, and growth trajectories. Disaggregating demand by species sharpens investment targeting - poultry alone accounts for an estimated 60 - 65% of formal commercial feed demand, making it the dominant market segment for GTTF technology investment. (UBOS, 2021) (ReportLinker, 2024a)

The **poultry sector** - comprising 47 million birds nationally - is the fastest - growing feed consumer. Commercial broiler operations require 2.2 - 2.8 kg of feed per kg of liveweight gain (feed conversion ratio, Feed Conversion Ratio (FCR)), while layer operations consume roughly 110 - 120 g/bird/day throughout a productive cycle of 18 - 20 months. KII data from this study documents Feed Conversion Ratio (FCR)s of 2.8 - 2.9 in less technically managed Ugandan farms against 1.4 - 1.5 in fully automated operations - a gap attributable in large part to aflatoxin contamination in the feed supply reducing nutrient absorption efficiency. (A2i, 2026c)

The **cattle sector** - comprising 16.7 million head - presents a bifurcated feed market. Traditional pastoralist herds, accounting for approximately 70% of the national herd, consume no formulated feed. The commercial dairy and feedlot segment, concentrated in the central, western, and northern corridors, uses compound dairy rations and calf starters - the target market for KAMP Group's dairy feed line and a growing demand segment for Ugandan processors.

The **pig sector** (4.4 million pigs nationally) and **aquaculture sector** (estimated 180,000 - 220,000 MT of fish produced annually in farms and cages) each represent smaller but rapidly growing feed markets with specific formulation needs - pig feed requiring higher lysine - to - energy ratios; fish feed requiring aflatoxin levels below 5 - 10 ppb given fish's heightened sensitivity to mycotoxins. (RVO, 2022)

Beyond soybean, Black Soldier Fly (BSF) larvae meal is an emerging protein alternative directly relevant to feed - formulation economics in this chapter: BSF meal carries a crude - protein content of roughly 55%, is scalable where waste feedstock is consistently available, and is best deployed as a partial rather than full substitute for soybean meal in least - cost feed formulations — evidence from the parallel GRASP fish and aquaculture assessment points to soybean inclusion rates falling from around 35% toward 10 - 15% as BSF is blended in, rather than soybean being displaced entirely. A large - scale BSF operation depends on a concentrated, reliable organic - waste feedstock stream, which is a materially different investment proposition from the many small, scattered BSF producers currently operating in Uganda. DDGS (dried distillers' grains with solubles, a by - product of ethanol production) is a genuinely strong protein and energy feed ingredient on a nutritional basis, but this study's field data places DDGS aflatoxin risk at 50 - 100 ppb in the worst cases — a concentration effect that makes off

- takers such as fish - feed producers, who must meet De Heus's sub - 5 - 10 ppb standard, structurally wary of it as an input. Least - cost feed formulation software and NIR - based ingredient testing (Section 8.4.2) are what allow a feed miller to blend soybean, BSF and DDGS safely against a cost and safety constraint simultaneously, rather than choosing one ingredient at the expense of formulation accuracy.

Table 8.1c - Livestock and Aquaculture Feed Demand by Species, Uganda 2023 - 2028

Species / Segment	Population 2023	Feed Type	Feed Conversion Ratio (FCR) / Daily Intake	Est. Annual Feed Demand 2023 (M kg)	Est. 2028 Demand (M kg)	CAGR
Broiler Poultry	~25M commercial birds	Complete pelleted/ mash	Feed Conversion Ratio (FCR) 1.5 - 2.9	140 - 160	185 - 210	5.6%
Layer Poultry	~22M layers (commercial)	Layer mash / complete	115 g/bird/ day	80 - 95	110 - 130	6.5%
Dairy Cattle (commercial)	~800K dairy cows	Compound dairy ration	3 - 6 kg/ cow/day	40 - 55	60 - 80	7.8%
Beef Feedlot Cattle	~150K commercial	Finishing ration	8 - 10 kg/day	10 - 15	20 - 28	13.3%
Pigs (commercial)	~1.5M commercial (4.4M total)	Grower/finisher pellet	Feed Conversion Ratio (FCR) 2.5 - 3.0	75 - 90	110 - 130	7.8%
Aquaculture (fish)	~220K MT annual output	Floating extruded pellet	Feed Conversion Ratio (FCR) 1.5 - 2.0	18 - 25	35 - 50	14.9%

Sources: UBOS National Livestock Census 2021; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; RVO Aquaculture Road Map 2022; A2i KII field estimates, 2026.

8.1.3 Grain and Feed Sector Outlook: 2025 - 2035

The following projections are drawn from the combined weight of UBOS population data, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) livestock census, FAO Hand - in - Hand investment modelling, and KII field intelligence gathered for this study. They are presented as a planning scenario, not a forecast, and should be read alongside the sector risks identified in section 8.7.

Table 8.1d - Uganda Grain and Animal Feed Sector: 2025 - 2035 Indicative Outlook

Indicator	2025 Baseline	2028 Mid - term	2032 Scenario	2035 Target	Key Driver / Note

Maize production (million MT)	5.2	5.8 - 6.2	6.6 - 7.0	7.0 - 8.0	NDP IV agro - industrialisation; certified seed adoption; climate variability risk, Organised farmer production and functioning extension services
Soybean production (million MT)	0.19	0.22 - 0.25	0.28 - 0.32	0.35 - 0.40	Processing deficit stimulus; AFAP and RVO seed programmes
Formal commercial feed production (M kg/yr)	262	310 - 340	380 - 430	480 - 550	Feed market CAGR ~5%; livestock population growth; per - capita income trajectory
Commercial drying penetration (% of maize harvest)	~22%	30 - 35%	42 - 50%	55 - 65%	BM Silo / Cimbria cooperative dryers; GTTF - supported aggregator infrastructure
Aflatoxin compliance rate at formal buyer intake	40 - 55%	60 - 72%	76 - 85%	>90%	Lyras UV; Aflasafe; intake testing protocols; Animal Feeds Bill enforcement
Smallholders in formal commercial supply chains	~300,000	380,000+	500,000+	600,000+	WARC hub - and - spoke; KAMP 120 - stockist; Mandela off - taker model; Jeroma cluster
Maize export value (US$ M/yr)	~126	150 - 175	200 - 240	260 - 300	Quality improvement unlocks EAC premium; sustained Kenya demand; DRC formal channel and South Sudan market structuring.
EU feed premix/ component import displacement (US$ M)	Baseline ~59M	Target: - 10M	Target: - 25M	Target: - 40M	ANDRITZ/SKIOLD/Van Aarsen domestic processing quality upgrade

Sources: UBOS National Livestock Census 2021; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; FAO Hand - in - Hand Investment Forum 2025; A2i KII field estimates, 2026. Projections are planning scenarios, not forecasts. Sector outlook is subject to policy risk (export ban, Animal Feeds Bill timing) and climate variability.

Per - capita poultry consumption provides the clearest growth signal. Field intelligence from this study's KII with Ugachick Poultry Breeders places current consumption at **approximately 1.3 kg per capita annually** - recovering from a COVID - era trough of around 1.0 kg - against Kenya's 6 kg, South Africa's 34 kg, and the United States' 45 kg. The implied growth runway to even East African norms, if Uganda's urbanisation and income trajectory continues, points to **8 - 9 kg per capita by ~2040 (scenario projection, consistent with Kenya's current level and East African urbanisation trajectories)** - a trajectory that would multiply effective commercial feed demand by a factor of five to seven over current levels, though the pace of this growth is scenario - dependent.

Figure 8.1 - Uganda Livestock & Farmed Fish Population Trends, 2015 - 2024 | Sources: NLC 2021 (UBOS); Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; FAO FAOSTAT 2025

8.2 Pillar 2: Market Dynamics and Supply Chain Architecture

8.2.1 The Grain Supply Chain: Six Nodes, Six Bottlenecks

Uganda's grain supply chain runs through six principal nodes 1)farm gate, 2)on - farm storage, 3)primary aggregator, 4)commercial dryer/cleaner, 5)miller, and 6)end - buyer. Each node carries a distinct set of value - addition opportunities and loss risks. Contamination begins upstream at farm and storage leve but concentrates and compounds at the **grain cleaning and drying node** which translates to the single most consequential control point in the chain: it determines whether aflatoxin contamination compounds or is arrested, it determines whether a miller can produce Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - compliant flour, and it determines whether the milling by - product (bran, oil cake) meets the nutritional specifications required for commercial animal feed formulation.

Table 8.2 - Grain & Feed Supply Chain Node Analysis

Node	Key Actors	Value - Add Opportunity	Typical Loss / Risk	Technology Intervention
Farm gate (harvest)	1.5M+ smallholder maize households	Proper harvesting technique; aflatoxin - resistant varieties	Moisture 18 - 27%; cob - to - field contamination begins	Farmer extension on harvest timing; Aflasafe biological control pilots (WARC)
On - farm / primary storage	Individual farmer; cooperative society	Hermetic bags; metal silos; 200 - 300 MT community stores	PHL 20 - 30%; aflatoxin multiplication if >14% moisture	BM Silo / hermetic storage for cooperatives; Tier 3 GTTF investments is a transformational rather that incremental need given current Post - Harves Loss levels
Grain aggregation / collection centre	WARC; KAMP outgrowers; Mandela Millers direct sourcing	Hub - and - spoke collection; weight / moisture / aflatoxin testing at intake	Cross - contamination; mixing of grades; delayed transport	Mobile aflatoxin test kits; Lyras A/S UV decontamination technology a near term, low CapEx investment priority sequencing ahead of next node
Commercial drying and cleaning (CRITICAL CONTROL POINT)	Mandela Millers (Buhler dryer, 100 t/hr); KAMP Group (4,000 MT silo); Amagara (used by WARC for toll - drying)	Reduce moisture to 13.5%; remove foreign matter; arrest aflatoxin spread; enable Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - compliant grain for milling AND feed	Absence of this node exposes all downstream processors to quality failure; only ~20 - 25% of Uganda's grain passes through commercial drying	Cimbria A/S grain dryers + cleaning; BM Silo recirculating batch dryers (cooperative scale, 40 - 50 t/day); GTTF's single highest - ROI node deployed as regionally distributed network rather than one/two centralised mega plants

Milling / processing	Mukwano; Mount Meru; Mandela Millers; KAMP Group	Flour, oil, meal, bran production; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification generates 15 - 25% price premium	Aflatoxin concentration in by - products (cake, bran); inconsistent quality of oilseed meal (37% vs. 44 - 46% target crude protein)	ANDRITZ / SKIOLD milling upgrades; NIR formulation for feed; Cimbria optical sorting
End - buyer / feed manufacturer	SR Kuku/ Wind Green; Ugachick; Mandela Millers; De Heus (incoming)	Complete feed formulation at US$ 700 - 850/MT - 3 - 4× value of raw grain	Dependence on imported premixes; informal home - mixing (200+ sheds around Natete/Mutundwe area alone) undercutting certified manufacturers	Van Aarsen / ANDRITZ pelleting; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Animal Feeds Bill enforcement; concentrate model expansion

Sources: A2i KII field survey (2026); UBOS (2024); Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) (2024); Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification register.

Table 8.2a - Uganda Grain Value Chain: Confirmed Price Ladder (2024 - 2025)

The price ladder below traces value creation along the grain supply chain, from farm - gate through processing to retail and export. Exchange rate: 1 USD = 3,600 UGX, aligned with the master GRASP currency convention used across all value chain chapters (previously stated as 3,800 UGX per KII field benchmark; figures below recalculated at 3,600 for cross - chapter comparability). Prices are cross - validated against KII field data from Mandela Millers, KAMP Group, SR Kuku/Wind Green, WARC, and Mount Meru Millers.

Chain node	Price (UGX/kg)	Price (US$/MT)	Multiple vs farm - gate	Technology relevance
Farm - gate, wet season (maize)	700 - 800	194 - 222	1.0x (reference)	Not a direct technology node. Upstream productivity (certified seed, spacing, timing) improves yield per hectare but sits outside primary processing scope.
Farm - gate, dry season / stored (maize)	950 - 1,100	264 - 306	\+30 - 40%	Hermetic storage bags (PICS); metal silos; proper harvest timing. PHL reduction: 10 - 20%. Cost of hermetic storage per MT: USD 0.006 - 0.010 (UGX 20 - 35)/kg.
Aggregator intake (dried, cleaned, 13 - 14% moisture)	1,050 - 1,200	292 - 333	\+38 - 55%	BM Silo or Cimbria cooperative dryer + grain cleaner. Drying cost: USD 0.008 - 0.014 (UGX 30 - 50)/kg variable. Premium uplift: USD 0.022 - 0.042 (UGX 80 - 150)/kg over undried supply.

Commercial miller intake, Uganda National Bureau of Stan-dardsUganda National Bureau of Standards (UNBS) - com-pliant, <7ppb aflatoxin	1,200 - 1,400 (sub - 7ppb premium to UGX 900 docu-mented by Mandela)	333 - 389	\+55 - 80%	Mandela Millers pays USD 0.25 (UGX 900)/kg vs. USD 0.22 (UGX 800)/kg market for sub - 7ppb grain. Cash within 30 min of delivery. Intake aflatoxin test is critical control point.
Milled maize meal, wholesale (120kg bag, Uganda National Bureau of Stan-dardsUganda National Bureau of Standards (UNBS) - certi-fied)	1,300 - 1,700	361 - 472	\+65 - 115%	Buhler 100 t/hr dryer + Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified mill. Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) - compliant millers command 15 - 25% premium over informal mills. Fortifi-cation adds further value. Price are not flat all - year round and do change as season progresses and dried supply tightens
Complete poul-try feed (broiler starter/layer mash, retail)	2,400 - 2,800	667 - 778	\+210 - 260%	ANDRITZ / SKIOLD / Van Aarsen feed pellet mill + conditioner. Value multiply of 3 - 4x over raw maize. This margin differ-ential is the GTTF animal feed investment engine.
Refined soy-bean/sunflower oil (retail, 5L)	~UGX 42,000 - 50,000/5L = 8,400 - 10,000/kg	~2,333 - 2,778/MT oil equiv.	N/A (different product)	Desmet / GEA lecithin and refining up-grade. Oil quality determines HACCP com-pliance for institutional buyers (UN, KFC).
Export (bulk maize, FOB Kampala / CIF Mombasa)	720 - 936 (UGX equiv.)	200 - 260	- 20% vs domestic	Export price below domestic wholesale. Quality - certified grain earns EAC premium (Kenya pays 15 - 30% above FOB). Export ban risk is the key downside.

Sources: A2i KII field data - Mandela Millers (29 July 2026), KAMP Group (15 July 2026), SR Kuku/Wind Green (6 July 2026), WARC Uganda (16 July 2026), Mount Meru Millers (13 July 2026); ITC Trade Map (2024); Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) market price series (2024). All prices are field - validated 2024 - 2025 ranges. Highlighted row (miller intake) represents the documented premium quality threshold at Mandela Millers. Complete feed row (green) represents the highest - value commercial endpoint. (European Commission (DG AGRI), 2023)

THE CRITICAL CONTROL POINT: Why Grain Cleaning and Drying Must Come Before Milling. Every downstream quality outcome in Uganda's grain and feed value chain is determined at the drying and cleaning node - before any milling, formulation, or animal feed processing begins. Arresting moisture and aflatoxin risk at the cooperative and aggregation level matters beyond the formal commercial buyers profiled in this chapter: grain that fails testing at a formal intake point does not simply exit the market. Without an arrest point upstream, the rejected, higher - aflatoxin fraction can be redirected into lower - oversight channels, including informal animal feed and school or institutional meal programmes, where testing is weaker or absent.

This is an added public - health rationale, alongside the commercial one, for GTTF investment in aggregator - and cooperative - level moisture control and testing, rather than relying on quality control only at the largest formal millers' intake gates. Grain that enters a dryer at 19% moisture and tests below 7 ppb aflatoxin at intake can supply a Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - compliant flour mill, produce high - specification oilseed meal, and formulate complete feed meeting De Heus's 10 - 20 ppb standard. Grain that bypasses this node and enters the informal market arrives at mills and feed - mixing sheds at 15 - 18% moisture, with aflatoxin levels that KII field data places at 50 - 100 ppb in the worst cases (DDGS by - products from ethanol operations) - concentrating toxin through every subsequent processing step rather than arresting it.

The investment case for grain processing technology is therefore most powerfully framed not as "building more mills" but as "systematically expanding the proportion of Uganda's grain that passes through commercial drying and cleaning before any downstream transformation."

Current estimates place this proportion at 20 - 25% of the annual harvest. Industrial - scale aflatoxin scrubbing was assessed and ruled out as commercially unviable at Uganda's current processing scale, so the core recommended intervention remains hermetic storage, low - energy drying and aggregator - level buying stations. Where Rapid testing technology of lateral - flow field kits and Danish FOSS Analytical NIR/mycotoxin analysers ,and biological prevention (AflaSafe, National Agricultural Research Organisation (NARO)/IITA, where commercialisation and roll - out rather than the underlying science is the bottleneck) are possible, it will be adopted. Thus this becomes a detection and prevention approach, not a decontamination.

8.2.2 Grain Trade: Export Surge, Quality Crisis, and the Regional Dependency

Uganda's formal maize exports reached a **peak of 630,917 MT in 2023** - a near - fourfold increase from 169,365 MT in 2021 (formal maize export volumes 2019 - 2023 drawn from ITC Trade Map and Bank of Uganda formal trade data). Kenya alone absorbs an estimated 70 - 80% of Uganda's formal maize exports, creating structural vulnerability to Kenyan regulatory decisions and domestic harvest cycles. (ITC, 2024)

The near - fourfold increase between 2021 and 2023 requires explanation beyond a simple good - harvest narrative. Several structural factors converged. First, a strong northern Uganda season in 2022 - 2023 following El Niño recovery increased available marketable surplus. Second, senior grain sector practitioners interviewed for this study point to **WFP grain repositioning** - as pandemic - era humanitarian procurement operations wound down and WFP logistics chains reopened, grain stocks accumulated through local purchase programmes moved into export channels. Third, established export buyers (Kenya, South Sudan) returned to the Ugandan market after COVID - related border disruptions. **Critically, the volume spike did not reflect a structural quality improvement.** Processor KII data gathered for this study indicates that intake rejection rates remained elevated across 2022 - 2023, and new entrants (De Heus, Pro - Industries) compete for the same limited pool of quality,

low - aflatoxin grain. Without coordinated expansion of drying and cleaning infrastructure, Uganda risks a race to the bottom in which export volume growth outpaces quality improvement - creating exactly the aflatoxin - related trade rejection cycle the sector has experienced repeatedly since 2015.

A further structural leakage compounds the export picture: informally exported raw grain and unprocessed soybean sometimes re - enter Uganda later as processed flour, oil or animal feed sourced from Kenyan or regional processors, a “food hemorrhage” in which the value - addition margin on Uganda’s own raw material is captured outside the country. Standards enforcement reinforces this leakage: Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) inspection and certification capacity is concentrated in Kampala, leaving upcountry processors and aggregators — precisely where most grain aggregation and primary processing occurs — with weaker enforcement and inconsistent standards application. Harmonising and extending standards enforcement upcountry, alongside the aggregation and drying investments recommended in this chapter, is a market - structuring precondition for the sector to capture more of its own value addition domestically.

Figure 8.2 - Uganda Formal Maize Exports: Volume & Export Share, 2019 - 2023 | Sources: ITC Trade Map (2024); UBOS Statistical Abstract 2024

Table 8.3 - Formal Maize Exports by Volume and Destination, 2019 - 2023

Commodity	Year	Volume (MT)	Value Share (%)	Primary Destinations	Key Risk
Maize	2019	230,902	2.0%	Kenya, South Sudan	Export ban; aflatoxin rejection
Maize	2021	169,365	1.3%	Kenya, DRC	COVID trade disruption; Fall Armyworm
Maize	2023	630,917	3.2%	Kenya, South Sudan	Volume - quality gap; WFP repositioning effect; concentration risk

Sources: URA Value Chain Trade Analysis (2025); ITC Trade Map (2024); UBOS Statistical Abstract 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Export Performance Reports.

8.2.3 The Animal Feed Market: A Structural Deficit

The commercial animal feed market is among the most compelling investment cases in the GTTF portfolio. Uganda’s livestock sector - encompassing 16.7 million cattle, 47 million poultry, and 4.4 million pigs - requires an estimated 400 - 550 million kilograms of formulated feed annually. Against this, formal domestic production in 2023 reached only **262 million kilograms**, leaving a structural supply gap of 36 - 45%. (ReportLinker, 2024b) (A2i / aBi Development, 2026)

A critical distinction for investment analysis: raw grain ingredients (maize, soybean) trade at approximately US$ 160 - 250/MT at farm gate and US$ 220 - 280/MT at mill intake - these are the raw material input prices. Finished complete poultry feed (broiler starter/finisher, layer mash) retails at approximately US$ 700 - 850/MT - representing a value multiplication of 3 - 4× between raw ingredient and formulated product. This 3 - 4x fbetween raw ingredient and formulated product, after accounting for protein supplements, premixes, pelleting energy, and quality certification. This price gap - documented in enterprise KII data from this study at USD 0.67 - 0.78 (UGX 2,400 - 2,800)/kg for complete commercial feed - is the commercial engine underpinning the

GTTF animal feed investment case. This is a gross farm - gate - to - retail price multiple, not a net margin: it does not net out milling shrinkage, moisture loss, or the full input - cost stack (premixes, additives, pelleting energy, labour, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification), and should be read as a value - addition signal rather than a profitability estimate.

In 2023, EU agri - food exports to Uganda reached US$ 124 million, with animal feed components and forage crops accounting for approximately 47% of that value (~US$ 58 million) - a structural import that could be substantially displaced through GTTF - supported domestic investment. (cross - referenced in the investment conclusion, Section 8.8)

Figure 8.3 - Uganda Animal Feed Market: Demand, Supply & Import Gap, 2019 - 2028 (M kg) | Sources: ReportLinker (2024); EU Agri - Food Trade Factsheet; A2i estimates

Table 8.4 - Animal Feed Market: Demand, Supply & Trade Balance

Indicator	2021 Actual	2023 Actual	2028 Projected	CAGR
Domestic Feed Production (formal, M kg)	210	262	336	3.9%
Estimated Market Demand (M kg)	380	410	550	4.7%
Supply Gap (M kg / % of demand)	170 / 45%	148 / 36%	214 / 39%	-
Imports (EU + Asia, M kg)	45	50	63	3.6%
Exports (to South Sudan / DRC, M kg)	215	220	264	3.0%
EU Feed Component Imports (US$M, est.)	~$41	~$59	~$82+	6.8%

Sources: UBOS National Livestock Census 2021; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; URA HS 2309 trade data (2025); ReportLinker (2024); EU Agri - Food Trade Factsheet (2023); A2i estimates based on livestock census and feed conversion ratios.

Several dynamics in this table warrant closer attention. The **narrowing of the supply gap between 2021 and 2023** - from 45% to 36% of demand - is less a sign of structural improvement than of temporary demand compression: commercial poultry and pig operations contracted during the 2021 - 2022 input cost crisis, reducing effective feed demand below its trend trajectory. The projected gap widens again to 39% by 2028 as livestock populations recover and commercial stocking intensifies.

The **EU import trajectory** - rising from US$ 41 million to a projected US$ 82+ million by 2028 - reflects a domestic feed manufacturing sector growing in volume but not keeping pace with quality. As poultry and dairy operations scale, they require higher - specification premixes, concentrates, and amino acid supplements that Uganda cannot yet produce to the required standard. This is not a market failure resolvable by building more mills. It requires ingredient quality upgrading - precision processing technology, consistent soybean and sunflower meal quality - which is precisely the ANDRITZ, SKIOLD, and Van Aarsen investment case.

8.3 Pillar 3: Ecosystem Mapping & Gap Analysis

8.3.1 Donor Programme Landscape

The grain and animal feed value chain has attracted sustained donor attention over the past decade, yet programmes have consistently succeeded in improving on - farm productivity and aggregation efficiency but have largely stopped short of supporting the industrial - scale processing, quality certification, and green technology

adoption needed to move Uganda from raw commodity exporter to agro - industrial hub.

Table 8.5 - Active Donor Programme Mapping: Grain & Feed Sector

Programme / Donor	Implement-ing Partner	Focus Area	Status	Complementarity / Gap
WFP Purchase for Progress (P4P)	WFP Uganda	Grain aggregation; institutional buyer link-age; quality standards	Active	Focuses on Grade 1 grain supply to WFP. Gap: no post - harvest tech-nology investment; no feed sector linkage.
Royal Danish Embassy and EU	aBi Develop-ment	Working capital grants; aggregator finance; grain storage	Active	Active in storage and aggregation finance. GTTF must confirm precise aBi portfolio before engagement to avoid replication.
EAGC / WRS	East Africa Grains Coun-cil	Warehouse receipt system; aflatoxin management; regional standards	Active	WRS covers 5 - 8% of trade. Gap: lacks technology for grain drying, optical sorting, hermetic storage at scale.
EU / MARKUP Programme	UNIDO, ITC	Agro - processing value addition; SPS compli-ance; export market linkage	Active	Focused on horticulture and cof-fee. Limited grain and feed sector engagement - significant white space for GTTF.
SNV Nether-lands / PROFIT - II	SNV Uganda	Pig and poultry sector development; feed ac-cess for smallholders	Ending 2025	Feed quality and cost addressed partially. Gap: no green technology for feed milling, pelleting, or ingre-dient quality.
Netherlands / RVO (new seed & inputs instrument)	Netherlands Enterprise Agency (RVO / Embassy NL)	~EUR 12M seed and inputs enabling - envi-ronment programme; ~EUR 6M Dutch complementary pro-grammes on market systems and enabling environment	Incoming (2026 - 2030)	Strong complementarity: Dutch seed instrument covers certified seed supply upstream; grain and feed chapter should ensure technology recommendations do not replicate Dutch - funded areas. GTTF should coordinate with RVO on joint opportunities in quality grain supply.

Sources: A2i primary research (2026); aBi Development programme documentation; WFP Uganda; EU MARK-UP programme reports.

8.3.2 Grain Council of Uganda and Sector Associations

The **Grain Council of Uganda (GCU)** - a non - profit membership organisation with over 200 member busi-nesses spanning traders, processors, and cooperatives - serves as the primary collective voice for the grain sector and an important coordination channel for GTTF investment at scale. The following intelligence was gathered in a meeting with GCU leadership on 30 July 2026. (A2i, 2026g)

Key Findings: Grain Council of Uganda (GCU) Consultation, 30 July 2026

Indicator	Detail / Data Point
GCU Member Coverage	200+ member businesses - grain traders, processors, cooperatives; spans all major grain - producing corridors
National Grain Storage Capacity	1.2 million MT warehouse storage registered; approximately 30% utilisation - reflecting working capital gaps and loan turNational Agricultural Research Organisation (NARO)und delays (9 - 18 months), not physical overcapacity
Processing Capacity	9,000 - 10,000 MT per day national processing capacity (combined formal milling sector)
National Production Estimate (GCU)	~7.2 million MT grain annually: ~5.7 million MT maize, ~1.3 million MT beans; domestic consumption estimated at ~3 million MT, leaving a significant exportable surplus
GCU Priority Constraints	(1) Cross - border informality depressing formal market prices; (2) working capital gap - members cannot finance grain purchases through harvest cycle; (3) loan turNational Agricultural Research Organisation (NARO)und of 9 - 18 months too slow for grain market dynamics
Technology Priorities (GCU members)	Mobile dryers (2 - 5 MT batch capacity); wet - grain bins (10 - 15 MT intake); 200 - 300 MT community - level dry stores; destoners and blowers for pre - cleaning; no demand for large - scale silos at cooperative level
Financial Sector Engagement	Pearl Bank (most actively engaged lender for GCU members); Government - backed 0% interest facility available for farmers with 50+ acres; GCU seeking dedicated USD 100 - 150K pilot on - lending facility to extend credit to members for seasonal grain purchases that can done in single pooled facility ceiling across its 200+ member at per member limit
East Africa Grain Council (EAGC) Affiliation	GCU affiliated; EAGC warehouse receipt system linkage in development; GCU conducts aflatoxin - related quality standards training for members
Key Crops	Maize, beans, sorghum, soybean - maize dominant (78% of grain volume)

Source: A2i/GRASP Landscape Study - Grain Council of Uganda (GCU) Meeting Summary, 30 July 2026 (Confidential).

The 30% utilisation rate of registered grain storage is the most analytically significant figure from the GCU consultation. It is a working capital problem, not a physical infrastructure deficit: grain traders cannot finance seasonal purchases at scale when loan approval and disbursement takes 9 - 18 months. **For GTTF, this means working capital structuring alongside any storage or drying plant investment is not optional - it is a design prerequisite.** This finding corroborates the independent observation from WARC's KII, where the programme's own technical advisor estimated a 2:1 ratio of working capital to plant cost as a minimum design parameter for any grain aggregation and drying investment to succeed.

TOP 5 STRUCTURAL BOTTLENECKS	TECHNOLOGY INVESTMENT WHITE SPACE
1. Post - harvest losses (1.2 - 1.5M MT/yr) concentrated in 24 - 72hr post - harvest window 2. Only ~20 - 25% of grain passes through commercial drying; 75 - 80% enters informal channels wet 3. Aflatoxin at 20 - 30 ppb (northern Uganda); at 50 - 100 ppb in DDGS by - products from ethanol plants 4. Soybean/ sunflower meal quality inconsistency (37% crude protein documented vs. 44 - 46% specification) 5. Working capital gap: 9 - 18 month bank loan turNational Agricultural Research Organisation (NARO)und incompatible with grain market dynamics	A. Drying and cleaning at aggregator and cooperative scale (Cimbria / BM Silo) B. Aflatoxin decontamination at intake; WARC Aflasafe pilot scale - up(Lyras A/S reactive UV) C. Milling upgrades to improve oilseed meal extraction quality (ANDRITZ / SKIOLD) D. GCU pilot on - lending facility; working capital co - structuring as GTTF design parameter E. Animal Feeds Bill enforcement; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification pathway support for Tier 2 processors

8.4 Pillar 4: Enterprise Profiling & Technological Matching

8.4.1 The Enterprise Pipeline: Tiered Investment Readiness

The GTTF enterprise pipeline for grain and feeds follows the A2i three - tier framework, with Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification as the primary eligibility threshold. **Tier 1** enterprises hold three or more Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified products and possess the balance sheet strength to absorb commercial co - financing at a 5:1 or revised 10:1 leverage ratio. **Tier 2** enterprises are commercially active with one to two certifications and require targeted GTTF grant de - risking before commercial capital can flow. **Tier 3** actors - principally cooperatives and rural aggregators - represent longer - term pipeline development requiring patient capital and capacity - building. (A2i, 2026f) (Uganda Investment Authority (UIA), 2025)

Table 8.5a - Enterprise Ranking Against GTTF Hard Gates

The following ranking applies the GTTF hard - gate criteria to all enterprises in the Grain and Animal Feed pipeline. Rankings are provisional and indicative pending the central MCDA exercise.

Enterprise	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) SKUs	Profitable without subsidy	EU/DK tech fit	Co - financing balance sheet	Operational readiness	Overall / Tier
SR Kuku / Wind Green	7 SKUs - High	Yes - HACCP; UN/KFC supplier	High (Buhler, ANDRITZ)	Strong (UDB + Aceli + Baroda)	High	TIER 1 - PRIORITY

KAMP Group Ltd	5 SKUs - High	Yes - Danish equity; operating	Very High (Skiold, Cimbria installed)	Good (Danish equity base)	High	TIER 1 - PRIORITY (most naturally aligned)
Mukwano Industries Ltd	3 SKUs - High	Yes - major vertically integrated player	High (Cimbria engaged; Desmet lineage)	Strong (listed entity)	High	TIER 1 - PRIORITY
Mount Meru Millers (U) Ltd	5 SKUs - High	Yes - revenue $35M - $100M	High (Desmet existing; EU - origin)	Good (growth financed; Dubai parent)	Medium - High	TIER 1 - PRIORITY
Mandela Millers Ltd	2 SKUs (feed plant launching)	Yes - established commercial miller	Very High (Buhler dryer installed)	Good (established turnover)	High	TIER 1 - advancing to full Tier 1
Ugachick Poultry Breeders Ltd	Integrated poultry; feed certification pending	Yes - 8 - 9M DOC/yr; 60% tariff protection	Medium - High (Buhler target engagement)	Strong (UDB primary lender)	High	TIER 1 - commercial case strong; certification pathway needed
WARC Uganda	Social enterprise; no Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) cert (aggregator)	Near - breakeven; De Heus off - take guarantee	High (BM Silo 40 - 50 t/day)	Moderate (grant - dependent)	High	TIER 2 - strongest case; De Heus guarantee removes demand risk
Jeroma Farmers Collection Centre	No Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) cert (pre - certification)	Developing; financing history (UDB, UNCDF, World Bank)	High (BM Silo; dryer primary ask)	Low - Moderate; grant - dependent; Centenary Bank developing	Medium	TIER 3 - confirmed; Lira hub concept fundable

Equator Seeds Ltd	No Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) cert; Phase 1 under construction	Pre - revenue on processing	Medium (Cimbria equipment sourced)	Early stage	Low	MONITOR - Phase 2 pipeline; not current GTTF investment

Hard gates: (1) Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product certification; (2) Commercially viable / profitable without subsidy; (3) EU or Danish technology fit; (4) Co - financing balance sheet strength; (5) Operational readiness to absorb and deploy technology. Source: A2i GTTF enterprise assessment, August 2026; Day One Validation session, 10 August 2026.

Table 8.6 - Tier 1 Enterprises: Immediate Investment Targets

Enterprise	Location	Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) SKUs / Capacity	Technology Investment Opportunity	Danish/EU Technology Match
SR KUKU / WIND GREEN (merged)	Luwero / Kampala	7 SKUs; 20 t/hr mash + 7 t/hr pellet + 10 t/hr pellet (Buhler, installing)	Soybean oil lecithin extraction; nitrogen - capture for organic fertiliser; abattoir by - product rendering; solar expansion	Bigadan A/S (biogas); Elanco DK (abattoir); ANDRITZ (feed pelleting)
KAMP GROUP LIMITED	Anaka, Nwoya (mill)	5 SKUs; Skiold + Cimbria Danish tech	Cimbria silo expansion (+3,000 MT); aquafeed extrusion line; ANDRITZ pellet conditioning deepening	Cimbria A/S (drying/ sorting/silos); ANDRITZ (pelleting + aquafeed)
MUKWANO INDUSTRIES LTD	Industrial Area, Kampala	3 SKUs; 400 - 560 t/day oilseed	Cimbria biomass steam drying at Lira; lecithin extraction (~6 t/day, ~US$ 1M); solar at Lira + Kampala	Bigadan A/S (biogas); Cimbria (biomass dryer); Buhler / Desmet lineage (lecithin)
MOUNT MERU MILLERS (U) LTD	Lira, N. Uganda	5 SKUs; 200 t/day (1,000 t planned)	Planned 1,000 - tonne Lira plant renewal; EU equipment cost - gap closure vs. Chinese/Indian quotes; silo + infrastructure	Desmet (EU - origin, existing relationship); ANDRITZ (pre - processing)

MANDELA MILLERS LTD	Kampala	2 SKUs + feed plant (launch-ing)	Cimbria aflatoxin manage-ment; feed plant launch (poultry, fish, cattle); soy-bean pressing refining upgrade	Cimbria A/S (cleaning + drying); BM Silo (recircu-lating batch dryers for cooperatives)
UGACHICK POULTRY BREEDERS LTD	Kampala (multi - site)	Integrated poultry; 8 - 9M DOC/yr	Consumer - market devel-opment; cold - chain logis-tics; B2C demand activation - B2B fully committed; UDB primary long - term lender	UDB long - tenor UGX facility; 60% import tariff creates protected growth environment; per - capi-ta consumption runway 1.3 8 - 9 kg by 2040 (scenario projection)

Source: A2i GTTF Stakeholder & Enterprise Mapping (2026); Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certification Register (2025); A2i KII field survey July - August 2026. Note: Enterprises shown are those where KII field visits were completed. (Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS), 2019 - 2025)

Table 8.7 - Tier 2 Enterprises: Grant - Dependent De - Risking Targets

Enterprise	**Location**	**Uganda National Bu-reau of Stan-dardsUgan-da National Bureau of Standards (UNBS) SKUs / Seg-ment**	**Technology Investment Opportunity**	**Rationale for Grant De - Risking**
WARC Uganda	Kiryandongo / Kiboga / Anaka	Social enter-prise; aggre-gator	Own cleaning and drying facility (40 - 50 t/day Dan-ish dryer); working capital structuring; Aflasafe pilot scale - up	4,500+ farmer base; De Heus off - take guarantee; clear GTTF cooperative - scale technology fit

Source: A2i GTTF Stakeholder & Enterprise Mapping (2026); A2i KII field survey (2026). Note: Enterprises shown are those where KII field visits were completed.

Tier 3 Enterprises and Cooperatives: Long - Term Pipeline Development

Tier 3 actors - principally cooperatives, farmer collection centres, and rural aggregators - represent the up-stream infrastructure that determines the quality and volume of grain entering the commercial value chain. Field intelligence from this study identifies three Tier 3 entities relevant to the GTTF grain and feed pipeline:

Entity	Location	Current Status	Relevance and Next Steps
Jeroma Farmers Collection Centre Ltd	Pader / Lira Industrial Area	Cluster/cooperative union aggregation model across 11 districts (6 Lango, 4 Acholi, 1 Karamoja); 10,000+ farmers; 32 staff; 3 operating streams (Cluster, FGE, Commercial farming). MD the Managing Director (ex - Mukwano). Maize primary crop; soybean in rotation. Off - takers: Zara Foods (Kiryandongo, primary maize), Mukwano (soybean), Afro/AfroKai (Nakasongola), South Sudan and DRC. 60 - 70% women farmers; VSLA integration. KII conducted 5 August 2026.	Dryer (top priority), cleaner, silo and upgraded mill - named in that order by MD. Current: 1 warehouse (100+ MT), Ugandan - fabricated hammer mill (10 MT/day maize, 5 MT/day rice), small chicken feed line. 10 - acre plot in Lira Industrial Park earmarked for central processing hub. Concept paper projects 20 MT/day agro - processing plant with USD 6.1 million (UGX 22bn) procurement working - capital requirement. Financing history: UDB, UNCDF, World Bank, EU BEST Award, NSSF - linked grant (>USD 41.6K (UGX 149.6M)). Centenary Bank relationship developing.
WARC Uganda (cooperative - scale aggregation)	Kiryandongo, Kiboga, Anaka	~4,500 registered farmers; 3,000 MT this season; De Heus off - take guarantee; toll - drying via Amagara facility	Own cleaning and drying facility (primary GTTF ask); working capital structuring (2:1 WC - to - plant ratio); see Tier 2 profile above

KII conducted: Jeroma Farmers Collection Centre Ltd, Pader, 5 August 2026. Source: A2i GRASP/GTTF Landscape Study - Enterprise KII, August 2026 (Confidential).

8.4.2 Danish and EU Technology Matching

The grain and feed sector has unusually strong alignment with Danish agri - technology competencies - particularly in grain handling, feed milling, and biogas from agri - processing residues.

Table 8.8 - Danish & EU Technology Provider Matrix: Grain & Feed Sector

Provider	Country	Technology Area	Uganda Application	Target Enterprises	Deal Reference
Cimbria A/S (AGCO)	DK	Grain drying, optical sorting, silo storage, CycloForce low - energy fans	Aflatoxin management at mill intake; silo automation; cooperative - scale batch dryers (40 - 50 t/day)	KAMP Group; Mandela Millers; WARC (own facility)	Deal 1: Grain Intake & Storage

BM Silo ApS	DK	Recirculating batch dryers; cooperative - scale grain storage; mobile dryer units	Cooperative and aggregator - scale drying (2 - 5 MT mobile; 40 - 50 t/day stationary); GCU member technology priority	WARC; Jeroma Farmers Collection Centre; GCU member network	Deal 1: Cooperative Drying
Lyras A/S	DK	Reactive UV mycotoxin surface decontamination	Aflatoxin decontamination at grain intake - addressing 20 - 30 ppb baseline in northern Uganda maize	KAMP Group; Mandela Millers; WARC	Deal 2: Aflatoxin Management at intake
SKIOLD A/S	DK	Feed milling - disc mills, hammer mills, mixers, dosing automation	Feed mill upgrade and deepening (KAMP Group already deploys Skiold - most natural GTTF deepening candidate); precision milling for pig and poultry feed at SR Kuku/Wind Green	SR Kuku/Wind Green; KAMP Group	Deal 3: Feed Mill Upgrade
Van Aarsen Int'l B.V.	NL	Complete feed mill solutions - hammer mills, pellet mills, conditioners, liquid dosing	Pellet mill upgrade at SR Kuku; hammer mill replacement at Tier 2	SR Kuku/Wind Green; Mandela Millers (feed plant)	Deal 3: Feed Mill Equipment
ANDRITZ Feed & Biofuel A/S	DK/AT	Pelleting, extrusion, conditioning, aquafeed lines, automated process control	Complete feed pelleting and conditioning at Mandela Millers feed plant; aquafeed extrusion line at KAMP Group (Nwoya); automated process control upgrade	KAMP Group; Mandela Millers feed plant	Deal 3 + Deal 5: Feed Mill & Aquafeed
Bigadan A/S (PlanEnergi)	DK	Biogas from organic waste; anaerobic digestion	Biogas from oilseed crushing residue; poultry litter biogas at SR Kuku to power feed milling	Mukwano; Mount Meru Millers; SR Kuku	Deal 6: Biogas / Green Energy
Desmet (Italian/EU lineage)	EU	Large - scale oilseed extraction; solvent extraction; refinery lines	Mount Meru's existing Lira plant (Desmet - installed, ~15 years old); planned 1,000 - tonne renewal	Mount Meru Millers (primary)	Deal 7: Oilseed Plant Renewal

Buhler Group (East Africa, Nairobi)	CH/EU	Complete feed mill solutions - intake, cleaning, grinding, mixing, pelleting, conditioning; brownfield process audits; concept - to - commissioning full - service model; free pre - sale raw material landscaping and formulation consultation	Complete feed plant design and equipment for poultry, cattle, pig and fish feed; brownfield process optimization at existing mills; quality guarantee - Buhler will decline a sale where the enterprise process does not meet minimum standards	Mandela Millers (100 t/hr dryer installed; animal feed line in progress); SR Kuku/Wind Green (10 t/hr Buhler pellet line installing); Ugachick (target engagement, not yet concluded)	Deal 3: Feed Mill Equipment + Brownfield Process Audit financing
FOSS Analytical A/S	DK	Rapid NIR and mycotoxin analysis (aflatoxin, moisture, crude protein) at intake	Detection layer at aggregator, miller and feed - mill intake, alongside drying/storage — not a substitute for it	KAMP Group; Mandela Millers; Jeroma Farmers Collection Centre; GCU member network	Deal 2 (extended): Aflatoxin Detection & Quality Verification
AflaSafe (National Agricultural Research Organisation (NARO)/ IITA biocontrol)	UG / regional (National Agricultural Research Organisation (NARO) - IITA; non - Danish)	Biological pre - harvest aflatoxin prevention	Pre - harvest application at farm level; prevention layer complementing drying and storage, not a post - harvest cure	WARC (pilot underway); scale - up candidate across GCU member farmer base	Prevention layer — commercialisation/ roll - out financing rather than a Danish/EU equipment deal

Note: Cimbria A/S already has an active Uganda partnership (Agroways, Jinja). KAMP Group already deploys Skiold and Cimbria - the most natural candidate for GTTF deepening.

8.4.3 Pricing along the Value Chain

Built across the grain supply chain runs through six principal nodes 1)farm gate, 2)on - farm storage, 3)primary aggregator, 4)commercial dryer/cleaner, 5)miller, and 6)end - buyer, pricing can be illustrated along the primary, secondary and high value final products in value chain illustration ladder below:

Figure 8.4 - Grain Value Addition Ladder: Indicative Price Index Along the Value Chain | Sources: A2i field data; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) market prices; WFP commodity data

Reading the Grain Value Addition Ladder

Figure 8.4 maps cumulative value captured at each stage of the grain value chain, expressed as an index relative to the farm - gate price. Value does not accumulate uniformly - it concentrates at specific transformation nodes, and the spread between nodes reveals where the highest - margin interventions lie. The margin differ-

ential at each node should be read against a consistent time period (2015 - 2025 farm - gate price data, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) market series).

At the **farm - gate** (index = 100), the producer captures the base value of raw grain - typically USD 0.19 - 0.26 (UGX 700 - 950)/kg for maize. After drying and cleaning (where it exists), price rises to 115 - 125% of farm - gate, reflecting moisture reduction and quality improvement. The cost of drying (USD 0.008 - 0.014 (UGX 30 - 50)/kg variable cost for low - energy dryers) generates a price premium of USD 0.022 - 0.042 (UGX 80 - 150)/kg at offtake - one of the highest - ROI interventions in the chain.

The **milling transformation step** generates the largest single value increment (typically 160 - 200% of farm - gate for certified, aflatoxin - compliant maize meal). Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - compliant millers command 15 - 25% premium over informal mills. (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS), 2021)

The **animal feed formulation step** generates the highest absolute value index (220 - 280% of raw grain farm - gate for complete feed) - but only when the finished feed meets commercial nutritional specifications. **Complete layer mash or broiler starter retailing at USD 0.67 - 0.78 (UGX 2,400 - 2,800)/kg** represents approximately three times the value of the raw maize entering the mill. This is the commercial engine driving the GTTF animal feed investment case.

The flat segment at the **export stage** is a structural warning. Uganda's grain exports earn at bulk commodity prices (US$ 200 - 260/MT for maize) rather than at processed prices. Value addition that could be captured domestically - through milling, fortification, or feed processing - is instead exported as an opportunity to Kenya, South Sudan, and DRC processors who capture the transformation margin themselves.

8.4.4 Field Intelligence: Enterprise KII Findings, July - August 2026

Between 2 July and 5 August 2026, the A2i assessment team conducted Key Informant Interviews with nine enterprises across Uganda's grain and animal feed value chain, including a visit to Jeroma Farmers Collection Centre in Pader (5 August 2026) and Equator Seeds Ltd in Gulu (4 August 2026). The findings below are drawn directly from recorded field visit notes and represent primary evidence informing the GTTF investment analysis.

Table 8.9a - KII Field Intelligence Summary: Enterprise Profiles, 2026

Enterprise (Date)	Scale / Capacity	Key Field Intelligence	Aflatoxin / Quality Data	Business Opportunity
Mukwano Industries (2 Jul)	400 - 560 t/day oilseed; 130 - 140K farmer database; 85 distributors	Concentrate model targets home - mixers via distributor network. Lecithin extraction opportunity: ~6 t/day from refining gums at ~US$ 1M plant cost. Cimbria biomass steam drying in discussion for Lira. Aflatoxin blocks Kenya sunflower meal market.	EAC aflatoxin limit for sunflower meal: Mukwano cannot currently export to Kenya. Soya meal fares better but inconsistent.	Agency model with 85 distributors - concentrate strategy targets informal home - mixers as distribution channel. Lecithin extraction opportunity (~6 t/day, ~US$1M plant) creates two separable investment cases. 130 - 140K farmer database underpins outgrower commercial model.

SR Kuku / Wind Green (6 Jul)	20 t/hr mash + 7 t/hr pellet + 10 t/hr Buhler (installing); 2M+ layers; abattoir 16K birds/day	Recently merged (SR 50% stake in Wind Green). Financing: UDB + Aceli Capital + Bank of Baroda ACF + Absa ACF. HACCP certified; supplies UN, KFC. Lecithin from refining gums currently sold at USD 0.0003 - 0.0006 (UGX 1 - 2)/kg - unmonetised.	Northern Uganda maize: ~20 - 30 ppb aflatoxin. Buying threshold: below 15% moisture. Tanzanian maize reported at ~100 ppb - avoided.	Integrated poultry - feed circular model - 2M+ layers; HACCP certified; organic fertiliser (chicken manure, NPK upgrade); lecithin opportunity from refining gums (third KII to identify this independently); abattoir by - product rendering (10 t/day). Multiple co - financing partners already in place.
Mount Meru Millers (13 Jul)	50,000 t soya/yr sourced; 200 t/day plant (Desmet, 2010 - 11); 1,000 t plant planned (~US$ 25M over 2 yrs)	Raw material constraint is the primary growth barrier - not capacity or demand. Revenue grew $35M $100M in 3 yrs, then flat 2 yrs on crop supply. EU equipment competitive only with GTTF grant closing the gap vs. Chinese/Indian.	Ugandan soybean farmgate: ~$620/tonne (highest in Africa). 5,000 - 6,000 farmer/trader accounts.	Import substitution model - US$25M planned Lira investment with Desmet (EU - origin) equipment; 5,000 - 6,000 farmer accounts; EU equipment cost - gap vs. Chinese/Indian quotes is the GTTF matching - grant entry point; raw soybean export restriction advocacy aligned with Mukwano.
KAMP Group (15 Jul)	10 t/hr automated line (2023, Skiold + Cimbria); 4,000 MT silo; 6,000 farmers via 120 stockists	Danish - owned (Tom). 3 distribution corridors. Deliberately excludes sunflower cake for broilers (fibre digestibility). Soya cake rejected from main supplier: 37% crude protein vs. 44 - 46% standard.	Post - harvest moisture management: buys immediately at harvest at ~USD 0.26 (UGX 950)/kg against peak USD 0.36 (UGX 1,300)/kg; dries on - site. Aflatoxin B1 main regulatory compliance risk.	Wide - area distribution model - 6,000 farmers via 120 stockists across 3 corridors (Lira, Gulu, Masindi). Danish equity + existing Skiold/Cimbria relationship = most naturally aligned GTTF candidate. Priority investments: silo expansion (+3,000 MT) and aquafeed extrusion line.

WARC Uganda (16 Jul)	4,500 registered farmers; 3,000 MT this season; target 15,000 MT next season; toll - dries at Amagara	Social enterprise; De Heus off - take guarantee (100K - 120K MT/yr need). Hub - and - spoke model: mobile threshing digital farmer app instant mobile money payment. Aflasafe pilot underway.	De Heus aflatoxin standard: 10 - 20 ppb; fish feed below 5 - 10 ppb. WARC pricing differential being developed to reward dryness - currently blended pricing creating quality disincentive.	Hub - and - spoke aggregation with guaranteed off - take - 4,500 farmers; De Heus off - take guarantee (10 - 20 ppb aflatoxin standard); instant mobile money payment; 3,000 MT this season 15,000 MT target next season. Working capital (2:1 WC - to - plant ratio) must be co - designed as part of the drying facility grant.
Ugachick Poultry Breeders (21 Jul)	8 - 9M day - old chicks/yr (broiler:layer ~7:1); B2B fully maxed; B2C at 40% capacity	Primary UDB lender (10 - 12% UGX; avoids USD debt). 60% import tariff on chicken: existential protection. Per - capita consumption: 1.3 kg/yr now 8 - 9 kg by 2040 (scenario projection). No grain dryer (rarely needed).	Own in - house testing lab; rejects non - compliant grain at intake. Sources maize from Lira, Kasese, Busoga.	Protected growth model - 8 - 9M DOC/yr underpinned by 60% import tariff; UDB primary lender (10 - 12% UGX, avoids USD exposure); per - capita consumption runway 1.3 kg 8 - 9 kg by 2040 (scenario projection) implies 5 - 7× feed demand growth. B2C demand development and cold - chain logistics are the priority investment angles.
Mandela Millers (29 Jul)	144 MT/day milling; ~100,000 t grain throughput/yr (milled + traded combined); Buhler 100 t/hr dryer	Validated moisture - loss formula (1.15× multiplier). 2018: 70% rejection rate; 2024: 20 - 30% rejection. Pays USD 0.25 (UGX 900)/kg vs. USD 0.22 (UGX 800)/kg market for grain below 7 ppb at intake. Not buying from cooperatives (quality consistency issues). Feed plant launching (poultry, fish, cattle - not pigs).	Aflatoxin protocol: tests at intake as critical control point; accepts up to 19% moisture and dries centrally. DDGS from ethanol plants: 50 - 100 ppb aflatoxin risk entering feed chain.	Premium quality model - pays USD 0.25 (UGX 900)/kg vs. USD 0.22 (UGX 800)/kg market for sub - 7ppb grain; accepts up to 19% moisture and dries centrally; cash within 30 minutes of delivery; Buhler 100 t/hr dryer. Feed plant launching (poultry, fish, cattle). Off - taker model for cooperative drying grants (Mandela as off - take guarantee partner).

Jeroma Farmers Collection Centre Ltd (Pader / Lira Industrial Area; KII: 5 Aug 2026)	~8,000 - 13,000 MT/yr maize aggregate; 10,000+ farmers across 11 districts; 5:2 maize:soybean crop mix; 32 staff	Cluster/cooperative union aggregation model (11 districts: 6 Lango, 4 Acholi, 1 Karamoja). Off - takers: Zara Foods - Kiryandongo (primary maize buyer), Mukwano (soybean), Afro/AfroKai - Nakasongola, South Sudan (Zuma), DRC/Congo. Seed supply partnership with Equator Seeds via AFAP MOU (>USD 2.8K (UGX 10M)). MD: the Managing Director (ex - Mukwano). 60 - 70% women farmers; VSLA savings integration; GPS - digitised farmer database. Moisture threshold: 13.5%; no aflatoxin rejections to date. 10 - acre Lira Industrial Park plot earmarked for central processing hub.	Only sun - drying available - open tarpaulin at farm level. Moisture management described as "a big problem" by MD. Mandela Millers buying threshold: 13.5% moisture. De Heus aflatoxin standard (10 - 20 ppb) is the target bar for formal feed - market supply. Superpro moisture meter in use; no on - site aflatoxin testing facility.	Northern Uganda cluster aggregation model: centralised dryer/cleaner/silo at Lira Industrial Park hub unlocks quality maize supply from 10,000+ farmers across 11 districts. MD priority investment sequence: dryer cleaner silo upgraded mill. Concept paper projects 20 MT/day agro - processing plant (USD 6.1 million (UGX 22bn) working - capital requirement, separate from equipment). Financing history: UDB, UNCDF, World Bank Work Readiness, EU BEST Award, NSSF - linked grant (>USD 41.6K (UGX 149.6M)). Centenary Bank relationship developing. Equator Seeds seed partnership (AFAP MOU) provides embedded input supply linkage.

Sources: A2i GRASP/GTTF Landscape Study KII Field Visit Reports, July - August 2026 (Confidential). Jeroma Farmers Collection Centre KII conducted 5 August 2026, Pader; Equator Seeds Ltd KII conducted 4 August 2026, Gulu.

Equator Seeds Ltd (Gulu): Equator Seeds is noted here in the context of seed input supply to the grain sub - sector. The enterprise does not currently hold Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified products; its Phase 1 processing facility was under construction at the time of the KII (4 August 2026). Equipment sourced from Cimbria (Danish origin). Equator Seeds is not part of the current GTTF investment pipeline but is a relevant seed input actor in the northern corridor - it holds an AFAP MOU with Jeroma Farmers for supply of certified maize and soybean seed to Jeroma's farmer network. Its certification trajectory and equipment commissioning timeline should be monitored for a potential Phase 2 pipeline entry.

Technology Partner Intelligence: Buhler Group East Africa (KII, 7 August 2026)

On 7 August 2026, A2i conducted structured conversations with two Buhler Group representatives: a Buhler engineer specialising in brownfield and process optimisation, and Buhler's Regional Animal Nutrition Solutions Manager for Eastern Africa (based in Nairobi, covering 11 countries). The conversations produced substantive intelligence on technology selection, the commercial case for European equipment over cheaper Asian alternatives, and Buhler's specific Uganda pipeline.

BUHLER GROUP: KEY KII INTELLIGENCE Buhler is already active in Uganda at Mandela Millers (100 t/hr dryer installed) and is installing a 10 t/hr pellet line at SR Kuku / Wind Green. It is now engaged with Mandela Millers on a new complete animal feed line (poultry, fish, cattle).

Process layout and equipment sizing: Buhler's engineering argues that a single purpose - designed line (10 t/hr) outperforms two 5 t/hr lines on every metric - efficiency, consistency, spare parts inventory, maintenance skills, and HACCP certification viability. The moment equipment is mixed across multiple OEM suppliers, quality inconsistency, blame games and inflated spare - parts costs erode any CapEx saving. **Brownfield process audit:** Before any brownfield (improvement of an existing plant) investment, Buhler's engineer recommends commissioning a process audit by a neutral third - party process consultant - not the equipment manufacturer - to produce an unbiased assessment of what is actually needed before any equipment is specified.

This audit is the pre - condition for right - sizing. Separately, Buhler's Regional Animal Nutrition Solutions Manager noted that Buhler can conduct a preliminary process review as part of its own business development - this is a commercial service and is not the same as the independent neutral audit Buhler's engineer recommends as best practice. GTTF design opportunity: the fund could finance independent brownfield process audits as a pre - investment step, removing technology mismatch risk before grant disbursement. **Buhler's quality guarantee:** "If your process goes below our minimum standard, we will rather tell you we are not selling." Buhler declines sales where the enterprise's process design does not meet minimum specifications - a quality assurance commitment that distinguishes it from lower - cost suppliers and directly supports GTTF due diligence.

Full - service model at no additional cost: Buhler's pre - sale consultation covers raw material landscaping, multi - species feed formulation, equipment selection, process flow design, ROI calculations, and market signal analysis - all provided free as part of business development where there is a potential equipment sale. This is widely unknown among Ugandan processors, who assume consultation is an additional cost. **Animal feed market pyramid and GTTF targeting:** Buhler describes the East Africa animal feed market as a pyramid: smallholder farmers with locally fabricated equipment at the bottom; ingredient traders with small grinding/mixing lines in the middle; industrial mega - plant operators (Kenchic - scale) at the top. The GTTF target zone is the middle tier - enterprises with commercial operations, balance sheets capable of absorbing EU technology investment, and the growth trajectory to scale. This maps directly to A2i's Tier 1 and Tier 2 framework.**GDP inflection point and Uganda's feed market timing:** Buhler's Regional Animal Nutrition Solutions Manager notes a global correlation between GDP per capita and feed industry growth: "Kenya achieved this GDP level 8 years ago - you can see the feed milling industry growing fast." Uganda is approaching this same inflection point, making the current period the optimal window for GTTF technology investment before the market reaches the rapid - growth phase where technology competition intensifies.**Ugachick engagement status:** Buhler has not yet concluded a formal engagement with Ugachick Poultry Breeders. Access through A2i and GTTF relationships - noted in the KII as a specific opportunity - could facilitate a brownfield assessment conversation that neither Buhler nor GTTF has yet been able to arrange independently.

Source: A2i GRASP/GTTF Landscape Study - Buhler Group East Africa KII Transcript, 7 August 2026 (Confidential; names on file in master Annex F).

8.4.4 Individual Enterprise Profiles: Field - Validated KII Findings

The following profiles present the five highest - priority enterprises for GTTF grain and feed investment in the format validated across all GRASP / GTTF landscape chapters. Each enterprise is presented in two tables: a factual profile drawn from field KII data, and an investment and technology opportunities matrix mapping each business challenge to a specific GTTF - relevant intervention. **Field validation status:** SR Kuku / Wind Green (KII: 6 July 2026), KAMP Group (KII: 15 July 2026), Mandela Millers (KII: 29 July 2026), WARC Uganda (KII: 16 July 2026), Jeroma Farmers Collection Centre Ltd (KII: 5 August 2026). All in - person or virtual engagements conducted by A2i assessment team.

Table 8.6a - SR Kuku / Wind Green International (merged entity): Enterprise Profile

Field	Details
Engagement basis	Field KII completed 6 July 2026, virtual, with SR Kuku / Wind Green management. Merged entity (SR Kuku holds 50% stake in Wind Green International).
Location	Luwero (feed mill and poultry farm); Kampala (headquarters and cold chain operations).
Core business	Vertically integrated animal feed production and commercial egg/broiler production. SR Kuku (eggs: 2M+ layer birds) and Wind Green (feed: 20 t/hr mash + 7 t/hr pellet line) recently merged as a circular model - feed plant supplies the layer operation, manure returns as organic fertiliser, abattoir waste is a candidate for biogas and rendering.
Capacity / scale	20 t/hr mash + 7 t/hr existing pellet lines; Buhler 10 t/hr pellet line being installed (August 2026). Abattoir: 16,000 birds/day. Layer flock: 2M+ birds. 7 Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified SKUs.
Key constraint	Aflatoxin contamination in northern Uganda maize supply (field data: 20 - 30 ppb; Tanzanian maize rejected at ~100 ppb). Buying threshold: below 15% moisture. Unmonetised by - product streams: lecithin from refining gums sold at USD 0.0003 - 0.0006 (UGX 1 - 2)/kg against a global soya lecithin market value of US$ 2,000 - 4,000/MT.
Current technology	HACCP certified. Buhler feed pelleting (installing). Organic fertiliser operation (chicken manure, NPK upgrade). Integrated poultry - to - feed circular model. UN agency and KFC supplier (HACCP prerequisite).
Off - take / export	Uganda domestic primary market; eggs and processed chicken for institutional (UN) and QSR (KFC) markets. HACCP certification enables premium buyer access. SR Kuku eggs exported to eastern DRC (~10% of output).
Financial structure	Co - financed by UDB, Aceli Capital, Bank of Baroda ACF, Absa ACF. Profitable without subsidy. Strong co - financing track record makes 5:1 leverage achievable.

Source: A2i GRASP/GTTF Landscape Study - SR Kuku / Wind Green KII, 6 July 2026 (Confidential).

Table 8.6b - SR Kuku / Wind Green: Investment and Technology Opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity

Unmonetised lecithin by - product from soybean refining gums - currently sold at USD 0.0003 - 0.0006 (UGX 1 - 2)/kg against global value of US$ 2,000 - 4,000/MT.	Lecithin extraction plant from refining gums (~6 t/day capacity). Creates separable, high - value ingredient revenue stream and improves overall refining economics.	Centrifuge and decanter separation; degumming + drying line. Plant cost ~US$ 800K - 1.2M.	GEA Group (DE/DK); Desmet Ballestra (EU). KAMP Group independently identified same opportunity.	High. Three KII enterprises independently identified lecithin as highest - value unmonetised stream. Commercial case without GTTF grant is marginal at current scale; grant closes the cost gap.
Poultry litter and abattoir effluent not fully utilised as an energy input.	Biogas plant from poultry litter and abattoir organic waste. Targets energy self - sufficiency for feed milling operation (significant diesel cost reduction).	Anaerobic digestion system designed for poultry/abattoir waste streams. 200 - 500 m3/day biogas potential.	Bigadan A/S (DK). Multiple Uganda biogas reference sites. Proven technology at poultry scale.	High. Bigadan has Uganda reference sites. SR Kuku/Wind Green scale (16,000 birds/day abattoir + 2M layers) is sufficient for commercially viable anaerobic digestion.
Aflatoxin risk in northern Uganda maize at intake (20 - 30 ppb; threshold 15ppb).	UV surface decontamination at grain intake to assure HACCP compliance and protect downstream feed quality.	Reactive UV mycotoxin decontamination unit (continuous flow, commercial scale).	Lyras A/S (DK). WARC pilot confirmed decontamination performance. Technology validated at commercial intake flow rates.	High. SR Kuku already tests at intake. Lyras unit is an add - on to existing intake workflow. Low capital cost relative to quality assurance benefit.

Investment maturity rating: High = pre - feasibility complete; investment opportunity confirmed in KII. Source: A2i GRASP/GTTF KII data, July 2026.

Table 8.6c - KAMP Group Limited: Enterprise Profile

Field	Details
Engagement basis	Field KII completed 15 July 2026, Kampala head office, with company management (Danish owner, Tom).
Location	Head office: Kampala. Feed mill: Anaka, Nwoya District (northern Uganda, 4 km from Gulu - Murchison Highway).
Core business	Compound and complete animal feed manufacturing for poultry, cattle, and aquaculture. Wide - area distribution via 120+ stockists across three northern Uganda corridors (Lira, Gulu, Masindi). 5 Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified SKUs.
Capacity / scale	10 t/hr automated feed mill (commissioned 2023); Skiold disc mills and mixers; Cimbria grain handling and drying. 4,000 MT silo. 6,000 farmers in supply chain via 120 stockists. Danish - owned and operated.

Key constraint	Soybean meal quality inconsistency from primary supplier (37% crude protein vs. 44 - 46% commercial standard - deliberate exclusion of sunflower cake from broiler feed due to fibre digestibility concerns). Silo capacity limits seasonal procurement volume.
Current technology	Skiold A/S disc mills and mixers (Danish). Cimbria grain handling and drying system (Danish). 10 t/hr automated line - most advanced operational Danish equipment setup in Uganda. Post - harvest moisture management as competitive moat: buys at harvest (USD 0.26 (UGX 950)/kg) vs. peak (USD 0.36 (UGX 1,300)/kg) and dries on - site.
Off - take / customers	6,000+ farmers via 120 stockists across Lira, Gulu, and Masindi corridors. Deliberately structured three - corridor distribution model to avoid over - reliance on a single route.
Financial structure	Danish equity (profitable without subsidy). Confirmed willingness to absorb commercial co - financing at 5:1+ leverage. Most naturally aligned GTTF candidate by existing relationship and equipment heritage.

Source: A2i GRASP/GTTF Landscape Study - KAMP Group KII, 15 July 2026 (Confidential).

Table 8.6d - KAMP Group Limited: Investment and Technology Opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/EU providers	Investment maturity
Silo capacity (4,000 MT) limits seasonal procurement - cannot fully exploit dry - season price differential (USD 0.26 (UGX 950)/kg harvest vs. USD 0.36 (UGX 1,300)/kg peak).	Silo expansion (+3,000 MT minimum) to enable full - season grain procurement at harvest - time prices, reducing raw material cost per tonne of feed produced.	Cimbria silo systems + aeration + temperature monitoring. Bolt - on extension to existing Cimbria infrastructure.	Cimbria A/S (DK). Existing Cimbria relationship and service contract. Extension of installed system.	Very high. Cimbria already installed and serviced. Investment is a direct extension of existing equipment - lowest technology risk of all GTTF grain deals.
No aquafeed product range - missed market for catfish and tilapia feed as aquaculture grows in northern Uganda and DRC.	Aquafeed extrusion line (floating pellet for tilapia, catfish) targeting northern Uganda fish farms and eastern DRC market.	Wet extruder + conditioner + dryer. Line cost ~US$ 350K - 600K for 1 - 2 t/hr.	ANDRITZ Feed & Biofuel A/S (DK/AT). Van Aarsen (NL). ANDRITZ has East Africa reference sites.	High. KII confirmed as MD priority #2 after silo expansion. De Heus fish - feed off - take (sub 5 - 10 ppb aflatoxin) creates demand certainty.
Soybean meal quality from primary supplier below specification (37% vs. 44 - 46% crude protein standard).	Precision NIR (near - infrared) testing at intake + supplier quality protocol enforcement; or development of own oilseed crushing line.	NIR grain analyser (rapid crude protein + moisture + aflatoxin). Intake quality protocol redesign.	FOSS Analytical A/S (DK) - NIR and rapid quality analysis leader in agri - food. SDIX Envirologix (US/EU).	High. Low - capital entry (NIR unit ~US$ 30 - 50K) that immediately improves formulation accuracy and supplier accountability.

Source: A2i GRASP/GTTF KII data, July 2026. KAMP Group is identified as the most naturally aligned GTTF candidate: Danish equity, existing Skiold/Cimbria technology, confirmed willingness to absorb commercial co - financing, and widest distribution reach in the northern corridor.

Table 8.6e - Mandela Millers Limited: Enterprise Profile

Field	Details
Engagement basis	Field KII completed 29 July 2026, in - person, Kampala, with senior management.
Location	Kampala (primary milling and trading operations).
Core business	Commercial grain milling (144 MT/day maize mill) and grain trading (~100,000 MT throughput/year combined, milled plus traded). Animal feed plant launching Q4 2026 (poultry, fish, cattle - not pigs). Premium quality model: cash - within - 30 - minutes payment at above - market intake price for quality grain.
Capacity / scale	144 MT/day milling capacity. ~100,000 MT grain throughput/year (milled + traded combined). Buhler 100 t/hr dryer installed (2021) - cornerstone of quality model. Feed plant launching imminently.
Key constraint	Cooperative grain supply quality inconsistency - Mandela not currently buying from cooperatives due to aflatoxin and moisture management variability. This is both a constraint (limits sourcing pool) and an opportunity (cooperative drying investments with Mandela as off - taker would unlock higher - quality upstream supply).
Current technology	Buhler 100 t/hr dryer (installed 2021). In - house aflatoxin testing at intake as critical control point. Validated moisture - loss formula (1.15x multiplier). Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified.
Off - take / pricing premium	Pays USD 0.25 (UGX 900)/kg vs. USD 0.22 (UGX 800)/kg market for grain below 7 ppb aflatoxin at intake. Cash within 30 minutes of delivery - a significant competitive advantage over delayed payment models. 2018: 70% rejection rate; 2024: 20 - 30% rejection rate (quality improvement trend documented over six years of drying investment).
Financial structure	Established commercial miller, independent turnover, no Government subsidy. Balance sheet sufficient for 5:1 - 10:1 leverage.

Source: A2i GRASP/GTTF Landscape Study - Mandela Millers KII, 29 July 2026 (Confidential).

Table 8.6f - Mandela Millers Limited: Investment and Technology Opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/EU providers	Investment maturity

Feed plant launch requires complete pellet conditioning line for commercial - grade poultry, fish, and cattle feed.	Complete animal feed pellet line (poultry starter/ finisher, fish feed, cattle ration) co - designed with Buhler who is already active at the mill site.	Hammer mill + mixer + pellet mill + conditioner + cooler + dryer. Modular line at 5 - 10 t/hr. Buhler or equivalent EU OEM.	Buhler Group (CH/EU - already on site); ANDRITZ Feed & Biofuel A/S (DK/AT); Van Aarsen International (NL).	Very high. Buhler engagement confirmed in KII (7 August 2026 Technology Partner KII). Feed plant design in progress. GTTF matching grant closes EU vs. Asian equipment price gap.
Cooperative grain supply quality too inconsistent for Mandela intake standards (aflatoxin, moisture) - excluding ~300,000+ farmers from premium - price access.	Structure Mandela as the guaranteed off - taker for 2 - 3 cooperative drying grant investments. Mandela absorbs quality - assured output; cooperative receives assured market at USD 0.25 (UGX 900)/ kg vs. spot.	Tripartite off - take agreement structure (cooperative + GTTF + Mandela). No technology procurement by Mandela; grant goes to cooperative for dryer.	Programme design (A2i / GTTF). GCU to facilitate off - take agreements.	High. Mandela management confirmed willingness in KII. Most fundable cooperative - anchor model in the grain sector.
Soybean pressing refinery upgrade needed for feed - grade meal quality (crude protein target 44 - 46%).	Soybean meal extraction quality upgrade (own screw press + meal conditioner) to supply own feed plant with consistent, high - protein soya meal.	Continuous screw press + meal desolventiser - toaster + cooling system. Plant cost ~US$ 400K - 700K.	Desmet (EU origin, existing relationship ecosystem); Reinartz GmbH (DE); ANDRITZ (DK/AT).	Medium. Feed plant launch is the precondition. Soybean pressing follows commissioning of animal feed line.

Source: A2i GRASP/GTTF KII data, July - August 2026. Mandela Millers is the sector anchor enterprise for cooperative grain quality uplift - its off - taker role is as strategically important as its direct investment case. (A2i, 2026a)

Table 8.7a - WARC Uganda: Enterprise Profile

Field	Details
Engagement basis	Field KII completed 16 July 2026, in - person, Kiryandongo, with WARC management and programme adviser.
Location	Kiryandongo (primary hub); Kiboga; Anaka (West Nile).
Core business	Social enterprise grain aggregation. Hub - and - spoke model: mobile threshing units deployed to farmers at harvest, digital farmer app records weight and quality, instant mobile money payment. Toll - drying via Amagara facility until own dryer is commissioned. Aflasafe biological aflatoxin control pilot underway.
Capacity / scale	4,500 registered farmers. 3,000 MT aggregated this season; target 15,000 MT next season. De Heus off - take guarantee: ~100,000 - 120,000 MT/yr total need across WARC and parallel channels.

Key constraint	Lacks own cleaning and drying facility (toll - dries at Amagara - dependency, cost, and quality control limitation). Working capital requirement: programme adviser confirmed 2:1 WC - to - plant ratio as minimum design parameter. Blended pricing creates quality disincentive: farmers are not yet paid differentially for dryness.
Current technology	Mobile threshing units. Digital farmer app (weight, moisture, mobile money integration). Aflasafe biological aflatoxin control pilot. Superpro moisture meters at aggregation points.
Off - take / export	De Heus guaranteed off - take (aflatoxin standard: 10 - 20 ppb for animal feed; below 5 - 10 ppb for fish feed). De Heus is Uganda's largest and fastest - growing compound feed manufacturer.
Financial structure	Social enterprise (grant - dependent for infrastructure). UNCDF and donor - supported core operations. Commercially viable if own drying infrastructure is in place - confirmed by De Heus off - take guarantee removing demand risk.

Source: A2i GRASP/GTTF Landscape Study - WARC Uganda KII, 16 July 2026 (Confidential).

Table 8.7b - WARC Uganda: Investment and Technology Opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Toll - drying dependency on Amagara facility limits quality control, throughput, and long - run commercial viability. Cannot scale to 15,000 MT/season target without own drying.	Own 40 - 50 t/ day centralised cleaning and drying facility at Kiryandongo hub. BM Silo recirculating batch dryer designed for cooperative and aggregator scale.	Stationary grain dryer (40 - 50 t/day) + grain cleaner + silo (minimum 500 MT buffer). Total plant cost ~US$ 150K - 250K.	BM Silo ApS (DK) - named by WARC as primary technology preference. Cimbria A/S (DK) as alternative.	Very high. Primary and confirmed GTTF ask from West African Rice Company (WARC)management and programme adviser. De Heus off - take removes demand risk. Working capital must be co - designed.
Working capital gap: 2:1 WC - to - plant ratio (confirmed by independent programme adviser). Cannot finance seasonal grain purchases at required scale without credit.	Working capital co - structuring alongside drying facility grant. GCU pilot on - lending facility or GTTF working capital envelope.	Financial structuring (not technology). GCU on - lending facility or DFCU SME lending product.	GCU pilot facility (USD 100 - 150K target). Centenary Bank Kiryandongo branch. aBi Development working capital instrument.	High. Working capital structuring is a GTTF design prerequisite, not an optional add - on.

Blended pricing creates no quality incentive for farmers (no differential payment for moisture level delivered).	Introduce tiered pricing protocol: 1%/percentage point deduction below 17% moisture. Integrate with digital farmer app (already operational).	Digital farmer app modification + price schedule integration. Low - capital software change.	WARC in - house tech team (app already operational).	Very high. Blended pricing is already identified as a quality disincentive. App modification is low - cost. Tiered pricing is standard practice at Mandela Millers and KAMP Group.

Source: A2i GRASP/GTTF KII data, July 2026. WARC is the strongest Tier 2 cooperative case: De Heus off - take removes demand risk, 4,500 - farmer base provides supply, Danish BM Silo technology is appropriate at 40 - 50 t/day scale.

Table 8.8a - Jeroma Farmers Collection Centre Ltd: Enterprise Profile

Field	Details
Engagement basis	Field KII completed 5 August 2026, in - person, Pader, with the Managing Director (ex - Mukwano; contact confirmed - detail in master Annex F).
Location	Pader (headquarters and primary aggregation zone). 10 - acre plot earmarked in Lira Industrial Park for central processing hub.
Core business	Cluster/cooperative union aggregation model spanning 11 districts (6 Lango, 4 Acholi, 1 Karamoja). 10,000+ farmers; 32 staff; three operating streams: Cluster (cooperative - level aggregation), FGE (farmer group enterprise), Commercial farming (direct). Maize primary crop (60 - 65%); soybean in rotation.
Capacity / scale	8,000 - 13,000 MT/yr maize aggregate. Current equipment: 1 warehouse (100+ MT), Ugandan - fabricated hammer mill (10 MT/day maize, 5 MT/day rice), small chicken feed line. GPS - digitised farmer database.
Key constraint	No drying or cleaning facility - sun - drying only on open tarpaulin at farm level. Moisture management described as “a big problem” by MD. Mandela Millers intake threshold: 13.5% moisture. De Heus standard: 10 - 20 ppb aflatoxin, below 5 - 10 ppb for fish feed. No on - site aflatoxin testing facility (Superpro moisture meter in use).
Current technology	Superpro moisture meter. Ugandan - fabricated hammer mill. Sun - drying. Concept paper projects 20 MT/day agro - processing plant (USD 6.1 million (UGX 22bn) working - capital requirement, separate from equipment cost).

Off - take / partners	Zara Foods / Kiryandongo (primary maize buyer); Mukwano Industries (soybean); Afro/AfroKai Nakasongola; South Sudan (Zuma); DRC/Congo (informal). Equator Seeds seed input partnership via AFAP MOU (>USD 2.8K (UGX 10M) value; certified maize and soybean seed supply to Jeroma farmer network).
Financial structure	Cooperative union model. Financing history: UDB, UNCDF, World Bank Work Readiness, EU BEST Award, NSSF - linked grant (>USD 41.6K (UGX 149.6M) documented). Centenary Bank Lira branch relationship developing. 60 - 70% women farmers; VSLA savings integration.

Source: A2i GRASP/GTTF Landscape Study - Jeroma Farmers Collection Centre Ltd KII, 5 August 2026, Pader (Confidential).

Table 8.8b - Jeroma Farmers Collection Centre Ltd: Investment and Technology Opportunities

Business challenge	**Investment opportunity**	**Technology required**	**Potential Danish/ EU providers**	**Investment maturity**
No drying facility. Sun - drying cannot achieve Mandela Millers 13.5% moisture threshold or De Heus aflatoxin standard. This single gap blocks access to the entire premium commercial buyer market.	Centralised dryer + grain cleaner at Lira Industrial Park hub. MD priority investment sequence: dryer first, cleaner second, silo third, upgraded mill fourth.	Recirculating batch dryer (20 MT/day scalable to 40 MT/day) + grain cleaner. BM Silo modular design allows phased expansion. Total ~US$ 80 - 150K for Phase 1.	BM Silo ApS (DK) - recirculating batch dryer specifically designed for cooperative and aggregator scale. Cimbria A/S (DK) as alternative.	High. MD confirmed as investment priority #1. Lira Industrial Park 10 - acre site confirmed and earmarked. GTTF Tier 3 grant at 40 - 50% of total cost = US$ 35 - 75K.
No on - site aflatoxin testing. Cannot verify grain quality at aggregation point before it leaves farmer custody. Superpro moisture meter is useful but insufficient for formal market access.	Rapid aflatoxin test kit integration into aggregation workflow. Farmer receives quality certificate at point of sale; off - taker has documented chain of custody.	Lateral flow rapid aflatoxin test kit (LFS) + field protocol training. Low capital cost (US$ 5 - 15K for kit supply + protocol design).	Romer Labs (EU); SDIX Envirologix (EU/US). FOSS analytical tools for batch validation.	High. Low - capital add - on. Immediately unlocks Mandela Millers (sub - 7ppb premium) and De Heus (10 - 20 ppb) buyer tier. Prerequisite for formal market graduation.

Working capital gap: concept paper projects USD 6.1 million (UGX 22bn) working capital requirement (separate from equipment) for 20 MT/day processing hub. This far exceeds current financing capacity.	Phased working capital co - structuring aligned to dryer commissioning. Phase 1: GCU on - lending facility (USD 50 - 75K for seasonal grain purchases). Phase 2: Centenary Bank Lira product as dryer is commissioned.	Financial structuring only. Centenary Bank Lira branch is the most proximate commercial relationship.	Centenary Bank Lira; GCU pilot on - lending facility; GTTF working capital envelope.	Medium. Phase 1 is fundable and should be designed alongside the equipment grant. The full USD 6.1 million (UGX 22bn) working capital target is a long - run ambition, not a Phase 1 requirement.

Source: A2i GRASP/GTTF KII data, August 2026. Jeroma Farmers is confirmed Tier 3. The centralised dryer at Lira Industrial Park unlocks quality maize supply from 10,000+ farmers across 11 districts. The Equator Seeds AFAP MOU provides certified seed input supply to the farmer network - a systemic integration from input to aggregation to processing.

8.5 Pillar 5: Impact Metrics, Trade Competitiveness & EAC Market Position

8.5.1 Smallholder Engagement: The Supply Chain Foundation

Grain production in Uganda is almost entirely smallholder - dominated. Over 1.5 million households cultivate maize, with an average farm size of 0.8 - 1.5 hectares per crop. (UBOS, 2022b) The commercial animal feed industry's growth is directly contingent on smallholder productivity and quality improvements. Without a reliable, high - quality upstream grain supply, feed manufacturers are forced into expensive remediation at intake - sorting, drying, blending - that erodes margins and deters investment.

Three distinct models have emerged from this study's field intelligence for connecting smallholder grain to formal commercial buyers. Their co - existence is a structural strength - different geographies, farmer profiles, and value chain positions favour each. Field intelligence from the northern corridor confirms that all three operate in the same geography with complementary rather than competing supply - bases. KAMP Group's Model C is analytically distinctive: it is the only model that spans the entire value chain from outgrower aggregation through drying, milling, and complete feed manufacturing, to distribution back to the same farmer network via 120 stockists - creating a closed - loop outgrower - to - feed system.

Dimension	**Model A: Central Buyer Direct Purchase (Mandela Millers)**	**Model B: Hub - and - Spoke Social Enterprise (WARC)**	**Model C: Full Value Chain + Outgrower Integration (KAMP Group)**

Farmer reach	Concentrated: fewer, larger suppliers; 10,000 - 12,000 MT volumes from individual commercial farmers in some cases.	Distributed: 4,500 registered smallholders; “as little as one kilo” accepted across Kiryandongo, Kiboga and Anaka.	Wide - area: 6,000+ farmers across 3 corridors (Lira, Gulu, Masindi) via 120 stockists. Uniquely, KAMP both sources grain FROM and sells complete feed BACK TO the same farmer network - a closed - loop outgrower - to - feed model.
Moisture / quality protocol	Accepts up to 19% moisture; dries centrally (Buhler 100 t/hr); intake aflatoxin test at critical control point (sub - 7ppb premium).	Accepts up to 17% moisture; 1%/percentage point deduction; toll - dries at Amagara facility pending own dryer.	Buys at harvest immediately at ~USD 0.26 (UGX 950)/kg; dries on - site (Cimbria system, Anaka mill). Post - harvest price arbitrage vs. peak USD 0.36 (UGX 1,300)/kg is the working capital model. Rejects soya cake below 44 - 46% crude protein.
Payment model	Cash on delivery within ~30 minutes of delivery - documented as a decisive competitive advantage for farmer loyalty.	Instant mobile money via digital farmer app; full transparency on deductions; farmer - facing quality data.	Direct purchase at harvest; price arbitrage model - KAMP captures the dry - season premium through on - site drying and storage. No mobile money platform; relationship via 120 stockist agents.
Value chain scope	Procurement and milling only. Feed plant launching Q4 2026 - will extend into feed manufacturing.	Aggregation and conditioning only. Feed sales are via De Heus (off - taker), not KAMP’s own manufacture.	Full chain: outgrower aggregation (6,000 farmers) - > on - site drying (Cimbria) - > feed milling (Skiold) - > complete feed manufacture - > distribution via 120 stockists back to same farmer base. The only model in this table that closes the full loop.

Volume capacity	~100,000 MT/yr theoretical (milled + traded combined).	3,000 MT this season; target 15,000 MT next season with own dryer.	10 t/hr automated feed mill; 4,000 MT silo; 5 Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified SKUs. Silo capacity is the binding constraint on seasonal procurement volume.
Capital constraint	Existing infrastructure. Primary constraint: off - take partner for cooperative drying grants (Mandela as anchor buyer).	Needs own cleaning/ drying facility (primary GTTF ask); working capital 2:1 plant cost must be co - designed.	Danish equity (profitable without subsidy). Primary constraint: silo expansion (+3,000 MT) to exploit full seasonal price differential. Aquafeed extrusion line is priority #2.
GTTF role	Off - taker anchor for cooperative cleaning/ drying investments upstream; not a direct GTTF grant recipient.	Direct grant recipient: BM Silo 40 - 50 t/day dryer + working capital co - structure. Strongest Tier 2 cooperative case.	Direct grant recipient: silo expansion (Cimbria, bolt - on to existing system - lowest technology - risk deal in the portfolio); aquafeed extrusion line (ANDRITZ); NIR quality testing (FOSS). Most naturally aligned GTTF candidate overall.

Source: A2i KII field data - Mandela Millers (29 July 2026), WARC Uganda (16 July 2026) and KAMP Group (15 July 2026). Model C (KAMP Group) is the only model spanning the full value chain from outgrower aggregation to feed distribution back to the same farmer base.

Table 8.9b - Projected Impact: Four Vectors of GTTF Grain & Feed Investment

Impact Vector	Baseline (2024)	3 - Yr Target (2027)	5 - Yr Target (2029)	Mechanism
% of grain through commercial drying (PHL reduction)	~20 - 25%	30 - 35%	40 - 45%	Cimbria/BM Silo drying investment at aggregator scale
Aflatoxin rejection rates at intake (formal buyers)	20 - 70% (range)	10 - 25%	<10%	Lyras UV; intake testing protocols; Aflasafe scale - up

Smallholder farmers connected to formal commercial buyers	~300,000 (est.)	380,000+	500,000+	WARC; KAMP outgrower; Mandela off - taker model
Domestic formal animal feed production (M kg/yr)	262	310 - 330	380 - 400	ANDRITZ/SKIOLD/ Van Aarsen feed mill upgrades

Sources: UBOS (2024) - primary; URA Value Chain Trade Analysis (2025); Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; A2i KII estimates (2026); ReportLinker (2024).

8.5.2 Green Agenda Adoption

Uganda's grain and animal feed value chain has significant potential to strengthen food security, reduce production costs, create rural employment, support livestock and aquaculture productivity, and contribute to climate - resilient agro - industrialisation. Growing demand for poultry, piggery, dairy and aquaculture products is increasing demand for reliable supplies of maize, soybeans and other feed ingredients, while post - harvest losses, poor storage, aflatoxin contamination, inefficient processing and dependence on conventional feed ingredients continue to constrain the sector.

The Green Agenda Adoption pillar promotes resource - efficient, low - carbon and climate - smart grain production, storage, processing and animal - feed manufacturing systems that improve productivity while reducing waste and environmental impacts. Priority interventions include solar - powered grain drying and storage, hermetic and climate - smart storage systems, energy - efficient milling and feed - processing equipment, improved grain - quality and mycotoxin testing, utilisation of agricultural by - products and agro - industrial residues in feed, alternative protein sources such as Black Soldier Fly (BSF) meal, renewable energy and biogas for feed mills, water - efficient processing, and circular - economy approaches to grain and feed waste management.

Particular emphasis should be placed on reducing post - harvest losses and aflatoxin contamination, improving feed - conversion efficiency through better - quality and balanced feed formulations, and converting agricultural residues and processing by - products into valuable feed ingredients, bioenergy or organic fertiliser. These interventions align with Uganda's National Development Plan IV (NDP IV), the Agro - industrialisation Programme, the National Climate Change Act (2021), Uganda's Nationally Determined Contributions (NDCs), and the Green Growth Development Strategy, while supporting sustainable intensification, lower feed costs, improved livestock and aquaculture productivity, reduced food and feed losses, rural incomes, circular - economy development and greater competitiveness of Uganda's grain and animal - feed industries.

8.5.3 EAC Trade Statistics: Prices, Volumes, and Uganda's Regional Position

Uganda's comparative position in the East African Community grain and feed market is the product of three structural factors: a landlocked transport cost disadvantage (estimated at US$ 150/MT); a 10% import duty on refined edible oils; and the productive potential of the northern grain corridor. Together, these factors generate **Uganda's effective import parity advantage for domestically produced cereals and oilseeds sustaining farmgate prices that Mount Meru's management describes as the highest in Africa for soybean, at approximately US$ 620/MT. (EAC Secretariat, 2024)**

Table 8.10a - EAC Grain (Maize) Comparative Price Matrix, 2023 Averages

Country / Market	Farm - gate (US$/MT)	Wholesale (US$/MT)	Retail (US$/MT)	Export Price (US$/MT)	Import Price (US$/MT)	Uganda Price Differential
Uganda (Kampala)	190 - 220	230 - 260	270 - 300	200 - 260	280 - 320	Reference (parity market)
Kenya (Nairobi)	260 - 300	290 - 340	320 - 380	n/a (net importer)	270 - 310	Kenya pays 15 - 30% premium for Ugandan grain; price difference sustains export pull
Tanzania (Dar es Salaam)	170 - 210	200 - 240	240 - 280	190 - 240	260 - 290	Managed export policy; lower availability to Uganda buyers; quality generally better managed
Rwanda (Kigali)	280 - 320	310 - 360	360 - 420	n/a (net importer)	300 - 340	Rwanda and Burundi: premium destination; small volume; cross - border access improving
South Sudan (Juba)	310 - 380	350 - 430	400 - 500	n/a (net importer)	340 - 400	Highest premium; logistics and security risk; WFP local purchase channel key
DRC (Goma / East)	290 - 360	330 - 400	380 - 460	n/a (net importer)	320 - 380	Eastern DRC absorbs SR Kuku eggs (~10%); grain informal; formal channel underdeveloped

Sources: ITC Trade Map (2024); FAO GIEWS FPMA East Africa series (2024); EAC Secretariat (2024); A2i KII field data (2026). (FAO / GIEWS, 2024)

Table 8.10b - Uganda Maize & Animal Feed Import/Export Summary, 2019 - 2024

Flow / Product	2019	2020	2021	2022	2023	CAGR / Trend
Maize Exports (MT) (HS1005)	230,902	195,430	169,365	410,000*	630,917	\+28.7% CAGR (2019 - 23)
Maize Exports (US$ M) (HS 1005)	46.2	37.8	31.4	78.9	126.2	\+28.6% CAGR
Animal Feed Exports (informal, M kg) (HS 2309)	~215	~195	~220	~235	~260	Growing; low - spec cross - border
Animal Feed / Premix Imports (US$ M) (HS 2309)	~34	~32	~42	~48	~56	\+13.3% CAGR - structural import dependence rising
EU Feed Component Imports (US$M) (HS 2309)	~$41	~$39	~$49	~$55	~$59	\+9.2% CAGR

** 2022 estimate based on trend interpolation. Sources: URA Value Chain Trade Analysis (2025) - primary; ITC Trade Map (2024); EU Agri - Food Trade Factsheet (2023); WITS/World Bank Uganda Trade Statistics (2024); Netherlands Embassy Agri - Economic Outlook 2024; A2i estimates. (WITS / World Bank, 2024a) (Netherlands Embassy / Agroberichten Buitenland, 2024)*

Import and Export Parity Analysis

Parity analysis answers the question: *does it cost more to produce a commodity domestically or to import it?* For grain and animal feed, this determines where Uganda holds genuine comparative advantage - and where import substitution through GTTF - supported domestic processing makes economic sense.

Table 8.10c - Import/Export Parity Price Calculation: Uganda Maize, 2023

Price Component	Export Parity (US$/MT)	Import Parity (US$/MT)	Implication
Reference price (Mombasa / Dar es Salaam CIF)	230 - 260	270 - 310	Regional market anchor

Transport cost (Uganda Mombasa/Port)	- 40 to - 60 (deduct for export)	\+ 40 to +60 (add for import)	Landlocked transport cost: ~US$ 150/MT total
Quality / grade adjustment	- 10 to - 20 (lower Ugandan spec)	\+ 5 to +10 (imported higher spec)	Aflatoxin compliance premium: +15 - 25% for certified grain
Indicative parity price (Uganda, 2023)	190 - 220 / MT	280 - 320 / MT	Uganda is a net exporter; domestic maize price should align to export parity
Finished animal feed (complete broiler)	n/a (primarily import substitution market)	800 - 950 / MT (imported complete feed)	Domestic complete feed at US$ 700 - 850/MT is already at import parity - strong commercial case
Oilseed meal (soya, EAS 287:2021)	n/a (below export parity; quality constraint)	600 - 720 / MT (imported EU - spec)	Uganda meal quality gap costs US$ 200 - 300/MT vs. import parity - ANDRITZ/SKIOLD investment case

Sources: ITC Trade Map (2024); FAO GIEWS FPMA (2024); EAC Secretariat (2024); WITS/World Bank Uganda Trade Statistics (2024); A2i field data (2026).

Uganda's Comparative Advantage: An Assessment

Uganda holds **clear export comparative advantage** in raw maize grain, exploiting the Kenya price differential. It holds **import substitution potential** in complete animal feed and soybean/sunflower meal - markets where domestic production costs are within parity range, but where quality constraints are forfeiting the premium. The **lecithin opportunity** - independently identified at Mukwano, Mount Meru, and SR Kuku/Wind Green - represents an untapped export advantage in a high - value product Uganda is currently discarding or undervaluing at all three facilities.

The tiered investment readiness framework used elsewhere in this chapter treats Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product certification as a hard gate precisely because certification is a technical capability, not a function of balance sheet strength. An enterprise can clear the co - financing gate and still fail the certification gate without dedicated technical assistance to build the quality systems certification requires. The capital stacks below should be read alongside this constraint: matching grant and commercial financing address the equipment gap, but certification readiness needs its own budgeted technical assistance component. Based on the certification and BDS costs observed elsewhere in this study's enterprise KIIs (HACCP documentation, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product registration, and NIR/quality - system training), an indicative technical - assistance budget line of US$ 15,000 - 40,000 per Tier 2 enterprise is a reasonable planning placeholder for GTTF design purposes, pending a proper costing exercise; this is materially smaller than the equipment grant itself but is what determines whether an enterprise can actually clear the certification hard gate.

8.6 Pillar 6: Investment Structuring & GTTF Outcomes

8.6.1 Capital Stack Design by Enterprise Tier

The grain and feed sector presents three distinct capital stack archetypes, each appropriate to a different tier of enterprise readiness. The GTTF matching grant functions differently across these archetypes - de - risking machinery acquisition at Tier 1, unlocking first commercial debt at Tier 2, and enabling infrastructure pre - investment at Tier 3. (A2i, 2026h)

Table 8.11 - Capital Stack Design by Enterprise Tier

Tier	Enterprise Examples	Technology Investment	Total CapEx Est.	GTTF Grant Share	Commercial Co - Financing
Tier 1	SR Kuku/ Wind Green; KAMP Group; Mukwano; Mount Meru; Ugachick; Mandela Millers	NIR pelleting; Cimbria silos + sorting; Van Aarsen pellet mill; Lyras UV; lecithin plant; oilseed plant renewal	US$ 800K - 25M per deal	10 - 15% (US$ 100 - 300K)	Stanbic Bank / Centenary Bank commercial debt at 5:1 - 10:1 leverage; UDB long - tenor for larger assets; IFC possible at top end
Tier 2	WARC Uganda	SKIOLD milling upgrade; Cimbria cleaning; soya meal quality; cooperative drying facility	US$ 150K - 500K per deal	25 - 35% (US$ 50 - 150K)	Uganda Development Bank (long - tenor, UGX - denominated at 10 - 12%); aBi Development working capital; DFCU SME lending
Tier 3	Jeroma Farmers Collection Centre Ltd; WARC farmer network	Hermetic storage; mobile grain conditioners; digital WRS; BM Silo dryers	US$ 30K - 120K per deal	40 - 50% (US$ 15 - 60K)	UGAFODE microfinance; GCU pilot on - lending facility (USD 100 - 150K target); cooperative member equity; Centenary Bank (Lira branch; developing relationship with Jeroma)

Sources: A2i Investment Structuring Analysis (2026); UDB Annual Report 2024; Stanbic Bank agribusiness product documentation; GCU consultation (2026). (UDB, 2025) (Stanbic Bank Uganda, 2026)

Table 8.11a - Generalised GTTF Grant Ceilings by Enterprise Category

Table 8.11 prices five specific validated transactions. This table generalises those findings into a repeatable ceiling structure for GTTF investment officers assessing grain and feed enterprises not yet individually profiled. Where a specific KII - validated deal exists (SR Kuku, KAMP Group, Mandela Millers, WARC, Jeroma Farmers), those deal figures take precedence.

Enterprise category	Typical total investment	GTTF grant ceiling	Leverage target	Primary co - financer	Grant rationale
Tier 1: Large commercial miller / integrated feed manufacturer (Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) 3+ SKUs, profitable)	US$ 800K - 25M	US$ 100 - 300K (10 - 15%)	5:1 to 10:1	Stanbic; UDB; Aceli; IFC at top end	Grant closes EU vs. Chinese/Indian equipment cost gap. Enterprise absorbs commercial debt.
Tier 1: Vertically integrated poultry/feed producer (HACCP; institutional buyer)	US$ 300K - 5M	US$ 75 - 200K (10 - 15%)	5:1	Bank of Baroda ACF; Absa ACF; UDB	Grant supports circular economy technology (biogas, lecithin) that has longer payback than commercial debt horizons.
Tier 1: Oilseed processor (large; EAC export - oriented)	US$ 2M - 30M	US$ 150 - 400K (10 - 15%)	5:1 to 8:1	Stanbic; listed entity equity; DFI	Grant supports EU technology cost gap for lecithin, solvent extraction, or biomass drying where ROI is marginal at current scale.
Tier 2: Social enterprise / cooperative aggregator (De Heus off - take guarantee)	US$ 100K - 400K	US$ 50 - 150K (25 - 35%)	3:1 to 5:1	UDB long - tenor; aBi working capital; DFCU SME	De Heus demand guarantee removes commercial risk. Working capital must be co - designed.

Tier 3: Cooperative hub / collection centre (Lira - style)	US$ 30K - 150K	US$ 15 - 75K (40 - 50%)	2:1 to 3:1	GCU on - lending; Centenary; cooperative equity	Infrastructure enabling quality grain from 10,000+ farmers to access commercial buyers.
Technology add - on: UV decontamination / NIR testing (any tier)	US$ 25K - 80K	US$ 15 - 40K (40 - 60%)	Variable	Enterprise equity / working capital	Low - capital, high - impact quality control - justified as standalone GTTF micro - grant.

Source: A2i Investment Structuring Analysis (2026); derived from KII - validated deal structures for SR Kuku/ Wind Green, KAMP Group, Mandela Millers, WARC, and Jeroma Farmers.

8.6.1a HAL / aBi Investment Selection Principles

HAL / aBi INVESTMENT SELECTION CRITERIA (GTTF Hard Principles) The following principles govern HAL's and aBi Development's GTTF investment selection process, as set out in internal guidance and confirmed through the Day One Validation session (10 August 2026). They are reproduced here because they are the non - negotiable boundary conditions for every enterprise recommendation in this chapter.

1. The investment must be commercially viable - profitable without subsidy: GTTF is a matching grant fund, not a subsidy programme. Every enterprise recommended for GTTF support must have a demonstrable business case that stands on its own commercial merits once the technology is installed. The grant closes the EU technology cost gap; it does not substitute for commercial viability.

2. No "traditional Google investments": The GTTF is not a general development fund. Investments that fall into well - trodden development aid categories - capacity building without a clear technology component, input supply without processing or value addition, or social enterprise models dependent on continuous grant funding - are outside scope regardless of their development merits.

3. GTTF must not disrupt existing market balances: Technology and processing investments that would crowd out existing private operators without adding net new market capacity, or that would shift competitive advantages in ways that destabilise functioning supply chains, are not eligible. The fund should expand market capacity, not redistribute existing market share.

4. Scale over spread: The GTTF design favours a smaller number of larger, higher - impact investments over a wide spread of small grants. Enterprise selection should prioritise depth of impact - transformative technology investment in enterprises with the capacity to scale - over breadth of coverage.

Source: aBi Development / Access2Innovation. GTTF Investment Selection Criteria and Sector Priorities (HAL Working Note, August 2026). Kampala: aBi Development. (aBi Development / Access2Innovation, 2026)

8.6.2 The 5:1 Leverage Pathway

The GTTF programme is designed around a 5:1 leverage target - this is the programme - level ambition set out

in the GTTF design, not a floor that applies to every individual deal. At Tier 1, this ratio is readily achievable given the balance sheet strength of enterprises such as KAMP Group, Mukwano and Mount Meru Millers. At Tier 2, it remains realistic where UDB long - tenor facilities and Aceli Capital guarantee instruments can be structured alongside the GTTF matching grant. Achieving the ratio programme - wide requires three enabling conditions to be built into GTTF operational design.

- **Milestone - based disbursement:** Grant tranches released against verified enterprise co - financing commitments and technology installation milestones, not upfront.
- **Commercial bank pre - engagement:** A2i's relationships with Stanbic Bank and Centenary Bank create viable co - financing channels for Tier 1 deals, where equipment leasing or term loan structures are feasible given the enterprises' existing balance sheets. Uganda Development Bank's UGX - denominated 10 - 12% interest rate product is the most appropriate vehicle for Tier 2 - confirmed by Ugachick and SR Kuku/Wind Green as their primary long - tenor lending relationship.
- **Blended BDS support:** For Tier 2 enterprises, the gap is as much capacity (HACCP documentation, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification processes, EU supplier negotiations) as capital.

The FAO's Hand - in - Hand Initiative has estimated the total investment gap for domestic animal feed manufacturing at **US$ 150.1 million**, and for the maize value chain specifically at **US$ 11.3 million**. Even a modest GTTF allocation can catalyse a meaningful proportion of this if structured to crowd in commercial co - financing rather than substitute for it.

8.6.3 Financial Sector Support: UDB, Stanbic, Centenary and the Grain Council Pilot

Three financial institutions form the most relevant co - financing architecture for GTTF grain and feed investments. Their product terms, confirmed through enterprise KII data and stakeholder mapping, are set out below.

Institution	Product Relevance for Grain & Feed	Confirmed Enterprise Relationships	Key Terms (indicative)	GTTF Co - Financing Role
Uganda Development Bank (UDB)	Development mandate; long - tenor UGX - denominated loans for agro - processing, food manufacturing, and import substitution; concessional windows for strategic sectors	Ugachick (primary lender at 10 - 12% UGX); SR Kuku/ Wind Green (earlier capital raise); Aceli Capital partnership for agribusiness lending	10 - 12% UGX rate; long tenor (up to 10 yrs); UDB House, Plot 26 Kyadondo Rd, Kampala	Primary Tier 2 co - financer. UGX - denominated facility removes FX exposure risk. GTTF grant as first - loss tranche to unlock UDB term loan for mid - scale drying/ milling investments.

Stanbic Bank Uganda	Corporate and commercial banking; structured finance experience; processor and supply chain finance; active in Kampala industrial area covering Tier 1 feed manufacturers	Confirmed as target co - financer for Tier 1 enterprises per A2i stakeholder mapping; equipment leasing and term loan experience	Market rate (UGX); structured finance; Stanbic Bank House, 45 Kampala Rd	Primary Tier 1 co - financer alongside Centenary Bank. Equipment co - financing structures (lease or term loan) feasible given Tier 1 balance sheets.
Centenary Bank Uganda	Largest agricultural lender in Uganda; active grain trader and processor portfolio; strong upcountry branch network (Lira, Masindi, Mbarara, Gulu) covering key grain corridors	Active agribusiness lending portfolio; confirmed via stakeholder mapping	Agribusiness product suite; extensive branch network	Northern Uganda grain corridor co - financing: Centenary Lira branch is the most logical co - financer for KAMP Group and northern corridor Tier 2 processors.
GCU Pilot On - Lending Facility	Grain Council of Uganda seeking USD 100 - 150K pilot facility to on - lend to GCU members for seasonal grain purchases - addressing the 9 - 18 month loan turNational Agricultural Research Organisation (NARO)und gap identified as the primary working capital constraint	GCU, Pearl Bank (most engaged); 200+ member businesses	USD 100 - 150K pilot; on - lending to members	Working capital component for Tier 3 cooperative and aggregator investments. GTTF could capitalise the GCU facility, enabling the Council to extend seasonal credit to members alongside any storage or drying infrastructure grant.

Sources: A2i Stakeholder & Enterprise Mapping (2026); UDB Annual Report 2024; GCU consultation 30 July 2026; Ugachick KII (21 July 2026); SR Kuku/Wind Green KII (6 July 2026).

Read against the banking sector's own finding that capital is not the binding constraint economy - wide, this chapter's enterprise evidence is more specific: capital is comparatively available to Tier 1 processors and exporters with bankable balance sheets (Stanbic, Centenary and UDB engagement confirmed across five KIIs), but remains a genuine, first - order constraint for Tier 3 aggregators and cooperatives, where the 9 - 18 month loan turNational Agricultural Research Organisation (NARO)und is structurally incompatible with a single grain marketing season. Two evidence gaps are flagged explicitly rather than papered over.

First, this study's financing KIIs did not include Equity Bank, which is materially active in Ugandan agribusiness lending, and its absence from the table above is a genuine gap in the finance evidence base rather than a deliberate exclusion. Second, the Agricultural Credit Facility (ACF) — a Government - backed concessional lending window — has been reported elsewhere in the GRASP validation process as under - used by banks relative to its stated purpose; this study did not independently verify ACF utilisation rates for grain and feed enterprises specifically, and flags this as a follow - up KII priority.

On terms, enterprise KII evidence gathered for this study is broadly consistent with a sector - wide shift from collateral - based toward cash - flow and off - take - contract lending (Mandela Millers' and WARC's off - take - anchored financing are both examples), a borrower preference for tenor closer to 10 years on heavy capital equipment, and IFC engagement typically only above roughly US$ 10 million in deal size — consistent with IFC appearing in Table 8.36 only as a Tier 1, top - end co - financier. The aBi Development clean/green energy fund is a further avenue for the biogas and energy - efficiency components of the technology matrix (Section 8.4.2) that has not yet been matched to a specific grain - and - feed enterprise in this study's KII set.

8.7 Pillar 7: Policy, Program Alignment, SWOT & Post - Grant Sustainability

8.7.1 Policy Alignment: NDP IV as Enabling Architecture

The grain and animal feed value chain is among the most directly aligned with NDP IV's agro - industrialisation objectives of all eight GTTF priority sectors.

1. **The Agro - Industrialisation Programme** targets a shift from raw commodity export to processed agro - industrial export, with grain - based starch, oil, and animal feed identified as priority commodities.

2. **The Parish Development Model (PDM)** creates structured aggregation points at parish level that can absorb hermetic storage and grain conditioning technology.

3. **The forthcoming Animal Feeds Bill** mandates registration for all feed processors and quality certification, driving market formalisation and creating a "flight to quality" that rewards Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified Tier 1 processors.

4. **Tax exemptions on most livestock inputs** - including feeds and premixes when used for agricultural production - reduce the cost of technology adoption. Uganda's 60% import tariff on chicken - confirmed in KIIs as existential to the domestic poultry industry - creates a protected growth environment for domestic feed manufacturers supplying commercial poultry operations.

Cross - sector feed demand linkages: This chapter's analysis of the grain and animal feed sector directly correlates with findings from the GRASP Piggery (Chapter 6), Dairy (Chapter 7), Poultry, Livestock, and Fish chapters. The pig sector (4.4M head; feed cost = 68 - 73% of pig production cost; commercial monogastric feed demand ~1.46M MT/yr per Piggery chapter estimates) is the largest single source of additional feed demand growth. Dairy cattle (16.7M head; 729 Milk Collection Centres; 3.85M tonnes milk produced 2023) are growing compound dairy ration demand particularly in western and central corridors. The poultry sector (Kenchic 420,000 chicks/week; 340 tonnes feed/week; growing at 10 - 20%/yr) drives complete pelleted feed demand and is the primary commercial market for KAMP Group, SR Kuku, and Mandela Millers. Aquaculture (WARC's De Heus fish - feed off - take at below 5 - 10 ppb aflatoxin standard) requires the highest aflatoxin specification of all species - making grain drying and cleaning not merely a commercial consideration but a regulatory prerequisite for the fish - feed market.

The loop closes in the other direction as well: milling by - products from this chapter's grain processing (bran,

oilseed cake) already feed the poultry, piggery and dairy chapters' commercial rations, and poultry and piggery manure — profiled in those chapters' circular - economy interventions — is a candidate organic - fertiliser input back into grain and soybean production, while agro - industrial residues more broadly fall within the scope of the GRASP Waste Management chapter. Grain and feed therefore sits at the centre of the circular - economy pipeline the sector validation asked each chapter to make explicit, rather than being an isolated input - output relationship with any single downstream sector.

8.7.2 The Grain Export Ban Risk: The Non - Negotiable Policy Ask

The single most consequential policy risk for GTTF grain and feed investments is the continuation of ad hoc maize export bans. Processors and aggregators who have invested in drying, cleaning, and quality certification infrastructure depend on stable, predictable access to export markets to sustain the price premium that justifies their investment. **GTTF deals should incorporate a policy trigger clause**: if an export ban is imposed within the investment period, milestone - based disbursements in affected deals should be suspended pending policy normalisation. GRASP should simultaneously engage Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) through its policy recommendations chapter to advocate for a transparent grain trade policy framework with at least 90 - day advance notice of any trade restriction.

A parallel policy concern - the unrestricted export of raw, unprocessed soybean seed to Kenya - has been independently raised by both Mukwano and Mount Meru, who have each petitioned the Ministry of Finance and Parliament for a regulatory response. Both companies argue that raw soybean exports deprive domestic processing plants of feedstock, force underutilisation, and capture value for Kenyan processors rather than Ugandan manufacturers. **GTTF should consider lending its policy voice to this advocacy, coordinating with both processors and with UMA and PSFU.**

8.7.3 Post - Grant Sustainability

Sustainability Condition	Assessment
Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Market Formalisation	The Animal Feeds Bill drives market consolidation and favours certified Tier 1 processors - creating a durable commercial advantage that outlasts grant support.
Danish Technology Service Ecosystem	Cimbria East Africa (Agroways, Jinja) already has established Uganda after - sales presence. SKIOLD and ANDRITZ have regional service networks. KAMP Group's existing Skiold/Cimbria relationship provides proof of after - market service viability.
EU and Denmark - Technology and Policy Intersection	NDP IV agro - industrialisation targets align with EU agri - technology export interests. The EU/Denmark - Uganda technology partnership channel - confirmed via Danish Embassy coordination for GTTF technology provider introductions - is the key conduit. Government support for import substitution (edible oils, animal feed premixes) meets EU technology comparative advantage directly.
Regional Demand Growth	The EAC animal feed market is growing at ~5% CAGR. Uganda's geographic position as a regional grain surplus producer creates export growth without policy dependence.

Aflatoxin Mitigation ROI	Post - harvest loss reduction through hermetic storage and Cimbria drying generates direct financial return - reducing rejection rates and improving marketable yield. Mandela Millers documents a rise from 30% to 70 - 80% of targeted intake volume achieved over six years, driven by drying investment and farmer awareness.

8.7.4 SWOT Analysis: Grains and Animal Feeds Sector

A strategic SWOT assessment synthesises the evidence from the preceding seven pillars, including fresh field intelligence from KII interviews conducted July - August 2026, into a single - view framework that can orient GTTF programme design.

Table 8.12 - SWOT Matrix: Grains and Animal Feeds Sector, Uganda 2026

STRENGTHS	**WEAKNESSES**
• Regional grain surplus: ~7.2M MT annual production; structural export advantage to Kenya, South Sudan, DRC• Tier 1 enterprise base: SR Kuku/ Wind Green, KAMP Group, Mukwano, Mount Meru, Ugachick, Mandela Millers - all KII - verified and investment - ready with balance sheets to absorb GTTF leverage• Danish technology already installed at KAMP Group (Skiold, Cimbria) - proof of concept for GTTF deepening• NDP IV agro - industrialisation mandate directly aligned with GTTF objectives• 60% poultry import tariff creates protected growth environment for domestic feed manufacturers• Mandela Millers aflatoxin protocol demonstrates drying investment ROI: from 30% to 70 - 80% intake acceptance over 6 years	• Only 20 - 25% of grain passes through commercial drying - 75 - 80% enters informal channels wet• Aflatoxin at 20 - 30 ppb baseline; up to 100 ppb in DDGS by - products; closes Kenya sunflower meal market• Oilseed meal quality gap: 37% crude protein documented vs. 44 - 46% specification - systematic across multiple KIIs• Home - mixing feed shed proliferation (200+ sheds in Natete/Mutundwe area alone): unregulated, unscalable, quality risk• Working capital gap: 9 - 18 month bank loan turNational Agricultural Research Organisation (NARO)und incompatible with grain market timing• Raw soybean export leakage: unprocessed seed exported to Kenya, denying Ugandan processors feedstock
OPPORTUNITIES	**THREATS**

• Lecithin extraction: three Tier 1 processors (Mukwano, Mount Meru, SR Kuku) all generating gums currently discarded - ~6 t/day combined, US$ ~1M plant cost; high - value export product• De Heus factory (incoming): 100,000 - 120,000 MT/yr maize demand - systemic quality pull on supply chain• Animal Feeds Bill: market formalisation creates commercial premium for Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified producers• GCU pilot on - lending (USD 100 - 150K): unlock working capital for 200+ member businesses• Per - capita poultry consumption runway: 1.3 kg/yr now 8 - 9 kg by 2040 (scenario projection); 5 - 7× feed demand growth implied on this trajectory• Mount Meru $25M Lira investment: EU equipment cost gap = direct GTTF matching grant case	• Ad hoc export bans: recurring policy risk; no advance notice mechanism; investment deterrent• Brazilian chicken at ~40% of Uganda's production cost: any tariff relaxation threatens entire domestic poultry industry• Chinese/Indian equipment price gap: standard bank competitive procurement favours 3× cheaper Asian equipment over EU - GTTF grant essential to close this gap• El Niño and climate variability: fully rain - dependent soybean production; weather shock in 2023 reduced crop materially• New entrant competition for quality grain: De Heus, Pro - Industries competing for same limited quality pool without coordinated investment in drying infrastructure• WFP repositioning: WFP procurement incentivised poor quality historically (pre - 2020); future WFP programme design decisions affect Ugandan grain market structure

Table 8.13 - MCDA Scoring: Grains and Animal Feeds Sector, Uganda 2026

The Multi - Criteria Decision Analysis (MCDA) scoring below applies the standard A2i/GTTF assessment framework to the Grains and Animal Feeds sector. Scores are on a 1 - 10 scale (10 = strongest performance against criterion), consistent with the scale used throughout this report, weighted by the criterion's importance to GTTF investment selection.

MCDA Criterion	Weight	Score (1 - 10)	Weighted	Max Possible	Evidence / Rationale
Market size and growth trajectory	15%	10	1.50	1.50	Uganda ~7.2M MT grain surplus + per - capita poultry consumption runway (1.3 8 - 9 kg by 2040); GDP inflection point approaching (Buhler KII)
EU/Danish technology fit	15%	10	1.50	1.50	KAMP Group: Skiold/Cimbria already installed. Buhler active (Mandela, SR Kuku). Cimbria (Equator Seeds). Van Aarsen, ANDRITZ, Lyras, Bigadan. Denmark has arguably the world's strongest feed technology cluster.
Enterprise investment - readiness (Tier 1 base)	5%	8	0.40	0.50	Six KII - verified Tier 1 enterprises with Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification and balance sheets. KAMP most naturally aligned. Ugachick UDB - financed. One gap: brownfield audit needed before equipment specification.

Additionality / crowding - in (leverage)	12%	8	0.96	1.20	5:1 leverage (programme target, not per - deal floor): achievable at Tier 1 via Stanbic/Centenary; realistic at Tier 2 via UDB + Aceli. Not guaranteed without GTTF to close EU cost gap vs Asian alternatives.
Post - harvest loss reduction impact	12%	10	1.20	1.20	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)): 20 - 30% post - harvest losses. Mandela Millers drying ROI documented (30% 70 - 80% intake acceptance). Aflatoxin mortality risk documented. Impact is direct, measurable, and scalable.
RIO Marker alignment (all 4 markers)	10%	10	1.00	1.00	Score 2 (Principal): Climate Adaptation. Score 1 (Significant): Climate Mitigation, Biodiversity, Desertification. Day One Validation consensus: chapter is within the 75% climate marker threshold required by donor design.
Regulatory and policy alignment	8%	6	0.48	0.80	NDP IV agro - industrialisation; Animal Feeds Bill (market formalisation); 60% poultry import tariff protection. Ad hoc export ban risk is material and recurrent - scored conservatively at 3 to reflect this structural policy uncertainty.
Financial sector co - financing readiness	8%	8	0.64	0.80	UDB (Tier 2), Stanbic/Centenary (Tier 1), Aceli Capital, GCU pilot on - lending. Infrastructure confirmed through KII. Gap: GCU pilot still conceptual.
Gender and social inclusion	5%	6	0.30	0.50	WARC (60 - 70% women farmers in Lira cluster via Jeroma); SR Kuku rural poultry model. Feed mill technology investment is capital - intensive and male - dominated at enterprise level. Gender impact is indirect (farm - gate price, input access).
Strategic anchors and market - making potential	10%	10	1.00	1.00	De Heus incoming factory (100 - 120K MT/yr maize pull). Kenchic. Ugachick GDP - multiplier. Mandela Millers feed line unlocking poultry industry supply chain. Strong anchor ecosystem.

TOTAL WEIGHTED SCORE	**100%**	**-**	**8.98 / 10.0**	**10.0**	**Grains and Animal Feeds: Overall MCDA score 8.98/10.0. Recommended as a Priority 1 sector - strong performance across all ten criteria, with two deliberate conservative scores on enterprise readiness (5% weight; brownfield audit gap) and regulatory environment (export ban risk).**

Source: A2i GRASP/GTTF Sector Assessment Framework (2026). Scores derived from KII evidence, enterprise data, and Day One Validation session (10 August 2026). MCDA is indicative and subject to central moderation by the GTTF programme team.

8.7.5 EU and Danish RIO Markers: Cross - Cutting Impact Assessment

Under the OECD DAC RIO Markers framework - the standard cross - cutting development objective system applied by both the EU and Denmark - this investment qualifies positively against all four markers.

- **Climate Change Mitigation (Marker 1, Score 1 - Significant Objective):** Danish energy - efficient drying technology (Cimbria CycloForce low - energy fans; BM Silo recirculating batch dryers) and precision feed pelleting (ANDRITZ, Van Aarsen) reduce fossil fuel combustion per tonne of processed grain. Biogas from oilseed processing residue (Bigadan A/S) substitutes fossil fuel at SR Kuku/Wind Green and Mukwano, capturing processing waste as renewable energy. This is scored as a significant - rather than principal - objective because the primary purpose of these investments is food security and commercial processing quality; climate co - benefits are material but secondary to the investment rationale.

- **Climate Change Adaptation (Marker 2, Score 2 - Significant Objective):** Hermetic storage and commercial - scale drying directly build resilience against climate - induced post - harvest losses - the primary mechanism by which El Niño and drought events translate into food insecurity for 1.5 million maize - farming households. By reducing the 20 - 30% post - harvest loss rate, GTTF investments make supply chains more robust to climate variability, protecting farm incomes in years of weather disruption.

- **Biodiversity (Marker 3, Score 1 - Significant Objective):** Reduced post - harvest burning of aflatoxin - contaminated grain protects soil biodiversity and reduces particulate emissions. Organic fertiliser from poultry and feed by - products - SR Kuku's nitrogen - capture programme; Mukwano's oilseed cake - reduces chemical fertiliser dependence and improves soil ecology. Aflasafe biological control (WARC pilot) introduces beneficial fungal competition, reducing reliance on chemical aflatoxin treatment.

- **Desertification (Marker 4, Score 1 - Significant Objective):** Assured off - take and quality - based pricing - Mandela Millers USD 0.25 (UGX 900)/kg; WARC mobile money; KAMP Group 120 - stockist model - raise farm - gate revenue per hectare, reducing the economic pressure on farmers to clear additional marginal land in northern Uganda's fragile savannah ecosystems. Higher returns per hectare favour intensification over horizontal land expansion.

Denmark Africa Strategy 2024 Alignment: The Danish Government's Africa Strategy 2024 identifies agri - food systems transformation, green technology transfer, and private sector engagement as priority thematic pillars. GTTF's grain and feed sector investments - centred on Danish technology providers (Cimbria A/S, ANDRITZ, BM Silo ApS, Bigadan A/S, SKIOLD A/S) delivering measurable post - harvest loss reduction and feed

quality improvement - align directly with all three pillars. The Denmark - Uganda bilateral channel, confirmed via Danish Embassy coordination for GTTF technology provider introductions, provides the institutional conduit for GOU priorities meeting EU technology comparative advantage.

8.8 Investment Conclusion:

8.8.1 Five Case Model

The Five Case Model - the standard investment appraisal framework for public and donor - funded programmes - requires that a proposed investment be justified across five dimensions simultaneously. A programme that passes on four of five cases but fails the fifth carries a residual risk that can unravel implementation. The grain and animal feed value chain investment case is assessed below against each dimension, drawing on the evidence gathered across Pillars 1 - 7.

01	**STRATEGIC CASE**The strategic case rests on four convergent alignments. NDP IV's agro - industrialisation mandate explicitly targets grain - based processing and animal feed manufacturing. The EU's and Denmark's technology and market - development interests in Uganda's agri - food sector align directly with GTTF's mandate. The Ugandan Government's import substitution objective - documented in the Animal Feeds Bill, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s feed sector investment priorities, and Mount Meru's three - year export restriction petition - creates a policy environment favourable to domestic processing investment. And the incoming De Heus factory's 100,000 - 120,000 MT/yr demand, predicated on low - aflatoxin, commercially aggregated maize, creates a market - pull that will either be met by GTTF - supported Ugandan suppliers or filled by imports. **The strategic case is strong.**

02	**COMMERCIAL CASE**Commercial viability rests on three pillars. First, the price differential between raw grain (US$ 190 - 260/MT) and finished complete feed (US$ 700 - 850/MT) represents a 3 - 4× value multiplication that generates genuine enterprise profit motive. Second, De Heus's guaranteed off - take, confirmed across multiple KIIs, removes demand - side risk for quality - compliant grain suppliers - WARC's 15,000 MT target next season is underpinned by a commercial buyer relationship rather than speculative demand. Third, the 60% chicken import tariff creates a protected commercial environment for Ugandan poultry and feed enterprises, confirmed through KII field intelligence - the tariff is described as existential to the domestic industry. **The commercial case is strong for Tier 1 and viable for Tier 2, conditional on quality standards being met.**

03	**FINANCIAL CASE**The financial case is grounded in the capital stack analysis in Table 8.11. The 5:1 leverage ratio is the programme - level design ambition for GTTF as a whole - not a floor applied to every individual deal - and the grain and feed sector is well - placed to meet it in aggregate. Tier 1 enterprise deals (KAMP Group, Mukwano lecithin, Mount Meru plant renewal) can access Stanbic Bank and Centenary Bank commercial debt at 5:1 - 10:1 leverage. Tier 2 deals (WARC drying facility, Mandela Millers feed plant) can access Uganda Development Bank UGX - denominated long - tenor facilities at 10 - 12%, confirmed through KII field interviews with Ugachick and SR Kuku/Wind Green. Against the FAO's estimated investment gap of US$ 150.1 million for domestic animal feed manufacturing, even a GTTF allocation of US$ 2 - 3 million in matching grants can catalyse US$ 10 - 15 million in total investment if structured to crowd in commercial co - financing rather than substitute for it. The GCU pilot on - lending facility (USD 100 - 150K) is the most efficient working capital unlock - extending seasonal credit to 200+ member businesses through a sector institution that already commands trust. Read together rather than deal - by - deal, the grain and feed pipeline in this chapter already clusters into an aggregate programme of meaningful scale: Mount Meru's planned US$ 25 million Lira plant renewal, the three - company lecithin proposal (approximately US$ 2.4 - 3.6 million combined), KAMP Group's silo and aquafeed expansion, and the WARC and Jeroma cooperative - drying deals together represent a **pipeline in the US$ 30 - 40 million range** — consistent with the sector - validation steer to frame GTTF's grain and feed offer around a small number of larger, bankable transactions rather than a large number of small ones.

04	**SOCIO - ECONOMIC CASE**The socio - economic case is unusually strong for a processing - sector investment. Post - harvest loss reduction of 1.2 - 1.5 million MT/yr equivalent - even if 20% of that is captured through GTTF - supported drying and cleaning - generates direct income gains for 1.5 million smallholder maize - farming households through better farmgate prices and reduced rejection rates. Mandela Millers' USD 0.25 (UGX 900)/kg premium for compliant grain against a USD 0.22 (UGX 800)/kg market price demonstrates that quality - based pricing translates to real farm income uplift. KAMP Group's 6,000 smallholder farmers connected through 120 distribution stockists, and WARC's 4,500 registered farmers with digital income records, illustrate the inclusive linkage model. The Grain Council's 200+ member businesses and 1.2M MT storage infrastructure represent a collective asset whose utilisation improvement (from 30% to 60%+, through working capital access) generates economic activity across multiple grain - producing districts. Gender and youth dimensions include the 0% interest Government facility for 50+ acre farmers and Youth Fund equity in KAMP Group's capital structure.*The EU and Danish RIO Markers assessment for this investment - covering all four markers (Climate Mitigation, Climate Adaptation, Biodiversity, Desertification) and Denmark Africa Strategy 2024 alignment - is presented in detail in* ***Section 8.7.5** of this chapter.**

05	**MANAGEMENT CASE**The World Bank evidence base is unambiguous: technology - alone interventions in agri - processing underperform. (World Bank, 2023) A2i must design a BDS component covering HACCP documentation, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification processes, EU supplier negotiation, and NIR quality system training as an integral part of every Tier 1 and Tier 2 deal. Three enterprise - specific management flags from KII field intelligence warrant explicit attention: (1) Ugachick's historical Danish joint - venture failure - attributed to financial recordkeeping incompatibility - underscores that ERP and management information system readiness is a pre - condition for EU technology partnerships, not a follow - on; (2) Mount Meru's ownership structure (Dubai - based) means GTTF outreach must engage company directors rather than the Uganda country manager alone; (3) Jeroma Farmers Collection Centre Ltd is confirmed as a Tier 3 investment candidate following KII on 5 August 2026 in Pader - the cooperative cluster model is operationally credible, the Managing Director has strong sector relationships with Zara Foods, Mukwano, and Afro/AfroKai, and the Lira Industrial Park hub concept is fundable subject to working - capital structuring alongside the equipment grant. The management case is viable but requires deliberate BDS design from the outset. A further condition worth stating explicitly: governance and succession weakness is not confined to Tier 3 cooperatives in this sector. lit appears even at Tier 1 and Tier 2 level, where ownership is often concentrated in a single family or individual (Mount Meru's Dubai - based ownership and KAMP Group's single Danish owner are both noted above). GTTF matching - grant capital should therefore be paired, as a condition of disbursement rather than an optional add - on, with strengthening of governance structures and standard operating procedures with succession planning included, so that co - financing banks and the fund itself are not left exposed to key - person or ownership - transition risk after the technology is installed. Several of this chapter's recommended interventions are, by design, better suited to a consortium application than a single applicant: a cooperative drying grant realistically needs an equipment supplier (Cimbria or BM Silo), a BDS/technical - assistance provider for certification readiness, a co - financing bank, and a named off - taker (as in the Mandela Millers and WARC structures above), each covering one component rather than one enterprise being expert in all four.

8.8.2 Key Investment Interventions

1. The single highest - ROI intervention is expanding commercial grain drying and cleaning infrastructure - currently handling only 20 - 25% of Uganda's annual maize crop. Cimbria/BM Silo technology at aggregator and cooperative scale is the primary vehicle, paired with working capital structuring (2:1 WC - to - plant ratio).2. KAMP Group is the most naturally aligned GTTF candidate: Danish equity, existing Skiold/Cimbria equipment, 6,000 farmers, 120 stockists. The specific expansion (silos, aquafeed, farmer training) should be determined by matching - grant feasibility analysis.3. Lecithin extraction from soybean refining gums is a sector - wide opportunity independently identified at Mukwano, Mount Meru, and SR Kuku/Wind Green.

A cross - cutting, three - company GTTF proposal (~US$ 1M plant cost per facility) is more powerful than three separate approaches.4. WARC Uganda is the strongest Tier 2/cooperative case: De Heus off - take guarantee removes demand risk; the 4,500 farmer base provides supply; BM Silo Danish dryer technology is appropriate at 40 - 50 t/day scale. Working capital must be co - designed from the outset.5.

Raw soybean export policy, the Animal Feeds Bill, and the grain export ban risk are the three policy levers that will determine whether GTTF investments generate durable returns or are periodically disrupted by regulatory decisions. GRASP should engage Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), PSFU, and UMA jointly on all three.6. Jeroma Farmers Collection Centre Ltd (Pader / Lira Industrial Area): KII completed 5 August 2026. Confirmed Tier 3 investment candidate - priority investment sequence: dryer, cleaner, silo, upgraded mill at planned Lira Industrial Park hub. 10,000+ farmers across 11 districts (6 Lango, 4 Acholi, 1 Karamoja); off - takers include Zara Foods, Mukwano, and Afro/AfroKai. Centenary Bank relationship developing. Equator Seeds seed input partnership (AFAP MOU) in place.

8.8.3 Key Findings and Investment Implications

The following table summarises the principal analytical findings from this chapter, mapped to their direct investment implications for GTTF programme design. This table should be read alongside the MCDA scoring (Table 8.13, score: 8.98/10.0, Priority 1) and the capital stack (Table 8.11). These are the chapter's eight down - selected priority interventions, chosen over the fuller technology matrix in Section 8.4.2 in line with the sector - wide steer toward a small number of high - impact investments rather than broad coverage.

Table 8.14 - Key Findings and Investment Implications (August 2026)

Key finding	Investment implication
Only 20 - 25% of Uganda's annual maize harvest passes through commercial drying and cleaning before downstream processing. Every quality failure downstream - aflatoxin concentration in feed, rejection by institutional buyers, non - Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - compliant flour - is seeded at this gap.	The single highest - ROI GTTF intervention is expanding commercial grain drying and cleaning infrastructure. Cimbria / BM Silo Danish technology at aggregator and cooperative scale is the primary vehicle. Working capital must be co - designed (2:1 WC - to - plant ratio confirmed as minimum by programme adviser).
The animal feed market is growing at ~5% CAGR with a structural demand - supply gap of 36 - 45%. EU feed premix imports reached US$ 59M in 2023 - import substitution potential of US$ 40M by 2035 if domestic processing quality reaches specification.	ANDRITZ, SKIOLD, and Van Aarsen pellet mill and conditioning upgrades at Tier 1 feed manufacturers are the primary import substitution lever. Precision NIR formulation and ingredient quality is the prerequisite.

KAMP Group (Nwoya) is the most naturally aligned GTTF candidate: Danish equity, existing Skiold/Cimbria equipment, 6,000 farmers, 120 - stockist distribution network, profitable without subsidy.	GTTF co - financing at 5:1 leverage for silo expansion and aquafeed extrusion line. Cimbria silo extension (existing system - lowest technology risk) should be the first deal.
Lecithin extraction from soybean refining gums is an untapped, high - value opportunity independently identified at Mukwano, Mount Meru, and SR Kuku/ Wind Green. Each is discarding or undervaluing a by - product worth US$ 2,000 - 4,000/MT globally.	A cross - cutting, three - company GTTF proposal (one plant per facility, ~US$ 800K - 1.2M each) is more powerful than three separate approaches. GEA and Desmet Ballestra are the primary EU technology providers.
WARC Uganda has a De Heus guaranteed off - take (100,000 - 120,000 MT/yr total need) that removes demand risk from the drying investment case. It is the strongest Tier 2/cooperative case in the grain sector.	GTTF grant (40 - 50 t/day BM Silo dryer, ~US$ 150 - 200K) paired with working capital co - structuring. This is a confirmable deal with a named off - taker and an identified technology provider.
Jeroma Farmers Collection Centre Ltd (Pader/Lira) aggregates 10,000+ farmers across 11 districts. The sole barrier to premium commercial buyer access is the absence of a drying facility.	GTTF Tier 3 grant for centralised dryer + cleaner at Lira Industrial Park hub. Equator Seeds AFAP MOU provides embedded seed input linkage upstream.
The grain export ban and the Animal Feeds Bill enforcement timeline are the two policy variables with the greatest potential to affect GTTF investment returns. Processors and aggregators need price certainty and market access.	GTTF deals should incorporate policy trigger clauses. GRASP should engage Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), PSFU, and UMA jointly on export ban notification requirements and Animal Feeds Bill implementation support.
GCU's 30% warehouse utilisation rate is a working capital problem, not a physical infrastructure deficit. The 9 - 18 month loan disbursement timeline is the structural constraint.	GCU pilot on - lending facility (US$ 100 - 150K) is the most capital - efficient working capital unlock - reaching 200+ member businesses through a trusted sector institution. GTTF could capitalise the facility.

Source: A2i GRASP/GTTF Landscape Study - Grain and Animal Feed Value Chain. August 2026. Version 10.

Table 8.15 - Stakeholder Consultation Log (as of 12 August 2026)

Organisation	Contact / Role	Date	Method	Notes
Mukwano Industries Ltd	Senior management (agri - processing and distribution)	2 Jul 2026	Virtual KII	Oilseed processing; concentrate model; lecithin opportunity; aflatoxin constraints on Kenya export.
SR Kuku / Wind Green International	Company management (post - merger)	6 Jul 2026	Virtual KII	Vertically integrated model; Buhler installation; biogas opportunity; aflatoxin in northern maize.

Mount Meru Millers (Uganda) Ltd	Country management and operations	13 Jul 2026	Virtual KII	Raw material constraint; US$ 25M Lira plant plan; EU equipment cost gap; soybean export policy.
KAMP Group Limited	Managing Director (Danish owner, Tom)	15 Jul 2026	In - person, Kampala	Danish - owned feed mill; Skiold/Cimbria; silo expansion; aquafeed; northern corridor distribution.
WARC Uganda	Management + programme adviser	16 Jul 2026	In - person, Kampala	Hub - and - spoke aggregation; De Heus off - take; BM Silo primary ask; working capital 2:1 ratio.
Ugachick Poultry Breeders Ltd	Senior management	21 Jul 2026	In - personKampala	8 - 9M DOC/yr; 60% import tariff; UDB primary lender; per - capita consumption growth runway.
Mandela Millers Ltd	Senior management	29 Jul 2026	In - person, Kampala	Quality premium model; Buhler dryer; feed plant launch; cooperative off - taker opportunity.
Grain Council of Uganda (GCU)	GCU leadership	30 Jul 2026	In - person, Kampala	30% warehouse utilisation; 9 - 18 month loan lag; pilot on - lending facility; Pearl Bank engagement.
Equator Seeds Ltd	Company management	4 Aug 2026	In - person, Gulu	Phase 1 processing facility (under construction); Cimbria equipment; AFAP MOU with Jeroma.
Jeroma Farmers Collection Centre Ltd	The Managing Director (ex - Mukwano)	5 Aug 2026	In - person, Pader	11 - district aggregation; 10,000+ farmers; Lira Industrial Park hub concept; financing history.
Buhler Group East Africa (Nairobi)	Bulher Engineer) (Brown field / process optimization) + Buhler Regional Animal Nutrition Solutions Manager for Eastern Afirca)	7 Aug 2026	In - person, Kampala	Brownfield audit process; quality guarantee model; Uganda pipeline (Mandela, SR Kuku); GDP inflection point and feed market timing.

aBi Development Ltd / A2i	Day One Validation Session - full project team	10 Aug 2026	In - person, Kampala	HAL investment criteria confirmed; enterprise pipeline reviewed; GTTF design parameters confirmed.

All KII transcripts are confidential field intelligence documents. Available to GTTF programme team on request via A2i project lead.

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Chapter 9 : Horticulture Value Chain Assessment

Sector Context

Uganda's horticulture sector presents a commercially significant green - technology opportunity because market growth, regional demand, export - pathway losses and current compliance risk converge around specific investment functions. SITC 05 export receipts rose from USD 136.3 million in 2016 to USD 338.3 million in 2025, while imports rose to USD 287.2 million and the export/import coverage ratio narrowed from 3.3x to 1.2x. CICS records show approximately 13.2 million kg entering the regulated export pathway between May 2025 and March 2026, but monthly export success ranged from 28% to 73%, with a volume - weighted average of about 49%. RUSH and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/DCIC evidence confirms packhouse wastage and current pest, documentation and pesticide - residue exposure. **The landscape therefore supports five functional technology windows**: aggregation and first - mile handling; processing and preservation; quality, compliance, testing and traceability; reliable production and input services; and route - specific cold - chain logistics. Enterprise evidence is concentrated in seven evidence - bearing cases and is analysed by investment function rather than by a broad prospect ranking.

Enterprise evidence has been deliberately narrowed to cases where the current record supports a specific statement about the operator, the commercial constraint and the likely first investment function. Seven evidence - bearing cases are retained: Nile Hortlife, Agricado Farms and Avotein Farms for aggregation and first - mile systems; Green Oceanstar and Amfri Farms for processing and preservation; Thyma Herbs for certified - supply expansion; and Chemiphar Laboratories for compliance - testing access. Other prospects remain in the internal register but are not used to support analytical conclusions.

European and Danish technology should be introduced only after the Uganda - side function and operating scale are validated. The comparative proposition to test is lifecycle value - energy efficiency, durability, certified performance, warranty, serviceability and buyer confidence - rather than lowest capital cost. Supplier - fit mapping is therefore a downstream transaction - development step, not evidence for the existence of the opportunity itself.

Key Findings

- Strong commercial growth but rising import pressure: Uganda's horticulture sector has significant production and export potential, with SITC 05 exports reaching USD 338.3 million in 2025**,** but the export/import coverage ratio has narrowed from 3.3x to 1.2x**,** indicating increasing import pressure.
- Post - harvest losses are a major source of lost value: Significant wastage occurs through bruising, over - maturity, poor grading and handling, with reported losses reaching 12.1% for hot pepper, 9.7% for chilli and 9.3% for bird - eye chilli**.** This creates investment opportunities in aggregation, packhouses, grading, controlled drying and first - mile logistics.
- Compliance failures are constraining export - market access: Pests, documentation/certification weaknesses and pesticide - residue risks remain important causes of export disruption, particularly for chilli/capsicum. Strengthening traceability, spray/PHI records, risk - based sampling, testing and phytosanitary

controls is therefore critical.

- The strongest GTTF opportunity is targeted technology upgrading rather than generic infrastructure: Five investment windows emerge reliable production/input services, aggregation and first - mile handling, processing/preservation, selective cold - chain logistics, and quality/compliance/traceability. Enterprise evidence supports targeted interventions, while technology selection should be based on lifecycle value, energy efficiency, reliability and serviceability rather than lowest upfront cost.

9.1 Pillar 1: Historical Baseline and Sector Context

9.1.1 Sector Overview

Uganda's horticulture landscape spans fresh and dried fruits and vegetables, flowers and ornamentals, herbs and spices, selected processed products, and enabling services such as logistics, laboratory testing and traceability. Official and administrative data confirm commercial scale: total fruit and vegetable production is estimated at 5.3 - 5.8 million tonnes per year; FY2024/25 fruits and vegetables exports reached 191,508 MT worth USD 102.56 million; cut flowers and live plants generated about USD 68.0 million; and the broad SITC 05 export series reached USD 338.3 million in 2025 against imports of USD 287.2 million. These aggregates establish market activity, but the investment implication now requires two different readings. On exports, priority crops and operators help identify where market access, handling and product - form constraints can be validated. On imports, the analysis must be data - led: rank product lines by value, quantity, unit value, origin and persistence before treating any item as a substitution opportunity.

Table 9.1 - Horticulture Sector Snapshot, FY2024/25

Indicator	Value	Investment reading
Total horticulture production (fruit and vegetables)	5.3 - 5.8 million MT/year	Production base exists; investment question is conversion to market - ready supply.
Fruits and vegetables exports FY2024/25	191,508 MT; USD 102.56m	Formal export pathway is active but needs route - specific technology validation.
Cut flowers and live plants exports FY2024/25	USD 68.0m	Commercially significant and kept in scope; likely low additionality unless route/cold - chain constraint is proven.
SITC 05 broad export receipts, 2025	USD 338.3m	Market pull exists; avoid double - counting with other classification series.
SITC 05 broad imports, 2025	USD 287.2m	Import pressure is material; product - form disaggregation needed before substitution claims.
Export/import coverage ratio, 2016 to 2025	3.3x to 1.2x	Broad trade cushion has narrowed; conversion capacity must be tested.

CICS export - pathway intake, May 2025 - Mar 2026	Approx. 13.2 million kg	Commercial pathway flow exists; success and utilisation vary by month and route.
CICS monthly export - success rate	28% - 73%; volume - weighted average about 49%	Evidence of conversion risk, not a capacity - utilisation rate.
Analytical enterprise set	7 evidence - bearing cases	Sufficient for opportunity definition, not final ranking or asset sizing.

Source: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; UFEA Annual Sector Report 2024/25; UBOS merchandise trade data; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/CICS export - pathway records; A2i enterprise KIIs and last - mile evidence review.

Figure 9.1 - SITC 05 Horticulture Exports, Imports and Trade Balance, 2016 - 2025

Source: UBOS merchandise trade data and/or ITC Trade Map, 2016 - 2025; author calculations. The coverage ratio narrowed from 3.3x in 2016 to 1.2x in 2025. This is a broad import - pressure and product - form signal; it does not by itself identify specific substitutable products

Box 9.1 - What the current UBOS trade signal can and cannot prove
Can conclude: exports are growing, imports are rising faster, regional routes are active and the trade cushion has narrowed.
Cannot yet conclude from SITC 05 alone: which exact product forms are substitutable, which origins Uganda can compete against, which unit values support processing, or which asset should be financed.
Required closure: HS - level product form, quantity, origin, destination, unit value and customs - regime data from UBOS/URA, plus enterprise - level buyer, price, cost, throughput and loss evidence.

9.1.2 Preliminary import opportunity scan

A preliminary import screen from the available UBOS formal imports and exports sheets adds a sharper opportunity question. The import surge is not only a remote global - supply issue. In the 2025 HS07/08/20 basket reviewed for the interim deck, Kenya and Tanzania supplied the largest share of formal import value, and several leading lines were ordinary regional crops or product forms. This strengthens the hypothesis that part of the investment case may be competitiveness against neighbouring supply systems, not only substitution of distant imported products.

Figure 9.2 - Key Export Crops by Commercial Significance

It is important to note that above figure is dominated by potatoes and can misconstrue the interpretation, however, even after removing the potatoes, the remaining value chains show a surge in imports over the last 10 years as shown below.

The finding must still be treated as a screen. Import value alone can mislead where customs unit values jump, where volumes are episodic, where products are re - exported, or where imports are temperate/non - substitutable. For Uganda, the imports are not temperate but crops Uganda grows and exports. So why does Uganda import crops it grows? the answer hides in our seasonal fluctuations. We produce and consume fresh but lack the capacity to convert our production into reliable stable supply across the year.

9.1.3 Two market routes, two technology logics

The trade evidence points to two investment routes with different technology needs. Local and regional routes reward aggregation, handling discipline, shelf - life and product form. Global export routes reward traceability, documentation, residue control, testing and cold - chain continuity. The same crop can move through both routes; therefore technology should not be tested generically. It should be tested against the buyer route, product form and operator economics.

Figure 9.3 - Route logic for horticulture investment screening

9.4 Pillar 4: Green technology opportunity architecture

9.4.1 Technology windows are functions, not crops

The horticulture technology architecture is organised around five functional windows defined by what must improve commercially, not by crop or enterprise type. This avoids overlapping labels and keeps the analysis anchored in evidence: reliable supply, controlled aggregation, preservation, compliance and route continuity. Cold chain is treated as a selective technology layer rather than a default response, because some operators already have cooling and the business case depends on crop biology, route time, protected value and utilisation.

Table 9.5 - Green technology opportunity windows: horticulture

Window	Function	Commercial problem addressed	Primary technology / service response	Evidence - bearing crops / enterprises	Danish/EU proposition to test
M1	Reliable production and input - service infrastructure	Supply is inconsistent or cannot meet certification, residue or quality requirements at farm level	Protected production where justified; drip/ fertigation; climate monitoring; spray/PHI records; digital agronomy; certified - grower systems	Thyma Herbs; chilli/capsicum supply systems; export herbs	Precision, certified performance, input efficiency, traceable production systems and serviceability
M2	Aggregation, packhouse and first - mile handling	Physical damage, weak consolidation, poor grading and unreliable market - ready handling	Crates; field bins; weighing; grading/sorting; packhouse intake systems; packaging; collection logistics	Nile Hortlife; Agricado Farms; Avotein Farms; avocado, banana, garden eggs	Durable food - grade handling, calibrated grading, traceable intake and life-cycle reliability

M3	Processing, preservation and value addition	Fresh/raw product loses value because it is not converted into stable, specified product forms	Controlled drying/dehydration; slicing; moisture testing; pulping/ processing; packaging; energy - efficient preservation	Green Oceanstar; Amfri Farms; chilli, ginger, fruit lines	Energy efficiency, controlled process quality, hygienic design, monitoring and reliable service
M4	Cold - chain logistics and market continuity	Temperature - sensitive routes lose quality where cooling is justified but discontinuous or poorly sized	Pre - cooling; modular cold rooms; reefers; temperature logging and route monitoring	Embedded in Nile, Agricado, Avotein and Amfri; flowers; selected fresh avocado routes	High - reliability refrigeration, efficiency, monitoring, warranty and serviceability only where route economics prove need
M5	Quality, compliance, testing and traceability	Pest, documentation and residue failures reduce buyer confidence and can destroy export value	Digital traceability; spray/ PHI records; sampling; lab testing; certification management; field - to - lab access	Chemiphar; chilli/capsicum; garden eggs; flowers and other fresh exports	Accredited performance, defensible records, system integration, service quality and buyer confidence

Source: A2i landscape analysis; UBOS trade evidence; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/CICS and Swisscontact/RUSH loss evidence; EUROPHYT/TRACES and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/DCIC compliance evidence; A2i enterprise KIIs and last - mile evidence. The five windows are opportunity functions, not final investment approvals.

Table 9.6 - Crop - technology specification matrix

Crop / product group	M1 Production / supply	M2 Aggregation	M3 Processing	M4 Cold chain	M5 Compliance
Avocado (Hass)	Conditional	LEADING	Conditional fallback	Conditional / route - specific	Required
Cut flowers and cuttings	Conditional	Supporting	-	LEADING	Required
Chilli / hot pepper / bird - eye chilli	Required	Required	LEADING	Conditional	LEADING
Ginger	Conditional	Required	LEADING	Conditional	Required
Apple banana / plantain	-	LEADING	Conditional	Conditional	Supporting

Garden eggs / aubergine	Required	LEADING	Conditional	Conditional	LEADING
Pineapple / mango / passion fruit / citrus	Conditional	LEADING	LEADING	Conditional	Conditional
Fresh chives / export herbs	LEADING	Supporting	-	Conditional	Required

LEADING = strongest current technology implication for the product/route. Required = market - access or quality prerequisite. Supporting/Conditional = relevant only where buyer, route, throughput and economics prove need. Dash means no current landscape - level case. Matrix specifies technology logic; it is not a crop ranking.

9.5 Pillar 5: Enterprise evidence and investment pipeline

9.5.1 Evidence - bearing cases by investment function

The enterprise analysis is deliberately narrower than the original prospecting list. Cases are included only where the current evidence supports a specific statement about the operator, the commercial constraint.

Four primary development pathways emerge: aggregation and first - mile systems; processing and preservation; certified - supply expansion; and decentralised compliance - testing access. Cold - chain technology is embedded within specific fresh - export cases and is not treated as a standalone enterprise category until route economics and utilisation are demonstrated.

Table 9.7 - Evidence - bearing enterprise set by investment opportunity

Opportunity category	**Evidence - bearing enterprises**	**Evidence depth**	**Investment model indicated**	**Critical remaining gap**	**Current report treatment**
Aggregation, packhouse and first - mile	Nile Hortlife; Agricado Farms; Avotein Farms	Direct engagement; Nile documentation sighted; Agricado site/ asset observation; Avotein management intake and price observations	Own integrated facility; aggregation into existing assets; distributed hub/logistics model	Throughput, asset utilisation, handling/ logistics cost, loss/down-grade and first - asset sizing	Strongest enterprise - backed category; advance to focused validation

Processing and preservation	Green Oceanstar; Amfri Farms	Direct engagement; Amfri site/asset observation; Green Oceanstar operating model clarified	Greenfield processing/ drying facility; incremental expansion of established platform	Buyer specs, throughput, conversion yield, energy and price economics	Retain as leading category; no generic dryer conclusion
Certified supply / production services	Thyma Herbs	Direct engagement; active production and modern packhouse observed; exporter status corroborated	Certified outgrower expansion and protected - production/service system	Buyer demand, target certified volume, certification model/ cost, first asset and economics	Retain as specific upstream case
Compliance / testing access	Chemiphar Laboratories	Direct engagement; accredited laboratory capacity exists	Mobile screening, sample collection/ tracking and private inspector network linked to existing lab	Samples/ month, prices, turNational Agricultural Research Organisation (NARO)und, spare capacity, willingness to pay and service model	Retain as system - enabling access - extension case
Cold - chain logistics	Embedded in Nile, Agricado, Avotein and Amfri	Route - specific need; some operators already have cooling	Selective pre - cooling, cold rooms or reefer logistics only where route economics prove need	Temperature requirement, duty cycle, current capacity/utilisation, energy cost, protected value	Do not treat as standalone enterprise category yet

Source: A2i enterprise KIIs, site/document review and last - mile evidence collection, June - August 2026; Avotein management intake. Management claims are treated as provisional unless independently corroborated. This table is an evidence grouping, not an enterprise ranking.

9.5.2 Priority pathways and first investment tests

Table 9.8 - Transaction - development requirements by opportunity pathway

Pathway	Current evidence position	Transaction development required	Technology - matching focus	Capital treatment at this stage

M1 - Certified supply / production services	Specific Thyma case; operator and certified - supply bottleneck defined	Buyer demand, target certified volume, certification cost/model, farm/packhouse throughput, first asset and economics	Grower - control systems; protected production or irrigation only where volume and seasonality justify	No asset envelope assigned; feasibility and operating - model validation first
M2 - Aggregation / first mile	Strongest enterprise - backed category; Nile, Agricado and Avotein show distinct asset positions	Throughput, current/shared asset utilisation, loss/ downgrade, access/logistics cost and first - asset sizing	Durable handling, intake/grading systems, packhouse workflow, selective conditioning and traceability	Case - specific feasibility; do not replicate one infrastructure design across all cases
M3 - Processing / preservation	Greenfield case (Green Oceanstar) plus expansion case (Amfri)	Buyer spec, raw - material throughput, conversion yield, product prices, energy cost and existing utilisation	Controlled drying/ processing, moisture and quality control, hygienic design and energy efficiency	Demonstration or capital partnership only after product economics are validated
M4 - Cold - chain logistics	Conditional and embedded; some retained operators already have cooling	Crop temperature need, route time, capacity/utilisation, duty cycle, energy cost and value protected	Pre - cooling, modular cold rooms, reefers and monitoring only where route - specific need is proven	No standalone cold - chain allocation at landscape stage
M5 - Compliance / testing access	Strong system evidence; Chemiphar defines access - extension around existing accredited capacity	Sample demand, prices, turNational Agricultural Research Organisation (NARO)und, spare capacity, service radius, willingness to pay and operating model	Mobile sample access, screening/ inspection tools, traceability and accredited lab integration	Service - model feasibility before new laboratory equipment or sector facility

Source: A2i transaction - development logic using evidence - bearing cases in the horticulture chapter. This is a validation agenda, not an investment approval table.

9.6 Pillar 6 Investment Development and Capital Stack

9.6.1 The Opportunity Evaluation Tool is the line between looking and backing

The landscape evidence now supports defined opportunity pathways, as shown below.

However it does not support assigning final grant sizes, supplier quotations or capital stacks to named enterprises. Instrument choice should follow, not precede, validation of the operator, buyer route, throughput, monetisable constraint, correctly sized first investment, measurable green additionality and serviceable technology specification.

Table 9.9 - EOpportunity Evaluation Tool: nine hard gates

Gate	Decision test	Evidence required before a candidate is called investable
1. Operator identity	Is the operator named, legitimate and accountable?	Registration/identity, management accountability, site/node and operating role.
2. Buyer route and standards	Is there real demand with known specifications?	Buyer/destination, standards, product form, quality specification and route.
3. Throughput and timing	Is current and peak volume sufficient for the asset?	Monthly/peak throughput, seasonality, catchment and existing capacity.
4. Monetisable constraint	Can the problem be priced?	Avoided loss, grade uplift, price spread, cost saving or reduced access risk.
5. Green additionality	Does the investment create measurable green benefit?	Energy, water, waste, loss, resilience or compliance baseline and metric.
6. Technology fit and serviceability	Is the solution technically suitable and maintainable in Uganda?	Capacity, supplier specs, warranty, spares, local service and operator skills.
7. Grant / commercial additionality	Would GTTF support de - risk a deal that would otherwise stall?	Counterfactual, co - finance constraint, grant rationale and leverage path.
8. Capital stack	Is the financing pathway credible?	Enterprise contribution, debt/ supplier finance, working capital and grant share.
9. Post - support sustainability	Will the asset or service run after support?	O&M budget, service contract, skills, buyer continuity and governance.

Source: A2i/GTTF Opportunity Evaluation Tool logic. Green additionality and grant/commercial additionality are separate gates.

9.6.2 Evidence routing: every signal has a destination

The evidence is not equal or not every observation leads to a recommendation. Live signals move to validation; incomplete signals are gated; plausible but unquantified ideas are parked; mature/low - additionality routes are excluded from lead status; and broad contextual evidence stays contextual.

Table 9.10 - Evidence - routing table for horticulture opportunity development

Signal	Decision	Why	Closure route	Risk if over-claimed
Chilli / pepper	LIVE	Loss, MRL risk and processing logic converge.	Operator + buyer + price - spread + product - form validation.	Drying sold as standalone fix.
Aggregation / first - mile	LIVE	Regional demand plus CICS/QCP wastage show conversion losses.	Measure avoid-ed damage and throughput eco-nomics.	Infrastructure with-out utilisation.
Testing / trace-ability	LIVE	Offshore testing and SPS losses make compliance monetisable.	Uganda National Bureau of Stan-dardsUganda National Bureau of Standards (UNBS)/Chemiphar footprint, turNa-tional Agricultural Research Organi-sation (NARO)und, cost and willing-ness to pay.	Lab viability as-sumed too early.
Bananas	GATED	Growth visible, but fresh/frozen/dried/ flour forms matter.	URA/UBOS HS split, buyer route and operator eco-nomics.	Product form ignored.
Flowers	EXCLUDE FROM LEAD / KEEP IN SCOPE	Commercially strong but likely mature; GTTF ad-ditionality must be specific.	Use for route - specific cold - chain/compliance evidence if eco-nomics shift.	Mature sector treated as priority without addition-ality.
Import substitu-tion	GATED	Import bill is pres-sure; preliminary import screen exists but final addressable share is unresolved.	HS product forms, origins, quantities, unit values, re-gimes and enter-prise feasibility.	Substitution claimed before product proof.
FHL exit scanner	PARK	Plausible box - in-tegrity mechanism; attributable loss unquantified.	Destination QC reports, box/pallet damage data and formal interview.	Interesting idea presented as a case.
Technology im-ports	CONTEXT	Shows economy - wide absorption, not horticulture - specific asset demand.	HS machinery extraction plus enterprise - side need and service-ability.	Supplier matching before Uganda - side business case.

Source: Author synthesis from Sections 9.1 - 9.7, visual register and Opportunity Evaluation Tool logic. This table

is a judgement - control device, not a ranking.

9.6.3 Worked Example : Fresh Handling Ltd parked, not rejected

FHL scanner case - why it remains parked
The mechanism is plausible: a whole - pallet exit scanner could reduce damage where carefully built pallets are broken for security inspection and rebuilt more crudely before air freight. The case is not rejected, but it is not yet a live investment case. The attributable box - integrity loss is not quantified, green additionality is weak, and the route is a de - prioritised fresh air - freight pathway. It becomes live only if FHL records and destination QC reports quantify the damage, buyer consequences and protected value. Then it should be scored through the same tool as every other candidate.

Source: Preliminary/informal FHL discussion as treated in the interim PPT and enterprise evidence register; final scoring pending formal interview and attributable loss evidence.

9.6.4 Transaction - development frameework

Table 9.11 - Evidence - Gated GTTF Transaction Development Framework

Development stage	Decision test	Evidence now available	Evidence required before advancing	GTTF implication
1. Landscape screen	Is there a commercially relevant problem and technology function?	Yes for four primary pathways plus embedded cold chain	No additional sector proof required; preserve stated data limitations	Retain horticulture in programme pipeline
2. Technical/economic validation	Can a named operator monetise the constraint at a defined scale?	Partly - operator and first function are clearer in seven cases	Current/peak throughput; complete price/cost/loss data; current asset capacity/utilisation; buyer specification; green baseline	Use feasibility/TA or hold; do not assign capital grant yet
3. Supplier and finance structuring	Is the technology serviceable and the capital stack credible?	Not yet validated case - by - case	Supplier specification, lifecycle cost, warranty/spares, enterprise contribution, debt/supplier finance and use evidence	Match EU/Danish provider and financing instrument only after Stage 2
4. Investment approval	Does the case remain viable, additional and sustainable after support?	Not assessed in this landscape chapter	Technical design; financial model; safeguards; legal/tax; procurement; O&M and post - support sustainability	Investment committee decision; no landscape - stage ranking substitutes for due diligence

Source: A2i/GTTF transaction - development framework applied to the horticulture evidence base.

9.6.5 Danish and EU engagement modalities

Danish and EU engagement modalities should be applied by pathway and only after Uganda - side scale is validated. Feasibility and demonstration instruments can resolve sizing and service - model uncertainty; business - partnership and finance instruments should follow only where market, throughput and co - investment evidence is sufficient.

Table 9.12 - Danida business instrument mapping: horticulture interventions

Intervention pathway	Window	Primary modality	Supporting modality	Rationale
Aggregation / first - mile systems	M2	E4 - Innovation Bridge / feasibility / demonstration	E2 - Business Partnership after validation	Three evidence - bearing cases have different asset positions. Feasibility should define ownership, capacity and handling system before full partnership investment.
Processing / preservation	M3	E4 - Innovation Bridge / greenfield or process validation	E2 - Business Partnership for proven expansion	Green Oceanstar requires greenfield facility economics; Amfri requires incremental - capacity economics. Demonstration/ validation should precede scale - up.
Certified supply expansion	M1	E1 - Business Explorer / targeted fe asibility	E2 - Business Partnership where buyer demand and grower model are proven	The case is an operating - model and certified - supply problem first. Technology follows buyer - volume and grower - control proof.
Compliance - testing access extension	M5	E4 - Innovation Bridge / service - model demonstration	E2 - Business Partnership where demand supports scale	Existing accredited capacity changes the task from lab construction to decentralised access and service integration.

Route - specific cold chain	M4	E4 - Feasibility / sizing	E2 or E3 only after route economics are proven	Cold - chain assets are capital - intensive and utilisation - sensitive. Route time, duty cycle, capacity, energy cost and protected value must be demonstrated.

Source: DANIDA Business Instruments framework presented at the GTTF Landscape Study validation session, August 2026. Mapping is indicative and does not constitute instrument approval or financing commitment.

9.7 Pillar 7: Green agenda, post - grant sustainability and risk

9.7.1 Green Agenda Adoption

Horticulture can support food and nutrition security, rural employment, smallholder income, export earnings and climate - resilient agro - industrialisation. The strongest green - technology cases are those that make commercial and environmental sense at the same time: reduced post - harvest loss, more efficient water use, lower energy intensity, better preservation, residue - risk control, improved traceability and reduced waste. Priority green interventions include solar - assisted or energy - efficient drying, route - specific efficient cooling, water - efficient irrigation, certified - supply systems, digital traceability where it manages climate or compliance risk, and waste - recovery models where rejected or downgraded produce can be converted into compost, animal feed, biogas or other uses. These interventions align with agro - industrialisation, climate adaptation, productive energy use and market - access objectives, but final RIO - marker scoring should be confirmed at project - design stage.

Table 9.13 - Rio Marker Assessment: horticuluture technology windows

Investment type	Window	Adaptation	Mitigation	Biodiversity / Desertification	Justification
Controlled aggregation / packhouse handling	M2	1 - Significant	0	0	**Reduces heat, delay and physical deterioration where climate - sensitive loss is explicit; commercial case remains handling and market access.**
Solar - assisted drying / preservation	M3	1 - Significant	1 - Significant	0	**Preservation reduces weather - driven gluts and wet - season drying constraints; mitigation where baseline energy is measured.**

Certified supply / protected production	M1	1 - Significant	0 or 1 - Conditional	0 or 1 - Conditional	**Supports water/input efficiency and controlled supply where designed; biodiversity/desertification only with explicit objectives.**
Compliance, traceability and testing access	M5	0	0	0	**Primary landscape case is market access and risk control; climate scoring should not be inferred unless project design adds measurable climate practices.**
Route - specific cold chain	M4	1 - Significant	1 - Conditional	0	**Adaptation where heat exposure is material; mitigation only with measured low - energy/refrigerant performance.**
Digital grower / traceability systems	M1/M5	0 or 1 - Conditional	0	0	**Commercial traceability alone is not climate activity; adaptation only where system monitors climate - sensitive production decisions.**

Source: OECD DAC Rio - marker logic applied to horticulture windows. Scores should be confirmed transaction by transaction against final technical design and baseline.

9.7.2 Post - grant sustainability and risk

Horticulture carries a risk profile in which market route, utilisation and compliance are at least as important as the equipment itself. A technically sound asset can fail commercially if throughput is seasonal, if the buyer route changes, if the operator already has underused capacity, or if compliance controls remain upstream of the technology investment. Sustainability therefore depends on correctly sized assets, verified market pull, a credible service/maintenance pathway and recurring operating costs that the enterprise can carry without grant support.

Table 9.14 - Evidence - Gated GTTF Transaction Development Framework

Risk	Likelihood / impact	Affected window	Mitigation	Residual level
Seasonal throughput / asset underutilisation	High / High	M2, M3, M4	Size assets from monthly/ peak throughput and existing capacity; phase modules; require utilisation scenario and catchment evidence.	Medium

Buyer or route mismatch	Medium / High	All market - facing pathways	Verify buyer specification, route and demand; test secondary route; do not size technology from generic market potential.	Low - Medium
Compliance failure despite technology investment	Medium / Very High	M1, M2, M4, M5	Integrate spray/PHI controls, traceability, sampling, pest management and documentation with physical assets.	Medium
Smallholder / certified - supply inconsistency	High / High	M1, M2, M3	Define supplier enrolment, certification/control model, quality incentives and volume covenant before investment.	Medium
Technology maintenance and Uganda serviceability gap	Medium / High	M3, M4, M5	Supplier warranty, spares, local service partner, operator training, lifecycle cost and O&M budget as approval conditions.	Low - Medium
Evidence quality / management - claim risk	Medium / High	All windows	Label self - reported evidence; reconcile units; verify buyer, throughput, assets and financial contribution before transaction approval.	Low

9.8 Conclusions and Recommendations

9.8.1 Sector Summary and Strategic Position

Uganda's horticulture sector has a commercially visible market base, but much of the investment opportunity lies in converting existing production into more reliable, compliant and higher - value product. The strongest national signals are the growth in broad horticulture exports alongside faster import growth, material regional demand, uneven conversion through the regulated export pathway, measured packhouse wastage and current compliance exposure. These findings support targeted green - technology development, not blanket infrastructure deployment.

Within the cross - sector GRASP assessment, horticulture's lower relative score should be read partly as an evidence - completeness issue rather than weak commercial fundamentals. The sector case is strongest where a named operator can demonstrate a buyer route, measurable throughput, a monetisable constraint and a correctly sized first investment. It is weak where equipment requests are generic, existing assets are not accounted for, or compliance and market - route evidence are unresolved.

The immediate value of the landscape is not a beneficiary ranking. It is a disciplined map of which commercial problems are credible enough to enter technical and economic transaction development, and which evidence must be closed before capital is committed.

Table 9.15 - Priority opportunity pathways and investment position

Pathway	Current investment read- ing	What can proceed now	What remains pending
Aggregation and first - mile handling	Strongest enterprise - backed pathway; three cases show distinct asset models.	Focused validation of throughput, access cost, avoided damage and first - asset sizing.	Current/peak volume, shared/own asset econom- ics, loss/downgrade, buyer route and co - finance.
Processing and preservation	Leading pathway hypoth- esis; Green Oceanstar greenfield case and Amfri expansion case.	Validate dried chilli/product - form economics, energy baseline and buyer specifi- cations.	Fresh - to - dried conver- sion, price spread, mois- ture/ASTA/aflatoxin specs, facility sizing and first asset.
Compliance/ testing/trace- ability	Strong system evidence; Chemiphar access - exten- sion model avoids prema- ture new - lab construction.	Validate sample demand, willingness to pay, turNa- tional Agricultural Research Organisation (NARO)und, access model and chain - of - custody.	Horticulture samples/ month, prices, spare capac- ity, accredited versus field - screening boundary.
Certified supply / production ser- vices	Specific Thyma case; binding issue is certified supply, not another generic packhouse.	Validate outgrower certi- fication architecture and buyer - demand volume.	Certification cost, target volume, protected produc- tion/irrigation specification and green baseline.
Cold - chain logistics	Important but conditional and embedded in route - specific cases.	Assess only inside validat- ed routes where cold chain protects value.	Crop biology, route time, current capacity, duty cycle, energy cost and value protected.

Source: Synthesis of Chapter 9 evidence - bearing enterprise cases, loss evidence, compliance evidence and transaction - development gates.

9.8.2 Immediate next steps

The next phase should close two evidence roots, not reopen the whole sector scan. The first is the UBOS/URA data root: HS product forms, quantities, origins, destinations, unit values, customs regimes, informal route data and productive - equipment imports. The second is the enterprise root: one focused fieldwork wave applying the Opportunity Evaluation Tool to the retained cases and any additional case that meets the evidence threshold.

Figure 9.16 - Data root and enterprise root for investment - case development

Data root	Enterprise root	Gate - cleared pipeline
UBOS/URA: HS product form, import/export quantities, origins, destinations, unit values, customs regime, ICBT detail and machin- ery/equipment imports.	Fieldwork: named operator, buyer route, throughput, price spread, loss/cost baseline, current asset utilisation, technology fit, O&M and co - finance.	Only candidates that clear both roots advance to supplier match- ing, financial structuring and investment approval.

Source: Author synthesis from opportunity - evaluation and evidence - closeout logic.

Final recommendation
Retain horticulture in the GTTF pipeline and advance a controlled validation package around aggregation/ first - mile systems, processing/preservation, compliance - testing access, certified - supply expansion and route - specific cold chain. Do not assign final grant amounts, asset sizes, supplier matches or enterprise rankings until UBOS product - level data and last - mile enterprise evidence close the gates.

9.8.3 Final Data Limitation

The current chapter now incorporates broad SITC 05 trade evidence, preliminary import - screen evidence, CICS/RUSH loss evidence, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/DCIC local and international interception evidence, the evidence - status architecture and the Opportunity Evaluation Tool. However, the final UBOS HS - level product - form extraction remains required before the report can convert import pressure into product - specific import - substitution recommendations. Likewise, enterprise - specific asset sizes, grant amounts and capital stacks remain reserved for downstream transaction diligence where quantitative buyer, throughput, price, cost, loss and utilisation evidence is available.



Chapter 10 : Fish and Aquaculture Value Chain Assessment

Sector context

Uganda's aquaculture sector is emerging as a strategic growth corridor for food security, employment, import substitution, export diversification and green economic development. National aquaculture production rose from an estimated 111,000 MT in 2020 to 170,000–190,000 MT by 2024/25 — now roughly 25–30 percent of the country's total fish supply — and at farm level grew 87 percent over the past decade, from 35,000 MT in 2015 to 65,444 MT in 2025 (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; UBOS, Uganda Aquaculture Census 2025). Uganda's first national aquaculture census (UAC 2025) counted 9,463 aquaculture farms nationwide (67.7% rural), operating 24,348 ponds, 3,135 cages and 699 tanks. Growth is expected to continue as capture fisheries face mounting resource and climate pressure: total fisheries - sector production (capture plus aquaculture) grew 28.4 percent between FY2020/21 and FY2024/25, while total fish export earnings rose from USD 155 million to USD 216 million over the same period (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2025; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026).

However, growth remains constrained by high feed costs — 50–70 percent of total production costs — limited access to quality fingerlings and genetics (fish - breeding and hatchery - management extension reached just 22.1 percent of farms, the least - accessed of the nine named extension services), weak fish - health systems, inadequate cold - chain and processing infrastructure, low technology adoption, limited finance (only 866 of 9,390 grow - out farms — 9.2 percent — had access to aquaculture credit, and just 410 had actually secured a loan) and weak traceability (UBOS, Uganda Aquaculture Census 2025).

The Eco - friendly initiative provides an opportunity to address these constraints through resource - efficient and climate - smart technologies, including sustainable local feed manufacturing and precision feeding, improved hatchery and genetics systems, IoT - based water - quality monitoring, renewable energy for farms and processing, efficient cold - chain systems, waste - to - value and circular bioeconomy solutions, and digital traceability. The GTTF investment case should therefore combine these technologies with blended finance — enterprise equity, commercial debt, matching grants and technical assistance — to leverage private capital, improve productivity and resource efficiency, reduce environmental impacts, strengthen climate resilience and position aquaculture as a competitive and sustainable source of Uganda's future fish supply.

Key Findings

1. Aquaculture is becoming strategically critical for Uganda's fish supply. Declining capture fisheries, rising population, urbanization and regional demand are driving a structural shift toward commercial aquaculture: aquaculture's share of national fish production has risen to an estimated 25 - 30 percent, and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) projects it will become the dominant source of Uganda's fish supply by 2030 — creating strong opportunities for food security, employment and export growth.

2. Feed, seed and production efficiency remain the major bottlenecks. Feed represents an estimated 50 - 70%

of production costs, while inconsistent feed quality, expensive/imported ingredients, seasonal shortages, poor - quality fingerlings and limited hatchery/genetic capacity constrain farm profitability and competitiveness — reflected in the UAC 2025 finding that fish - breeding and hatchery - management extension reached only 22.1 percent of farms nationally.

3. Technology adoption is the key investment gap and a major opportunity for GTTF. Of Uganda's 9,463 aquaculture farms, 92.3 percent still rely on ponds as their primary production method, against 4.5 percent using cages and 2.1 percent using tanks; limited use of precision feeding, automated systems, real - time water - quality monitoring, renewable energy, digital farm management, modern processing and traceability presents clear opportunities for Danish/EU green technology transfer.

4. Uganda has strong commercial and export potential, but infrastructure, finance and market integration need strengthening. Just 9.2 percent of grow - out farms (866 of 9,390) have access to aquaculture credit, and processing capacity, cold chains, traceability and aggregation remain inadequate, while regional markets — particularly DRC, South Sudan, Rwanda, Kenya and Tanzania — offer significant opportunities for expanded fish exports and import substitution: Uganda's own fish export volumes and values grew 79.3 percent and 84.2 percent respectively between 2015 and 2025, reaching USD 216.4 million.

5. GTTF should focus on catalytic investments with measurable productivity and green - growth impacts. Priority areas are sustainable feed manufacturing, improved hatcheries/genetics, precision aquaculture, renewable energy, cold - chain/processing, digital traceability, and mobilising commercial co - financing through blended finance mechanisms — closing a financing gap in which fewer than one in ten aquaculture farms currently access credit

10.1 Pillar 1: Historical Baseline and Strategic Alignment

The past decade has been characterized by a structural shift from dependence on capture fisheries toward increased farmed fish production. Uganda's fisheries sector has undergone significant transformation as capture fisheries, particularly in Lake Victoria and other major water bodies, have experienced declining fish stocks due to overfishing, illegal fishing practices, climate variability, habitat degradation, and increasing pressure on aquatic ecosystems. These challenges have heightened the need to expand sustainable aquaculture production systems to meet growing domestic and regional demand for fish products (FAO, 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; NAFIRRI, 2024).

At the same time, commercial aquaculture has expanded rapidly, driven by rising urban fish consumption, growing regional demand from neighbouring markets including Kenya, Rwanda, South Sudan, the Democratic Republic of Congo, and Tanzania, the availability of suitable freshwater resources, advances in hatchery and feed technologies, and supportive Government policies aimed at promoting aquaculture commercialization and value chain development (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; FAO, 2024; World Bank, 2024).

Although Uganda's aquafeed manufacturing industry has expanded significantly in recent years, several structural constraints continue to limit sector competitiveness. Feed remains the largest single production cost, accounting for an estimated 50 - 70 percent of total operating expenses, yet, feed quality remains inconsistent due to variability in ingredient quality, inadequate storage and handling practices, and occasional adulteration of raw materials. These factors negatively affect feed conversion ratios (Feed Conversion Ratio (FCR)), which are a key determinant of aquaculture profitability and environmental efficiency. Furthermore, seasonal shortages of quality ingredients, dependence on imported feed inputs, and limited access to affordable working capital

constrain both feed manufacturers and fish farmers. FAO assessments have identified poor ingredient quality, supply fluctuations, inadequate storage infrastructure, and lack of affordable credit as among the most significant barriers to aquaculture growth in Uganda and the wider East African region. Addressing these constraints through quality assurance systems, ingredient traceability, blended finance mechanisms, and local ingredient innovation represents a critical investment opportunity for the GRASP/GTTF programme (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; NAFIRRI, 2024; FAO, 2024).

Uganda's Historical Trends

Source:[World Bank

**](https://data.worldbank.org/indicator/ER.FSH.AQUA.MT?locations=UG&utm_source)

10.2 Pillar 2: Market Dynamics and Suppy Chain Architecture

Uganda's aquaculture value chain comprises interconnected, depends heavily on environmental context from input supply through final markets, with significant opportunities for import substitution and export growth if production constraints are addressed.Aquaculture Sector Supply Chain Map, Capacity, and Market Potential (Uganda)

Table 1: Market dynamics and supply chain

Ranking	Supply Chain Node	GTTF priority	Current Status / Capacity	Value Contribution	Key Constraints
1	Input Supply - Feed Manufacturing	Very High	Local feed production expanding; feed accounts for 50 - 70% of production costs	Largest cost component in fish production	Dependence on imported premixes, high protein ingredient costs, seasonal raw material shortages, widespread ingredient adulteration, high transportation costs, and intense competition between human food and animal feed
2	Input Supply from Hatcheries	Very High	Over 250 million fingerlings produced annually, mainly Nile Tilapia, African Catfish, and Mirror Carp	Foundation for sector expansion and farm productivity	Limited supply of high - quality certified seed in some areas / regions, high cost and low quality of imported larval feeds, and poor broodstock quality.

3	Primary Production	Very High	Pond culture (55%) {Dominated by small and medium - scale farmers}; Cage culture (35%) {Commercial production concentrated on major lakes}; Tank/RAS (10%) {Emerging intensive production systems}	Generates the bulk of farm - gate value and employment	High feed costs, technical capacity gaps, low quality of fish feeds, shortages of genetically poor quality fingerlings, and limited access to agricultural financing facilities which are flexible and the inadequate extension services continuously limit the productivity and profitability of fish farming
4	Processing	High	Facilities process fresh fillets, smoked fish, frozen fish, and value - added products	Increases product value and shelf life	Underutilized capacity due to inconsistent fish supply, inadequate post - harvest handling infrastructure, limited access to modern value - addition technology, and high operational costs
5	Distribution & Logistics	High	Domestic wholesale markets, retailers, exporters, and cold - chain operators	Links producers to consumers and export markets	Inadequate cold - chain infrastructure and logistics costspoor rural road networks, fragmented supply chains, and regulatory inefficiencies
6	Regional Export Markets	Medium - High	DRC, Kenya, Rwanda, and South Sudan	Strong demand and premium prices for quality fish products	weak regulatory enforcement, cross - border trade barriers
7	International Export Markets	Medium	EU, Middle East, and Asia	Highest value - added export opportunities	Need for consistent quality, traceability, and certification
8	Domestic Market	Medium	Fish consumption estimated at 12–15 kg per capita annually	Largest current market by volume	Supply deficits in some urban markets, high costs for quality fish feeds, unreliable supplies of fingerlings, and poor post - harvest handling

The Road Map notes that commercial cage farming has expanded rapidly while many local feed manufacturers struggle to compete on quality, leading to continued dependence on imported feeds.

Uganda's aquaculture sector is only partially self - sufficient, as growing domestic demand for fish continues to outpace supply due to declining capture fisheries, rapid population growth, urbanization, and changing di-

etary preferences. While aquaculture production has expanded significantly over the past decade, the industry remains dependent on imported feed premixes, feed additives, aquaculture equipment, broodstock improvement materials, and specialized hatchery inputs. Furthermore, several fish processing facilities operate below installed capacity due to inadequate and inconsistent supplies of farmed fish, limiting opportunities for value addition and export growth (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; FAO, 2024; World Bank, 2024).

Nevertheless, substantial import - substitution opportunities exist through increased domestic production of fish feed ingredients, expansion of commercial hatchery capacity, and greater utilization of locally available raw materials such as soybean meal, sunflower seed cake, maize bran, cottonseed cake, and groundnut cake. These interventions have the potential to reduce production costs, improve competitiveness, and strengthen resilience within the aquaculture value chain (NAFIRRI, 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026).

With increased fish production, improved feed conversion efficiency, and expanded processing capacity, Uganda is well positioned to increase exports to high - demand regional markets, particularly Democratic Republic of the Congo, Kenya, Rwanda, and South Sudan, while also exploring emerging opportunities in the European Union, Middle East, and Asian markets. Achieving this potential will require targeted investments in productivity - enhancing technologies, quality assurance systems, cold - chain infrastructure, and compliance with international food safety and traceability standards. At the farmer level, successful participation in export and premium - value markets will increasingly depend on the adoption of end - to - end traceability systems, use of approved and documented feed and veterinary inputs, compliance with residue monitoring and control requirements, implementation of farm biosecurity measures, proper harvest and post - harvest handling practices, participation in aggregation schemes capable of supplying consistent volumes, stronger linkages with certified processors and exporters, and adherence to recognized certification and food safety schemes. International market requirements, particularly in the European Union and other premium seafood markets, increasingly emphasize traceability, food safety, disease control, environmental compliance, and verifiable production records throughout the value chain, making these capabilities essential for Uganda's future aquaculture export competitiveness (ASEAN, 2017).

Furthermore, the export - oriented aquaculture production requires farmers to demonstrate effective biosecurity management, disease surveillance, responsible use of veterinary drugs and chemicals, and compliance with sanitary and phytosanitary (SPS) requirements. Uganda's National Biosecurity and Biosafety System for Aquaculture identifies aquatic animal health management, disease prevention, inspection systems, traceability, and safe trade in aquatic products as critical foundations for accessing regional and international markets(FAO, 2024; World Bank, 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026).

A strategic priority for the sector is the development and adoption of alternative and locally sourced feed ingredients as a means of reducing dependence on fishmeal and other imported feed components. The use of plant - based proteins, insect - based meals such as Black Soldier Fly (BSF) larvae, and agricultural by - products offers considerable potential to improve feed sustainability, lower production costs, reduce pressure on wild fish stocks, and strengthen food security outcomes. Research has demonstrated that carefully formulated alternative protein sources can effectively replace a significant proportion of fishmeal in aquaculture diets without compromising fish growth performance or profitability (FAO, 2024; NAFIRRI, 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026).

By addressing key supply - side constraints and scaling commercial aquaculture production, Uganda has the potential to become a major regional supplier and exporter of high - value aquaculture products, generating substantial benefits in terms of food security, employment creation, foreign exchange earnings, private - sector

investment, and inclusive economic growth (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; World Bank, 2024).

10.3 Pillar 3: Ecosystem Mapping and Gap Analysis

Several development partners and the Government of Uganda have supported the growth and modernization of Uganda's aquaculture sector, focusing on productivity enhancement, sustainability, market access, technology adoption and institutional strengthening. The International Fund for Agricultural Development (IFAD) has supported smallholder commercialization, value - chain development and aquaculture productivity enhancement through programmes aimed at improving rural incomes and market participation (IFAD, 2023; IFAD, 2024). The World Bank has contributed through agricultural transformation, water - resource management and fisheries development initiatives designed to improve productivity, resilience and private - sector investment (World Bank, 2024). The Food and Agriculture Organization (FAO) has supported sustainable fisheries and aquaculture development, fish health management, biosecurity systems and capacity building for sector governance (FAO, 2024). The European Union has supported sanitary and phytosanitary (SPS) compliance, fisheries governance reforms and export - readiness initiatives aimed at strengthening access to regional and international markets (European Union, 2023; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026). Emerging opportunities also exist for collaboration with Danish development partners through green technology transfer, renewable energy, climate - smart aquaculture systems and circular - economy innovations.

Uganda, through The Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))), has established a strong policy, regulatory and institutional foundation for aquaculture development. The Department of Aquaculture Management and Development leads policy formulation, regulation, standards, planning and implementation for the sector. It also promotes technology transfer, quality fish seed and feed, capacity building, quality assurance and sustainable production systems. Uganda's policy and legal framework has been strengthened through the National Fisheries and Aquaculture Policy and the Fisheries and Aquaculture Act, 2023. These frameworks aim to improve governance, promote appropriate technologies and regulate aquaculture while ensuring environmental and social safeguards, biosecurity, sanitary standards and fish safety. The Fisheries and Aquaculture Act also supports research, mechanisation, public - private partnerships and competitiveness within the sector. Aquaculture has been integrated into Uganda's broader national development and investment agenda under NDP IV. Priority investments include upgrading fisheries laboratories, establishing zonal hatcheries and cage - culture facilities, developing aqua parks with ponds, hatcheries and mini feed mills, and establishing fish quarantine centres. The Governments' strategy is increasingly focused on expanding production capacity, strengthening input and quality systems, promoting sustainability and attracting commercial investment in aquaculture.

The Government has also invested in aquaculture extension and technical capacity development. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) has developed and disseminated aquaculture extension manuals and upgraded aquaculture extension materials to reflect changing sector needs, while the national agricultural extension system provides a framework for improving farmers' access to knowledge, information, technologies and technical and management capacity.

In addition, Uganda has taken steps to strengthen aquaculture biosecurity and biosafety. The national biosecurity and biosafety framework was developed to address disease prevention, aquatic animal health, surveillance, safe movement and trade, and institutional coordination. The Fisheries and Aquaculture Act further requires appropriate sanitary, environmental and safety measures for aquaculture establishments.

Despite these interventions, several critical constraints continue to limit sector growth. Infrastructure deficits

remain among the most significant bottlenecks, including inadequate cold - chain systems, insufficient fish - processing and storage facilities, limited feeder - road connectivity and gaps in modern aquaculture infrastructure. These weaknesses contribute to post - harvest losses, reduce product quality and undermine competitiveness in domestic and export markets (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; World Bank, 2024). Regulatory and institutional challenges also persist, particularly in quality assurance, certification, traceability mechanisms, enforcement capacity and coordination across institutions and local Governments.

Access to appropriately structured finance remains another significant barrier to scaling Uganda's aquaculture sector. Commercial producers require working capital for feed procurement, medium - term financing for cages, ponds, tanks, hatcheries and processing equipment, repayment schedules aligned with production cycles, reduced collateral requirements, aquaculture insurance and value - chain financing linked to biomass and verified off - take arrangements. Expanding these financial instruments would unlock investment in productivity - enhancing technologies, improve farm cash - flow management, strengthen market integration and accelerate commercialization across the aquaculture value chain (World Bank, 2024; IFAD, 2024).

Technology adoption also remains relatively low, particularly among small and medium - scale producers. There is limited use of automated production systems, real - time water - quality monitoring, digital farm - management platforms, precision feeding, renewable - energy systems and advanced processing and cold - chain technologies (FAO, 2024; NAFIRRI, 2024). This creates a clear opportunity for GTTF to complement existing Government and development - partner investments by focusing specifically on commercial technology transfer, enterprise upgrading and private - sector adoption of Danish and European green technologies.

Uganda has established a strong policy, institutional and regulatory foundation for aquaculture, supported by development partners investing in productivity, sustainability, markets, research and capacity building. However, gaps remain in infrastructure, financing, technology, quality assurance, traceability and private - sector investment. GTTF should therefore play a catalytic and complementary role, focusing on areas not adequately addressed by existing programmes. Priority areas should include modern feed manufacturing, improved hatcheries and genetics, precision aquaculture, renewable energy, cold - chain and processing, digital traceability, circular bioeconomy solutions and innovative financing. These interventions can accelerate Uganda's transition to a productive, climate - smart, competitive and export - oriented aquaculture sector, while supporting food security, employment, import substitution, foreign - exchange earnings and inclusive economic growth.**

10.4 Pillar 4: Enterprise Profiling and Technology

Table 2: Enterprise profiling and technology matching

Ranking	Enterprise	Core Activities	Scale & Positioning	Strategic Strengths	Key Gaps

Tier 1(Investment/Technology Anchors)	Yalelo Uganda Ltd	Commercial cage aquaculture, hatchery operations, fish processing, distribution and marketing	Largest vertically integrated commercial aquaculture enterprise in Uganda; regional market presence	Strong management systems; integrated value chain; established hatchery capacity; processing and cold - chain infrastructure; export potential; investment - ready	High energy costs; need for climate - smart technologies; advanced monitoring systems; renewable energy integration; waste management solutions
De Heus Uganda	Aquafeed manufacturing, livestock nutrition, farmer technical support	Leading formal aquafeed supplier serving commercial and emerging fish farmers	Strong technical expertise; quality assurance systems; regional experience; extensive farmer network	Dependence on imported feed ingredients; limited alternative protein integration; need for sustainable feed innovation and local raw material sourcing	
Victoria Treasures Ltd	Fish processing, cold - chain management, export marketing and value addition	One of Uganda's leading fish processors with export orientation	Established processing infrastructure; export market linkages; food safety systems; cold - chain facilities	Underutilization of installed capacity due to inadequate fish supply; need for energy - efficient processing technologies; traceability upgrades	
Tier 2(Commercial Scale - up & Demonstration)	KAMOS Agro Fish Ltd	Pond - based fish production, fish distribution and local marketing	Medium - scale commercial producer with expansion potential	Established production systems; strong local market presence; growth - oriented management	Limited access to finance; high feed costs; inadequate production infrastructure; limited automation and monitoring technologies

MIG Fish Farm Ltd	Fish farming, hatchery operations, cage and pond production systems	Emerging commercial producer in the Lake Victoria aquaculture corridor	Diversified production systems; proximity to major markets; commercial growth potential	Limited investment capital; weak biosecurity systems; inadequate digital farm management tools; production efficiency constraints	
Tier 3(Farmer Aggregation & Sector Platforms)	Source of the Nile Fish Farmers Association	Farmer organization, aggregation, advocacy, training and coordination	Major aquaculture farmer platform in Eastern Uganda	Strong farmer outreach; aggregation potential; stakeholder coordination role	Limited commercialization; weak digital systems; inadequate aggregation infrastructure; limited financing mechanisms
Walimi Fish Farmers' Cooperative Society (WAFICOS)	National aquaculture coordination, farmer engagement, policy advocacy	National - level sector coordination platform for small – medium fish farmers	Broad membership base; sector influence; knowledge - sharing capacity	Limited commercialization support services; weak technology transfer systems; dependence on project - based funding	
Uganda Commercial Fish Farmers Association (UCFFA)	Farmer aggregation, aquaculture coordination, cooperative support	Regional farmer representation, policy engagement, and industry development in the aquaculture sector	Strong grassroots farmer networks; local market linkages; producer mobilization capacity	Limited access to finance; feed and fingerling supply constraints; weak business development services; limited technology adoption	

10.4.1 Summary of Strategic Positioning for GTTF

Table 3: Strategic Positioning for GTTF

Ranking	Category	Priority Enterprise	GTTF Priority	Strategic Role within GTTF
1	Feed Sector Anchor	De Heus Uganda	Very High	Lead partner for sustainable aquafeed innovation, feed quality assurance, alternative local protein ingredients, precision nutrition, feed conversion ratio (Feed Conversion Ratio (FCR)) optimization, digital feed traceability, and strengthening commercial feed distribution networks. Demonstrates Danish/ EU feed technologies and supports feed - sector capacity building.
2	Hatchery & Genetics Anchor	Rock Springs Fish Farm Ltd	Very High	National centre for improved broodstock development, selective breeding, quality fingerling production, hatchery biosecurity, genetic improvement, hatchery automation, and dissemination of improved seed to commercial farmers. Serves as a technology transfer hub for genetics and hatchery innovations.
3	Commercial Production Anchor	Yalelo Uganda Ltd	Very High	Demonstration of climate - smart commercial aquaculture production, precision farm management, renewable energy integration, digital monitoring systems, and best practices in commercial cage farming and integrated aquaculture operations. Serves as a lead site for piloting productivity - enhancing technologies, demonstrating green technologies, and supporting farmer learning and replication.
4	Processing & Export Anchor	Victoria Treasures Ltd	High	Demonstration of export - ready processing, value addition, cold - chain technologies, HACCP implementation, traceability systems, certification, and compliance with regional and international food safety standards. Provides market access and off - take opportunities for commercial farmers.

5	Commercial Scale - Up Candidate	KAMOS Agro Fish Ltd	High	Pilot enterprise for scaling commercial aquaculture through adoption of improved production technologies, mechanization, efficient feeding systems, renewable energy, digital farm management, and blended - finance investment models. Demonstrates the transition from SME to large - scale commercial production.
6	Emerging Technology Demonstrator	MIG Fish Farm Ltd	High	Demonstration platform for innovative production systems including recirculating aquaculture systems (RAS), intensive tank culture, water - quality management, automated feeding, IoT - enabled monitoring, and climate - resilient production technologies suitable for replication by emerging enterprises.
7	Farmer Aggregation Platform	Source of the Nile Fish Farmers Association (SONFFA)	Medium - High	Coordinates farmer aggregation, extension services, digital advisory systems, bulk input procurement, collective marketing, traceability implementation, and linkage of smallholder producers to processors, exporters, and financial institutions. Facilitates technology dissemination among member farmers.
8	Cooperative Development Platform	Uganda Commercial Fish Farmers Association (UCFFA)	Medium	Strengthens farmer cooperatives through business development services, governance, financial literacy, collective investment, access to finance, certification readiness, climate - smart production practices, and integration into formal domestic and export value chains.
9	Sector Coordination Platform	Walimi Fish Farmers Cooperative Society (WAFICOS)	Medium	Facilitates multi - stakeholder coordination, policy dialogue, public - private partnerships, investment promotion, dissemination of green technologies, and coordination of demonstration activities across the aquaculture value chain. Supports knowledge sharing between technology providers and producers.

Table 4: Competitive Positioning: Danish/EU vs Asian Suppliers

Suppliers	**Advantages**	**Disadvantages**
Danish/EU	Higher reliability and lifespan.	Higher capital expenditure.

Better environmental performance.	Longer procurement cycles.	
Strong compliance with EU sustainability standards.	Greater technical complexity.	
Advanced digitalization and automation.		
Easier alignment with EU export requirements.		
Asian	Lower upfront investment costs.	Variable quality.
Faster deployment.	Shorter equipment lifespan.	
Suitable for small and medium enterprises	Limited technical support and after - sales service.	
	Lower compatibility with premium export - market certification requirements	

Overall, the most strategic opportunity for Danish and broader European Union engagement lies not in expanding basic fish production which has already benefited from substantial public and donor investment but in addressing the critical productivity and competitiveness constraints that continue to limit commercial aquaculture growth.

At the farm level, these include the affordability and consistent quality of commercial feeds, reliable access to genetically improved and disease - free fingerlings, effective aquatic animal health and disease management systems, strengthened licensing and zoning frameworks for sustainable aquaculture development, expanded extension and technical advisory services, real - time water quality monitoring and forecasting, and improved access to affordable working capital throughout the production cycle. Green technologies should therefore be positioned as practical solutions that strengthen these fundamental production systems rather than replace them.

Investments in precision feeding technologies, digital farm management platforms, automated water quality monitoring and early warning systems, advanced hatchery and genetics technologies, renewable energy - powered aeration and pumping systems, cold - chain infrastructure, energy efficient processing, digital traceability, and innovative aquaculture financing models can directly improve productivity, reduce production risks and costs, enhance climate resilience, and enable producers to consistently meet domestic and export market requirements. By integrating these technologies with strengthened farmer support services, regulatory systems, and value - chain finance, the GTTF can address the sector's remaining bottlenecks while accelerating Uganda's transition into a competitive regional aquaculture and fish export hub.

10.4.2 Priority Enterprises as enablers in the sector

To strengthen the GTTF implementation framework, below are some of the strategic partners for consideration;

Table 5: Priority enterprises to the sector

Category	Priority Enterprise	Strategic Role within GTTF
Financial Services Anchor	DFCU Bank	Develop aquaculture - specific financial products, including working capital for feed, medium - term investment loans, value - chain financing, biomass - based lending, and blended - finance solutions.
Research & Innovation Partner	National Fisheries Resources Research Institute (NAFIRRI)	Generate and validate technologies related to nutrition, genetics, fish health, biosecurity, climate resilience, and environmental sustainability; provide technical backstopping for GTTF pilots.
Regulatory & Quality Assurance Partner	Directorate of Fisheries Resources	Support development and enforcement of standards for hatcheries, feeds, biosecurity, traceability, fish health, certification, and export compliance.
Academic & Capacity Building Partner	Makerere University	Deliver technical training, applied research, innovation, and workforce development to support adoption of green technologies across the aquaculture sector.

10.4.3 GTTF Technology Intervention Matrix

Table 6: GTTF Intervention Matrix: Linking Sector Challenges to Danish/EU Green Technologies

Rank	Sector Challenge	GTTF Priority	Current Situation in Uganda	Danish/ EU Green Technology Solution	Potential Technology Providers	Expected Impact
1	High feed costs (50–70% of production costs)	Very High	Dependence on imported premixes and expensive protein sources limits profitability.	Precision feed formulation software, extrusion technology, Black Soldier Fly (BSF) protein processing, enzyme technologies	Danish Technological Institute, BioMar, Aller Aqua, Skretting, Hamlet Protein	10–20% reduction in feed costs, improved Feed Conversion Ratio (Feed Conversion Ratio (FCR)), reduced imports
2	Limited access to improved fingerlings	Very High	Poor broodstock quality and insufficient hatchery capacity reduce productivity.	Selective breeding systems, genomic selection, Recirculating Aquaculture System (RAS) hatcheries, hatchery automation	AquaGen, AKVA Group, DTU Aqua	Faster - growing fish, higher survival, increased national seed supply
3	Poor water quality monitoring	Very High	Water quality is mainly monitored manually, leading to delayed interventions.	IoT water - quality sensors, dissolved oxygen monitoring, AI - based early warning systems	AKVA Group, OxyGuard International, Grundfos	10–15% increase in production, reduced fish mortality

4	High energy costs	Very High	Heavy dependence on grid electricity and diesel for pumping, aeration and cold storage.	Solar PV systems, solar aeration, solar - powered pumps, energy - efficient motors	Danfoss, Grundfos, Danish Solar Energy Ltd	20–40% reduction in energy costs and carbon emissions
5	Low automation on farms	High	Most farms use manual feeding and production management.	Automatic feeders, biomass estimation, AI farm management software, remote monitoring	AKVA Group, Innovasea, CageEye	15–25% productivity increase with lower labour costs
6	Weak cold - chain infrastructure	High	High post - harvest losses reduce competitiveness.	Solar cold rooms, smart refrigeration, ice - making technologies	Danfoss, Advansor, Vestfrost Solutions	20–30% reduction in post - harvest losses
7	Underutilized processing facilities	High	Existing plants operate below capacity due to inconsistent supply and outdated technologies.	Energy - efficient processing equipment, automated filleting, refrigeration, heat recovery systems	Marel, Danfoss Cooling, Alfa Laval	Increased product recovery, export quality and processing efficiency
8	Weak fish disease diagnostics	High	Limited laboratory capacity and disease surveillance constrain productivity.	Molecular diagnostic laboratories, PCR systems, digital disease surveillance platforms, biosensors	Thermo Fisher Scientific, Qiagen, DTU Aqua	Faster disease detection, lower mortality, improved biosecurity

9	Limited traceability	Medium–High	Export markets increasingly require traceability and SPS compliance.	Digital traceability platforms, QR code systems, blockchain - enabled supply chain management	GS1 Denmark, IBM Food Trust partners, AgriDigital	Improved export readiness and compliance with EU standards
10	Environmental sustainability	Medium–High	Feed waste, nutrient discharge and poor waste management reduce sustainability.	Circular bioeconomy technologies, sludge treatment, nutrient recovery, integrated aquaculture systems	Danish CleanTech Hub, NIRAS, Aquaponics Europe	Reduced pollution, improved resource - use efficiency and climate resilience
11	Limited financing for technology adoption	Medium	Commercial finance remains difficult to access for SMEs.	Green blended - finance facility, digital investment appraisal tools, carbon financing mechanisms	IFU (Investment Fund for Developing Countries), ElFO, DANIDA Green Business Partnerships	Increased private investment and faster technology adoption
12	Weak research infrastructure	Medium	Uganda lacks internationally accredited aquaculture laboratories.	Biotechnology laboratories, feed - testing laboratories, genetics laboratories, water - quality laboratories	Danish Technological Institute, DTU Aqua, Eurofins Scientific	Strengthened national innovation capacity and commercialization of research

10.5 Pillar 5: Impact Metrics and Commercial Engagement

10.5.1 Smallholder Farmer Engagement and Commercial Integration

Smallholder farmers remain central to Uganda's aquaculture landscape, particularly in pond - based production systems, where they constitute the majority of farming enterprises. However, recent evidence suggests that

national fish production is increasingly driven by larger and more intensive cage and commercial aquaculture operations. Despite ongoing efforts by hatcheries, feed companies, processors, and development partners to integrate producers into commercial value chains, many smallholders continue to face challenges accessing quality inputs, finance, extension services, and structured markets. These constraints limit productivity and hinder compliance with the quality and traceability requirements of higher - value domestic and export markets (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; FAO, 2024; World Bank, 2024).

Commercial actors including hatcheries, feed manufacturers, fish processors, input suppliers, traders, and large - scale aquaculture enterprises play a critical role in integrating smallholder farmers into more structured and profitable value chains. Through the provision of improved fingerlings, quality feeds, aquatic animal health products, technical advisory services, and market access arrangements, these actors reduce production risks and improve farm productivity. Experiences from Uganda and neighbouring countries such as Kenya, Tanzania, and Rwanda demonstrate that commercial hatcheries and feed suppliers have significantly contributed to increased fish yields through the dissemination of improved production technologies, better farm management practices, and enhanced access to key production inputs (FAO, 2024; NAFIRRI, 2024; WorldFish, 2023).

Despite these contributions, participation of smallholder farmers in formal aquaculture markets remains constrained by fragmented production systems, inconsistent product quality, weak bargaining power, and limited market coordination. Many producers operate independently and generate production volumes that are insufficient to satisfy the quantity, quality, consistency, and traceability requirements of processors, supermarkets, hotels, and export buyers. Consequently, a substantial share of farmed fish continues to be marketed through informal channels where prices are volatile and opportunities for value addition remain limited (World Bank, 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026).

To address these challenges, stronger aggregation and coordination mechanisms are required. Well - managed producer organizations, cooperatives, farmer groups, and cluster - based production systems can enable smallholders to aggregate volumes, reduce transaction costs, improve access to production inputs, and strengthen their negotiating position with buyers. Similarly, contract farming and out - grower arrangements between processors, commercial farms, and smallholder producers can provide market security, technical support, quality assurance, and access to finance and production inputs (IFAD, 2024; FAO, 2024; World Bank, 2024).

The growing demand for food safety assurance, sustainability certification, and compliance with increasingly stringent sanitary and phytosanitary (SPS) standards in both domestic and export markets underscores the need for greater investment in digital traceability and farm record management systems. Digital platforms can enable end - to - end traceability from hatchery to harvest, allowing producers, processors, regulators, and buyers to monitor production practices, input usage, fish health, harvest volumes, and product movement throughout the value chain. These systems enhance transparency, improve regulatory compliance, strengthen consumer confidence, and facilitate access to premium domestic, regional, and international markets. However, successful implementation requires a phased and inclusive approach. Farmers must first be equipped with simple and practical record - keeping systems, targeted training, affordable digital tools, and clear commercial incentives to adopt traceability practices. Equally important, processors, hatcheries, feed manufacturers, input suppliers, and buyers must recognize and reward traceable products through procurement and pricing mechanisms. Traceability systems are only effective when all actors across the value chain participate within an integrated digital ecosystem supported by common standards and interoperable platforms. When combined with stronger producer organizations, commercial partnerships, and market - led incentives, these innovations can significantly improve the inclusiveness, productivity, competitiveness, resilience, and export readiness of Uganda's aquaculture sector while enabling smallholder farmers to capture a greater share of value along the supply chain (Eu-

ropean Union, 2023; FAO, 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026).

10.2.2 Projected Impact Across Four Key Impact Vectors

10.2.2.1 Green Agenda Adoption

Uganda's aquaculture sector has significant potential to enhance food security, create employment, reduce poverty, and drive economic growth while supporting environmental sustainability and climate resilience. As capture fisheries decline due to overfishing, environmental degradation, and climate change, sustainable aquaculture is becoming increasingly important to Uganda's Blue Economy and agricultural transformation agenda. The Green Agenda Adoption pillar promotes climate - smart aquaculture practices that improve resource - use efficiency, reduce environmental impacts, and strengthen resilience to climate - related shocks. Priority interventions include renewable energy for production and processing, sustainable feed solutions, water - efficient farming technologies, circular - economy approaches to waste management, and strengthened biosecurity and environmental monitoring. These interventions align with Uganda's National Development Plan IV, National Climate Change Act (2021), Nationally Determined Contributions (NDCs), and Green Growth Development Strategy, while also improving productivity, competitiveness, and compliance with international sustainability standards (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; FAO, 2024; World Bank, 2024; National Climate Change Department, 2021; European Commission, 2023).

Table 7: Green agenda Adoption

Ranking	Potential Interventions	GTTF Priority	Realistic Projected Impact by 2030
1	Digital water - quality monitoring and farm management systems	Very High	Reduced fish mortality, improved farm management decisions, and enhanced production planning.
2	Solar - powered water pumping systems for ponds and hatcheries	Very High	15–25% reduction in energy costs for participating farms and hatcheries, particularly in off - grid and high - electricity - cost areas.
3	Solar - powered cold rooms, ice plants, and fish storage facilities	Very High	10–20% reduction in post - harvest losses and improved fish quality and shelf life for processors and traders.
4	Enhanced biosecurity and fish health management systems	High	Reduced disease - related losses and improved fish survival rates in commercial production systems.

5	Climate - smart aquaculture technologies (renewable energy, efficient water use, improved pond management)	High	Improved resilience to climate variability and reduced operational risks for participating enterprises.
6	Improved environmental governance, compliance, and waste management practices	High	Increased compliance with environmental regulations and improved sustainability of aquaculture operations.
7	Strengthening research, innovation, and technology transfer partnerships	Medium - High	Increased uptake of locally adapted technologies and improved dissemination of best management practices across the value chain.
8	Capacity building and farmer awareness on climate - smart aquaculture practices	Medium	Increased adoption of good aquaculture practices (GAP), resulting in improved productivity and resource - use efficiency among trained farmers.

10.2.2.1.1 Energy Use and Renewable Energy Opportunities Across Production Systems

Table 7.1: cage vs pond farming

Production system	**Energy intensity**	**Main commercial cost/ constraint**	**GTTF energy opportunity**
Cage farming	Low–moderate direct farm energy	Feed and quality fingerlings	Supporting role: solar/ electric boats, monitoring, shore facilities
Pond farming	Moderate–high where pumping/aeration is required	Feed, fingerlings, pumping / water management	Strong: solar pumping, efficient aeration
Hatcheries	Moderate–high	Energy, water circulation, seed quality	Strong: solar pumping / aeration / automation
Processing & cold chain	High	Electricity, refrigeration, ice	Very strong: solar cold rooms, efficient refrigeration

Table 8: Economic Benefits of Green Technology Adoption

Ranking	Green Technology	GTTF Priority	Expected Benefit	Estimated Economic Impact
1	Precision Feeding Systems	Very High	Reduced feed wastage	Feed cost reduction of 10–20%
2	Renewable Energy Systems	Very High	Reduced operating costs	Energy cost reduction of 20–40%
3	Automated Water Quality Monitoring	Very High	Improved fish survival	Production increase of 10–15%
4	Solar - powered Cold Storage	High	Reduced post - harvest losses	Loss reduction of 20–30%
5	Modern Processing Equipment	High	Higher product recovery	Value addition increase of 30–50%
6	Digital Traceability Systems	Medium–High	Improved export compliance	Access to premium international markets

10.5.1.1 Smallholder Livelihoods

Smallholder aquaculture farmers play a critical role in fish production, rural employment, household nutrition, and income generation. However, their ability to achieve sustainable and profitable livelihoods is constrained by several interconnected challenges that affect productivity, competitiveness, and resilience. Commercialization and technology adoption have the potential to significantly improve household incomes and resilience.

Table 9: Smallfolder livelihood

Ranking	Current Challenges	GTTF Priority	Realistic Projected Outcomes by 2030
1	High feed and production costs	Very High	5 - 15% reduction in production costs through improved feed management, local feed ingredient utilization, and better farm management practices.
2	Limited access to quality fingerlings, feed, extension services, and reliable markets	Very High	15–30% increase in productivity among participating farmers through improved access to quality inputs, extension services, and market linkages.

3	Inadequate access to finance for aquaculture investments	Very High	Increased uptake of aquaculture - specific financing products and matching grants, enabling commercial expansion among targeted enterprises and producer groups.
4	Fish diseases and biosecurity risks	High	Improved fish survival rates and reduced disease - related losses through strengthened biosecurity and fish health management systems.
5	Climate change and environmental risks	High	Increased adoption of climate - smart aquaculture technologies and management practices among participating farms, improving resilience to climate variability.
6	Technical knowledge and skills gaps	High	At least, >=5,000 farmers and aquaculture service providers trained in good aquaculture practices, business management, and climate - smart production systems.
7	Weak traceability and compliance systems	Medium - High	Improved compliance with food safety, traceability, and SPS requirements among participating enterprises, strengthening market access and export readiness.
8	Gender and youth inclusion barriers	Medium	Increased participation of women and youth in aquaculture production, processing, input supply, and service provision activities.

10.5.1.2 Employment Creation

Aquaculture is labor - intensive across production, feed manufacturing, hatcheries, processing, logistics, equipment supply, and marketing.

Table 10: Employment creation

Ranking	Employment Category	GTTF Priority	Evidence - Based Position (2025)	Projected Impact by 2030
1	Direct employment	Very High	Aquaculture employment is increasing alongside growth in commercial fish farming, hatcheries, feed manufacturing, and fish processing.	25–40% increase in direct employment opportunities resulting from sector expansion and value - addition investments.
2	Indirect employment	Very High	Employment supported through transport, trade, input supply, logistics, financial services, and equipment maintenance.	20–35% increase in indirect employment opportunities through growth of supporting value chains.
3	Youth employment	High	Youth participation remains concentrated in production and trading activities.	Increased participation through digital aquaculture services, farm management, feed production, and renewable - energy applications.
4	Women's employment	High	Women remain concentrated in processing, marketing, and retail activities.	Expanded participation in aquaculture enterprises, processing, input supply, and service provision.

Note*: Employment figures are indicative estimates derived from Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) fisheries production data, FAO aquaculture growth trends, and value - chain employment multipliers reported in aquaculture development studies. Direct aquaculture employment estimates include fish farming, hatchery operations, feed production, processing, and quality assurance activities, while indirect employment includes transport, marketing, input supply, equipment maintenance, financial services, and other supporting functions. Projections assume continued sector growth, increased commercialization, and investment in aquaculture value chains between 2025 and 2030 (FAO, 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; WorldFish, 2023; World Bank, 2024).*

10.5.1.3 Trade Balance Improvement

Aquaculture offers a strong opportunity to improve Uganda's trade balance by increasing domestic fish production, reducing supply deficits, and expanding exports to regional and international markets. Growing demand for fish in neighbouring countries such as the Democratic Republic of the Congo, South Sudan, Rwanda, and Kenya presents significant opportunities for Uganda's commercial aquaculture sector. Investments in hatcheries, feed production, processing, cold - chain infrastructure, and quality assurance systems can enhance competitiveness, increase foreign exchange earnings, and improve utilization of existing processing facilities. At the same time, increased aquaculture production will strengthen food security, reduce pressure on declining capture fisheries, and contribute to sustainable economic growth (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; FAO, 2024; World Bank, 2024).

Table 11: Trade balance improvement

Area	Realistic Opportunities (2025–2030)
Import Substitution Opportunities	- Increased domestic aquaculture production to meet growing fish demand and reduce supply deficits caused by declining capture fisheries. - Expansion of certified hatchery capacity to improve availability of quality fingerlings. - Increased use of locally available feed ingredients such as soybean meal, sunflower cake, maize bran, cottonseed cake, and insect - based proteins. - Growth of local feed manufacturing to reduce reliance on imported feed concentrates and premixes where feasible. - Adoption of locally fabricated aquaculture equipment (cages, tanks, nets, feeders, and cold - chain accessories).**Note:** *Emerging circular bioeconomy innovations in aquaculture focus on converting agricultural, food, and fish - processing by - products into sustainable feed ingredients, biofertilizers, bioenergy, and other value - added products, thereby reducing waste, improving resource efficiency, and strengthening environmental sustainability.*
Export Growth Opportunities	- Expansion of regional trade in farmed fish to the Democratic Republic of Congo, South Sudan, Rwanda, Kenya, and Tanzania. - Increased supply of farmed tilapia and catfish to domestic processors and regional markets. - Growth in value - added products including chilled fillets, smoked fish, vacuum - packed products, and ready - to - cook fish products. - Gradual access to premium export markets through improved SPS compliance, traceability systems, and certification.

Projected Outcomes by 2030	- 20–30% increase in farmed fish production among supported enterprises and producer groups. - Increased availability of quality fingerlings and locally manufactured feed products. - Greater participation of commercial farms in regional fish trade. - Increased utilization of existing processing and cold - chain infrastructure. - Reduced pressure on capture fisheries through increased aquaculture production. - Improved food and nutrition security through greater availability of affordable fish products. - Incremental growth in foreign exchange earnings from aquaculture - derived products and value - added fish exports.

Overall, if the infrastructure, financing, technology adoption, and market integration constraints are systematically addressed, Uganda's aquaculture sector can evolve from a largely fragmented production system into a commercially integrated, climate - smart growth sector. The greatest impact is expected from stronger linkages between commercial enterprises and smallholders, investment in modern production and processing technologies, and expanded access to regional and international markets. These interventions would simultaneously advance green growth objectives, improve rural livelihoods, create employment opportunities, and strengthen Uganda's trade balance through both export expansion and import substitution.

10.6 Pillar 6: Investment Structuring and GTTF Grant Outcomes

Uganda's aquaculture sector presents significant investment opportunities across several high - growth segments of the value chain. Based on investment profiles of existing commercial enterprises and regional aquaculture benchmarks, indicative capital requirements range from approximately USD 0.2 - 2 million for hatchery development and modernization, USD 0.5 - 3 million for commercial cage and pond farming expansion, USD 1 - 10 million for fish processing and cold - chain infrastructure, and USD 2 - 5 million for medium - to large - scale feed manufacturing facilities (FAO, 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2026; World Bank, 2024; WorldFish, 2023). These estimates reflect the investment levels observed in East African aquaculture enterprises and should be refined through enterprise - specific due diligence.

The optimal financing approach varies according to enterprise maturity and investment readiness. Large - scale commercial enterprises (Tier 1), such as vertically integrated producers, feed manufacturers, and processors, are generally better positioned to access commercial debt and private equity financing. In contrast, medium - scale enterprises (Tier 2) often face constraints related to collateral requirements, high borrowing costs, and technology adoption risks, making them suitable candidates for blended - finance mechanisms that combine private investment with concessional capital and technical assistance (IFC, 2023; World Bank, 2024).

For the Green Technology Transfer Facility (GTTF), a blended - finance structure comprising 20 - 30% enterprise equity, 40 - 50% commercial financing, 15 - 25% matching grant support, and 5 - 10% technical assistance is proposed as an indicative financing framework rather than a fixed model. The matching grant component would play a de - risking role by reducing upfront capital costs, improving project bankability, and accelerating adoption of green technologies such as solar - powered cold storage, renewable - energy pumping systems, digital water - quality monitoring, precision feeding technologies, and resource - efficient processing equipment.

Experience from agricultural and green - growth investment programmes in Africa suggests that appropriately targeted matching grants can mobilize between 3:1 and 6:1 private - sector leverage, depending on enterprise size, technology maturity, and market conditions (IFAD, 2024; IFC, 2023; DANIDA Green Business Partnerships,

2024). Under this assumption, a GTTF - supported investment portfolio could reasonably target a leverage ratio of approximately 4:1 to 5:1, meaning

that each USD 1 of grant funding could mobilize between USD 4 and USD 5 of additional private investment. Through this approach, GTTF resources would act as a catalyst for larger - scale commercial investments, accelerating technology transfer, improving productivity and sustainability, and strengthening the competitiveness of Uganda's aquaculture sector in domestic and regional markets.

10.6.1 GTTF Investment Portfolio

Based on the integrated landscape assessment, enterprise interviews, technology gap analysis, and market assessment, Uganda's aquaculture sector presents a pipeline of commercially viable investment opportunities capable of accelerating productivity, competitiveness, climate resilience, and export growth. The proposed investment portfolio focuses on addressing the structural bottlenecks consistently identified across the value chain, particularly feed manufacturing, hatchery modernization, precision aquaculture technologies, renewable energy, cold - chain development, processing, and digitalization. These investments are designed to leverage Danish and European green technologies while mobilizing substantial private - sector investment and strengthening Uganda's position as East Africa's leading aquaculture hub

Table 13. Proposed GTTF Investment Portfolio

Ranking	**Investment Window**	**GTTF Priority**	**Priority Technology**	**Lead Enterprise(s)**	Estimated Investment (USD Million)	**Expected Private Investment**
1	Sustainable Feed Manufacturing	Very High	Feed automation, ingredient optimization, alternative proteins	De Heus Uganda and local feed manufacturers	**3.0**	High
2	Hatchery & Genetics	Very High	Selective breeding, hatchery automation, broodstock improvement	Rock Spring, MASCO, NAFIRRI	**2.5**	Medium
3	Precision Cage Farming	Very High	Automated feeding, biomass monitoring, IoT water - quality systems	Yalelo Uganda, KAMOS Agro, Asante Aqua	**2.8**	High

4	Renewable Energy	High	Solar PV, battery storage, hybrid energy systems	Feed mills, hatcheries, processors	**2.5**	High
5	Cold Chain & Fish Processing	High	Solar cold rooms, refrigeration, energy - efficient processing equipment	Victoria Treasures Ltd and processors	**4.0**	High
6	Grain Quality & Aflatoxin Management	High	Grain drying, optical sorting, quality testing laboratories	Feed manufacturers & grain aggregators	**1.5**	High
7	Circular Bioeconomy	Medium–High	Black Soldier Fly (BSF), biodigesters, sludge management	Yalelo Uganda, De Heus Uganda, processors	**1.8**	Medium
8	Digital Traceability	Medium–High	Farm management systems, blockchain traceability, QR systems	Processors, farmer organizations, exporters	**1.2**	Medium
9	National Aquaculture Information System	Strategic	National digital production database, analytics and decision - support platform	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), UBOS, Directorate of Fisheries Resources	**1.0**	Low

10.6.2 Proposed GTTF Grant Structure

Recognizing that many green technologies require substantial upfront capital while generating benefits over the

medium to long term, GTTF financing should adopt a blended - finance approach that reduces investment risk while encouraging strong private - sector ownership. Rather than fully financing projects, GTTF grants should catalyse commercial investment by covering part of the incremental cost associated with adopting advanced Danish and European technologies. This approach is consistent with international practice for green technology funds and encourages long - term commercial sustainability.

Table 14: Indicative Financing Structure

Financing Component	Share (%)	Purpose
Enterprise Equity	5 – 15	Demonstrates ownership and commitment by the beneficiary enterprise
Commercial Debt	12 – 30	Finances productive assets and business expansion through banks or DFIs
GTTF Matching Grant	10 – 15	De - risks adoption of innovative green technologies and supports demonstration effects
Technical Assistance	1 – 5	Feasibility studies, engineering design, environmental safe-guards, training, technology transfer, monitoring and evalua-tion

Table 15: Indicative Grant Ceilings

Enterprise Category	Typical Total In-vestment (USD)	Recommended GTTF Grant Ceil-ing (USD)	Typical Grant Share	Private Co - fi-nancing
Tier 1 – Anchor Enter-prise (large proces-sors, feed manufac-turers, commercial cage farms)	**2–6 million**	**300,000–1,000,000**	15–20%	80–85%
Tier 2 – Commercial Enterprise (commer-cial farms, hatcheries, medium processors)	**500,000–2 mil-lion**	**100,000–400,000**	20–25%	75–80%
Tier 3 – SME Demon-stration Enter-prise(SMEs, cooper-atives, technology pilots)	**100,000–500,000**	**30,000–100,000**	20–25%	75–80%
Research & Innova-tion Pilot (universities, NAFIRRI, technology validation)	**150,000–800,000**	**100,000–300,000**	30–40%	60–70%

10.7 Pillar 7: Policy, Programme Alignment, and Post - Grant Sustainability

Uganda's aquaculture sector is well aligned with national development priorities under the Agriculture Sector Strategic Plan, NDP IV, and the Parish Development Model, which emphasize commercialization, food security, and private - sector - led growth. The GTTF intervention is also consistent with national climate and green growth frameworks, supporting renewable energy adoption, climate - smart aquaculture, digital systems, and resource - efficient production. Existing development partner programmes by the World Bank, FAO, IFAD, and EU provide a strong oundation, but leave gaps in technology transfer, enterprise upgrading, and commercial scaling that GTTF can address. Long - term sustainability will depend on the ability of supported enterprises to generate cost savings, productivity gains, and market - driven revenues that enable continued operation beyond grant support.

Table 16: Policy, program alignment and post – grant sustainability

Ranking	Assessment Area	GTTF Priority	Current Status / Alignment	Required Actions for Scale	Sustainability After Grant Support
1	**Alignment with GRASP/ GTTF Objectives**	Very High	Strong alignment with green growth, climate - smart agriculture, technology transfer, private - sector development, value addition, and sustainable livelihoods. Opportunities exist for adoption of European green technologies in feed manufacturing, cold chain, renewable energy, and precision aquaculture systems.	Accelerate technology transfer partnerships, blended finance investments, and climate - smart aquaculture solutions.	High sustainability where investments reduce feed costs, improve productivity, and strengthen market access. This can remain viable beyond grant support.
2	**Commercial Viability**	Very High	Strong domestic, regional, and international demand for fish products supports long - term growth.	Scale production, improve feed efficiency, increase value addition, and strengthen market integration.	increasing profitable and less dependent on external support.
3	**Post - Grant Sustainability**	Very High	High potential where investments focus on commercially viable technologies, market - driven business models and market integration	Ensure projects are supported by sound business planning, commercial co - financing, and strong market linkages.	Enterprises continue operating on commercial revenues, with grant funding serving as a catalyst rather than a permanent subsidy.

4	**Alignment with NDP IV Agro - Industrialisation Agenda**	Very High	Fully aligned with Uganda's agro - industrialisation priorities through increased production, value addition, export promotion, employment creation, and import substitution.	Strengthen commercial aquaculture clusters, processing infrastructure, and market linkages.	Continued market demand and export opportunities support long - term sector growth.
5	**Regulatory Framework**	High	Existing framework includes the Fisheries and Aquaculture Act, National Fisheries Policy, environmental regulations, and export certification systems.	Strengthen compliance systems, traceability, biosecurity, and quality assurance.	Stronger regulatory systems improve competitiveness and export readiness.
6	**Policy Stability and Foreseeable Risks**	High	No major foreseeable adverse policy actions affecting aquaculture sector growth. Government remains committed to fisheries modernization, food security, and export development.	Maintain predictable regulatory frameworks and strengthen implementation capacity.	Stable policy environment enhances investor confidence and long - term sustainability.
7	**Standards Development Needs**	High	Export standards exist but require broader adoption by SMEs and commercial producers.	Strengthen feed standards, fish health protocols, traceability systems, certification frameworks, and environmental compliance standards.	Sustained access to premium domestic and export markets.
8	**Short - Term Regulatory Reforms (1–3 Years)**	Medium–High	Some gaps remain in sector governance and commercial financing frameworks.	Develop aquaculture financing guidelines, implement cage - farming zoning systems, and strengthen feed quality enforcement.	Improved investor confidence and reduced operational risks.
9	**Fiscal Incentives Required**	Medium–High	Limited sector - specific incentives currently available.	Duty and tax relief on aquaculture equipment, renewable energy technologies, cold - chain infrastructure, and processing technologies.	Increased private investment and accelerated technology adoption.

10	**Long - Term Reforms (5+ Years)**	Medium	Sector transformation requires coordinated ecosystem development.	Implement the Blue Economy Strategy, establish aquaculture industrial parks, and develop aquaculture insurance systems.	Creates a mature, resilient, and investment - ready aquaculture industry.
11	**Medium - Term Reforms (3–5 Years)**	Medium	Investment costs remain relatively high for technology - intensive aquaculture operations.	Introduce tax incentives for aquaculture equipment, renewable energy systems, and improve export logistics infrastructure.	Lower production costs and improved competitiveness encourage private investment.

10.7.1 SWOT Analysis 1: Uganda's Regional Competitiveness, Trade Performance and Import–Export Parity (2015–2025)

Table 17: SWAOT analysis 1 - Uganda

Strength	**Opportunity**
Largest aquaculture producer in the EAC region	Rising regional fish deficit
Positive export - import parity (major net exporter)	Growing fish consumption in EAC and DRC
Strategic access to Lake Victoria, Kyoga, Albert and extensive freshwater resources	EU market access for farmed fish
Established fish processing industry with export experience	Renewable - energy - powered aquaculture
Growing commercial feed manufacturing sector	Precision feeding and smart aquaculture systems
Strong regional market access through EAC, COMESA and AfCFTA	Local production of high - quality fish feeds
Recent EU approval for farmed fish exports	Climate - smart aquaculture technologies
Expanding aquaculture enterprise base with over 9,400 fish farms	Development of value - added fish products
Weakness	**Threat**
High feed costs (50–70% of production costs)	Climate change and water quality deterioration
Dependence on imported feed additives, premixes and equipment	Fish diseases and biosecurity outbreaks
Limited cold chain infrastructure	Competition from imported frozen fish
Inadequate aquaculture financing products	Illegal fishing affecting overall fisheries reputation
Weak fish health and biosecurity systems	Rising feed ingredient prices
Limited traceability systems for export markets	Regional competition from Kenya and Tanzania cage farming expansion
Low technology adoption among smallholders	Stringent SPS and traceability requirements in export markets

Table 18: 2035 Sector Outlook – Uganda Aquaculture

Indicator	2025 Baseline	2030 Projection	2035 Projection
Aquaculture Production (MT)	65,444	150,000	300,000
Export Earnings (USD Million)	216	350	550
Commercial Feed Demand (MT)	98,000	225,000	450,000
Farmers Engaged (No.)	9,463	25,000	50,000
Direct Jobs (No.)	200,000	350,000	600,000

Source: UBOS[, 2025 Census Report](https://www.ubos.org/wp - content/uploads/publications/05_2026Uganda_Aquaculture_Census_2025__Report.pdf)

Projection assumptions:

- 18 - 20% annual growth in commercial cage aquaculture.
- Expansion of feed manufacturing capacity.
- Increased investment in hatcheries and fingerling production.
- Improved access to export markets following EU approval for farmed fish exports.

***Note:** "The 150,000 MT is a base - case projection implying that approximately 18% annual compound growth in total aquaculture production between 2025 and 2030, supported by accelerated commercial cage expansion, growth in productive pond systems, increased feed manufacturing capacity, improved hatchery and genetics performance, and better farm management. This is a conditional scenario rather than an unconditional forecast."*

Commercial Feed Demand

Using a conservative Feed Conversion Ratio (Feed Conversion Ratio (FCR)) of 1.5:

- 2025: 65,444 MT × 1.5 = approximately 98,000 MT feed demand.
- 2030: 150,000 MT × 1.5 = approximately 225,000 MT feed demand.
- 2035: 300,000 MT × 1.5 = approximately 450,000 MT feed demand.

These estimates align with commercial tilapia and catfish production systems currently operating in Uganda.

Farmers Engaged

Assumptions:

- Increased cage culture adoption on Lakes Victoria, Albert, and Kyoga.
- Growth in commercial pond aquaculture under Parish Development Model and private -

sector investment.

10.7.2 Regional Competitiveness, Trade Performance and Import / Export Parity Analysis

(2015–2025)

Table 19: Ten(10 - Year) Production Growth Comparison

Country	2015 Production (MT)	2025 Production (MT)	Growth (%)
Uganda	35,000	65,444	87.0
Kenya	24,096	33,423	38.7
Tanzania	22,000	43,590	98.1
Rwanda	20,500	52,439	155.8

Growth Formula

Key Findings for the GRASP Landscape

- **Uganda** *remains the largest commercial aquaculture producer in East Africa and has the strongest export orientation.*

- **Rwanda** *has experienced the fastest growth rate over the past decade, driven by strong policy support and private investment.*

- **Tanzania** *possesses substantial untapped potential owing to its extensive freshwater and marine resources.*

- **Kenya** *has a more mature technology ecosystem and feed industry but has experienced slower production growth.*

Table 20: Ten(10 - Year) Fish Consumption Growth

Country	2015 Consumption (kg/person/year)	2025 Consumption (kg/person/year)	Growth (%)
Uganda	8.6	14.3	66.3
Kenya	4.5	4.6	2.2
Tanzania	8.0	10.5	31.3
Rwanda	2.3	3.45	50.0
***Source:** UG {(Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))). (2019), WASCP. (2025)}, KE{ Kenya Fisheries Service (2024), & Farm Africa (2016)}, TZ {FAO. (2024), & MIFUGO}, RW {MINAGRI (2023 - 2035), & MINAGRI (2025)}*			

Growth Formula

Implications for GRASP/GTTF

- **Uganda** *presents the strongest domestic market opportunity owing to its rapidly increasing fish consumption and large population.*

- **Tanzania** *offers substantial growth potential and a relatively high consumption base.*

- **Rwanda** *exhibits strong growth momentum but from a low base.*

- **Kenya** *remains characterized by low per - capita consumption, suggesting substantial unmet demand and scope for increased aquaculture production.*

Table 21: Ten(10 - Year) Export Growth (Value and Volume) - Uganda

Year	Export Volume (MT)	Export Value (USD Million)
2015	18,408	117.5
2020	13,000	127.6
2025	33,000	216.4
Growth 2015–2025	**+79.3%**	**+84.2%**

Key Observations

- Export earnings almost doubled between 2015 and 2025.
- Growth in export value exceeded growth in volume, indicating improved prices and higher - value products.
- Uganda remains the leading fish exporter within the East African Community.
- The recent EU approval for farmed fish exports is expected to accelerate export growth beyond 2025.
- Export growth is increasingly expected to come from aquaculture rather than capture fisheries.

Table 22: Trends in Total Fish and Fish Products Exports (Capture Fisheries + Aquaculture)

Country	2015 Export Volume (MT)	2015 Export Value (USD M)	2020 Export Volume (MT)	2020 Export Value (USD M)	2024 Export Volume (MT)	2024 Export Value (USD M)	Coverage of Statistics
Uganda	18,408	117.5	13,000	127.6	21,257*	216.4*	Total fish and fish products exports (capture fisheries + aquaculture)
Tanzania	32,000**	145.2	34,000**	155.2	29,000	180.6	Total fish and fish products exports (capture fisheries + aquaculture)
Kenya	9,115	36	8,284	32.8	8,616	45.3	Total fish and fishery products exports (capture fisheries + aquaculture)
Rwanda	120	0.7	265	1.6	496	3	Total fish exports

Note:

- *Uganda's latest official figures are reported for FY2024/25**, not calendar year 2024.
- **Tanzania's 2015 and 2020 export volumes are approximate values derived from the national time**

series; the export values **(USD 145.2 million in 2020 and USD 155.2 million in 2021) are reported in the official Economic Survey. The latest official 2024 figure is** 29,000 MT valued at USD 180.6 million**.

Key Findings for GRASP

- **Uganda** *remains the largest fish exporter in the EAC in terms of export earnings.*

- **Tanzania** *has experienced the strongest increase in export volumes and is approaching USD 300 million in fish exports.*

- **Rwanda** *has recorded the fastest percentage growth, albeit from a small base.*

- **Kenya's** *exports have remained relatively stagnant, with greater emphasis on domestic market development.*

Table 23: Total Fish and Fishery Products Imports (2025)

Country	Import Volume (MT)	Import Value (USD Million)	Coverage of Statistics
Uganda	5,000	12.0	Total fish and fish products imports
Kenya	9,960	7.12	Total fish and fishery products imports
Tanzania	4,500	8.0	Total fish and fish products imports
Rwanda	8,000	15.0	Total fish and fish products imports

Implications for the GRASP Landscape Assessment

- **Uganda** *is a strong* **net exporter**, *with imports representing less than 6% of export earnings.*

- **Kenya** *is gradually reducing imports through expansion of domestic aquaculture production.*

- **Tanzania** *maintains near self - sufficiency and remains export - oriented.*

- **Rwanda** *is the most import - dependent market among the four countries, presenting opportunities for regional aquaculture trade and investment.*

Table 24: Aquaculture Market Gap and Import Dependency Analysis (2024/25)

Country	Estimated Annual Fish Demand (MT)	Domestic Fish Production (MT)	Aquaculture Production (MT)	Estimated Fish Supply Gap (MT)	Fish Import Dependency	Investment Opportunity

Uganda	900,000	727,034	65,444	~173,000	Low–Moderate	Feed manufacturing, cage aquaculture, cold chain, export processing
Kenya	650,000	220,000	33,423	~430,000	High	Commercial aquaculture expansion, feed mills, hatcheries
Tanzania	950,000	650,000	43,590	~300,000	Moderate	Cage farming, mariculture, processing
Rwanda	70,000	52,439	52,439*	~18,000	High	Intensive aquaculture, hatcheries, feed production

Source: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2025, UBOS Aquaculture Census 2025, FAO Fishery Country Profile, Kenya Fisheries Service Annual Bulletin 2024, Tanzania Economic Survey 2024, Rwanda National Aquaculture Strategy 2023–2035, NAEB Annual Report, & NISR Trade Statistics

Note:* *In Rwanda, total domestic fish production is predominantly from aquaculture because capture fisheries are relatively limited.*

Table 25: Total Fish and Fish Products Exports

Country	Export Volume (MT)	Export Value (USD Million)	Coverage	Commercial Farmed Fish Export Status
Uganda (FY2024/25)	21,257	216.42	Total fish and fish products exports (capture fisheries + aquaculture)	Emerging (EU approval granted in 2026; exports expected to expand)
Tanzania (2024)	59,746	289	Total fish and fish products exports	Limited; exports remain predominantly capture fisheries
Kenya (2024)	8,616	45.3	Total fish and fishery products exports	Small - scale aquaculture exports; exports dominated by capture fisheries
Rwanda (FY2023/24)	496	3	Total fish exports	Negligible aquaculture exports

Note: Export statistics refer to total fish and fish products exports reported in official national trade statistics and include products derived from capture fisheries and aquaculture unless otherwise stated. Most East African countries do not currently publish separate national export statistics for aquaculture - derived products

Source: *Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2025, Tanzania Economic Survey 2024, Kenya Fisheries Service Bulletin 2024, NAEB Annual Report 2023/24*

Implications for the GRASP Landscape Assessment

- **Tanzania** *currently leads East Africa in fish export volume and export earnings.*

- **Uganda** *remains highly competitive and possesses the strongest commercial aquaculture base and processing infrastructure.*

- **Kenya** *has a relatively small export sector and is increasingly oriented toward satisfying domestic demand.*

- **Rwanda** *remains largely import - dependent and exports only small quantities, presenting opportunities for regional trade integration*

Table 26: Regional Competitiveness Index

Ranking	Indicator	GTTF Priority	Uganda	Kenya	Tanzania	Rwanda
1	Investment Readiness	Very High	**5**	**4**	**3**	**3**
2	Technology Adoption	Very High	**4**	**5**	**3**	**3**
3	Feed Industry	Very High	**4**	**5**	**3**	**2**
4	Processing Infrastructure	High	**5**	**4**	**4**	**2**
5	Hatchery Capacity	High	**4**	**4**	**3**	**3**
6	Production Scale	High	**5**	**3**	**4**	**3**
7	Export Capacity	Medium–High	**4**	**2**	**5**	**1**
Overall Score (/35)		**31**	**27**	**25**	**17**	
Regional Ranking		**1st**	**2nd**	**3rd**	**4th**	
***Note:** Interpretations (Scores): Very Strong / Regional Leader (5), Strong (4), Moderate (3), Weak (2), Very & Weak (1)*						
Source: Uganda Aquaculture Census 2025 (UBOS), Rwanda MINAGRI/NAEB 2025, Tanzania Ministry of Livestock and Fisheries, & Kenya Fisheries Service.						

Scoring Rationale

- **Uganda (5):** Largest aquaculture producer in East Africa. ([ubos.org](https://www.ubos.org/wp - content/uploads/publications/05_2026Uganda_Aquaculture_Census_2025___Report.pdf))

- **Tanzania (4):** Large and rapidly growing production base.

- **Kenya (3):** Moderate production.

- **Rwanda (3):** Strong growth but relatively smaller scale.

GRASP Interpretation

The index indicates that **Uganda is the most competitive aquaculture ecosystem in East Africa**, combining: 1. Strong production scale; 2. High export earnings; 3. Advanced processing infrastructure; 4. Expanding feed and hatchery industries; 5. Strong investment readiness; and 6. Significant opportunities for Danish and EU technology transfer under GRASP/GTTF.

10.7.3 Import - Export Parity Analysis

Import–Export Parity measures whether a country is a net exporter or net importer. An import - export parity analysis measures whether local farmers can profitably compete with global markets. In Uganda's aquaculture sector, this analysis reveals a highly fragmented market. Large commercial farms lean toward **export parity** (selling to premium international markets) while smallholder farmers depend on **import parity** (competing with cheaper imported regional fish)

Formular

Table 2**2: Parity analysis

Country	Exports (USD Million)	Imports (USD Million)	Parity Ratio
Uganda	216.4	12.0	**18.0**
Tanzania	289.0	8.0	**36.1**
Kenya	45.3	7.1	**6.4**
Rwanda	3.0	15.0	**0.2**

Implications for GRASP

- **Uganda and Tanzania** possess the strongest export - oriented aquaculture ecosystems and are best positioned for EU market expansion.

- **Kenya** maintains a positive trade balance but remains primarily a domestic - market - driven sector.

- **Rwanda** presents a major import - substitution opportunity and could benefit from increased regional aquaculture trade and investment.

10.7.4 Comparative Analysis and Country Prioritization in the Region

This section synthesizes the findings from the Regional Competitiveness, Trade Performance, Import - Export Parity, and SWOT analyses to identify the countries with the highest potential for commercial aquaculture investment and green technology transfer under the GRASP/GTTF framework.

Table 23: Comparative Performance Indicators (2024/25)

Indicator	Uganda	Kenya	Tanzania	Rwanda
Aquaculture Production (MT)	65,444	33,423	43,590	52,439

Export Volume (MT)	33,000	8,616	59,746	496
Export Value (USD Million)	216.4	45.3	289.0	3.0
Import Value (USD Million)	12.0	7.1	8.0	15.0
Import - Export Parity Ratio	18.0	6.4	36.1	0.2
Per Capita Fish Consumption (kg/person/year)	14.3	4.6	10.5	3.5
Technology Adoption	High	Very High	Moderate	Moderate
Feed Industry Development	Strong	Very Strong	Moderate	Weak
Processing Infrastructure	Very Strong	Strong	Strong	Weak
Investment Readiness	Very Strong	Strong	Moderate	Moderate
Export Orientation	High	Moderate	Very High	Very Low

Strategic Conclusion

Uganda emerges as the highest priority aquaculture market in East Africa and the most suitable entry point for GRASP/GTTF investments. The country offers the greatest potential for achieving the programme's objectives of: 1. Green growth, 2.Climate - smart agriculture, 3.Technology transfer, 4. Private - sector development, 5. Export diversification, 6. Employment creation, 7. Sustainable livelihoods; and 8. Mobilization of commercial co - financing through blended finance mechanisms.

Tanzania and Kenya constitute secondary priority markets, while Rwanda represents a strategic niche opportunity focused on import substitution and regional integration.

10.13 Multi - Criteria Decision Analysis (MCDA)

The MCDA scoring below applies the standard A2i/GTTF assessment framework to the aquaculture sector, on the same 1 - 10 scale used throughout this report. Scores are derived directly from the evidence already presented in this chapter, including the blended - finance capital stack and the technology - adoption constraint identified as the sector's binding limitation.

Table 24 - MCDA Scoring: Fish and Aquaculture Value Chain

MCDA Criterion	Weight	Score (1 - 10)	Evidence / Rationale
Market size and growth trajectory	15%	8/10	Aquaculture production grew 87 percent from approximately 35,000 MT in 2015 to 65,444 MT in 2025, with further growth projected to 150,000 MT by 2030, against a substantial and persistent national fish supply deficit.
EU/Danish technology fit	15%	7/10	RAS water recirculation, precision feeding, IoT water - quality monitoring, and solar cold - chain technologies are named and matched to specific constraints, though with less enterprise - level KII validation than the Dairy or Coffee technology matches in this report.
Enterprise investment - readiness	5%	5/10	This chapter's own evidence identifies low technology adoption, not access to finance, as the binding constraint on commercial expansion; enterprise - level readiness data is less complete than in chapters with a fully field - validated KII programme.

Additionality and crowding - in (leverage)	12%	6/10	The blended - finance structure (20 - 30% enterprise equity, 40 - 50% commercial financing, 15 - 25% matching grant, 5 - 10% technical assistance) is clearly specified, but co - financing commitments are not yet confirmed against named transactions in the way they are in this report's more field - validated chapters.
Value - chain constraint relief impact	12%	7/10	Feed costs of 50 - 70 percent of production costs, poor - quality fingerlings, weak fish - health systems, and inadequate cold - chain infrastructure are all well - documented, specific constraints that the recommended technology set addresses directly rather than generically.
RIO Marker alignment (all 4 markers)	10%	6/10	Climate and resource - efficiency co - benefits (reduced water use and feed waste from precision technology) are plausible and consistent with the chapter's own framing, but this chapter has not built the same explicit, marker - by - marker RIO assessment found in the Dairy and Cassava chapters, so this score is not inflated to match them.
Regulatory and policy alignment	8%	6/10	Aquaculture licensing and cage density regulation are identified elsewhere in this report as adding uncertainty to commercial - scale investment planning; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s own framework is still maturing relative to the sector's growth rate.
Financial sector co - financing readiness	8%	5/10	This chapter identifies limited finance access as one of the sector's own stated constraints alongside feed costs and weak fish - health systems, a genuine gap rather than a fully resolved financing pathway.
Gender and social inclusion	5%	5/10	Gender participation data specific to aquaculture enterprises is not separately quantified in this chapter with the same rigour as production and cost data; treated as a data gap rather than a scored weakness in the sector.
Strategic anchors and market - making potential	10%	6/10	Named commercial anchors exist in the sector, but the chapter's own enterprise pipeline evidence is less complete than the fully field - validated anchor bases identified in Dairy and Coffee.
TOTAL WEIGHTED SCORE	100%	8/10	Fish and Aquaculture: overall MCDA score 6.31/10.0. A genuine growth sector with a well - identified binding constraint (technology adoption, not capital), held back by incomplete enterprise - level field validation and financing confirmation relative to this report's more mature chapters; this is an honest reflection of where the evidence base currently stands, not a judgment on the sector's underlying potential.

Source: A2i GRASP/GTTF Sector Assessment Framework (2026). Scores derived directly from evidence in this chapter's own capital stack and constraint analysis. MCDA is indicative and subject to central moderation by the GTTF programme team.

12: SWOT Analysis 2: GRASP Landscape Assessment – Uganda, Kenya, Tanzania and Rwanda in the aquacultural sector

Table 25: SWAOT analysis 2 (Regional)

Country	Strengths	Weaknesses	Opportunities	Threats
Uganda	1. *Largest aquaculture and fisheries export sector in the region.
2. Strong processing and export infrastructure.
3. Established a commercial cage farming industry.
4. Positive export - import trade balance.
5. Significant private - sector participation*	1. **High feed costs.**
2. **Limited specialized aquaculture financing.**
3. **Weak extension services in some regions.**
4. **Dependence on imported technology.**	1. *EU export market access.
2. Expansion of commercial feed production.
3. Climate - smart aquaculture technologies.
4. Blue Economy investments.*	*- Climate variability. - Export market compliance costs. - Increasing regional competition.*
Kenya	*- Strong research institutions and innovation ecosystem. - Higher technology adoption rates among commercial farms. - Well developed private feed sector. - Strong domestic fish demand.*	*- Net fish importer. - Limited export competitiveness. - High production costs. - Limited water resources compared with Uganda and Tanzania.*	*- Cage farming expansion in Lake Victoria. - Feed manufacturing growth. - Value - added fish processing.*	*- Import competition. - Rising feed prices. - Environmental pressures on Lake Victoria.*
Tanzania	*- Large water resource base. - Significant untapped aquaculture potential. - Large domestic market. - Long coastline supporting aquaculture opportunities.*	*- Lower commercialization levels. - Underdeveloped processing infrastructure. - Lower technology adoption. - Weak aquaculture financing ecosystem.*	*- Cage culture expansion. - Export diversification. - Private - sector investments. - Blue Economy initiatives.*	*- Regulatory uncertainty. - Climate - related risks. - Competition from Uganda and Kenya.*
Rwanda	*- Strong Government support. - Efficient policy implementation. - Rapid aquaculture growth rates. - Growing cage culture on Lakes Kivu and Muhazi.*	*- Small domestic water resource base. - Limited export capacity. - Dependence on imported fish. - Small processing sector.*	*- Intensive aquaculture systems. - Regional market integration. - High - value niche aquaculture products. - Investment in hatcheries and feed.*	*- Land and water constraints. - Dependence on regional fish imports. - High production costs.*

10.8 Value Chain Price Analysis and Value Capture Assessment

Price formation along Uganda's aquaculture value chain demonstrates that the greatest commercial opportunities lie in value addition rather than primary production alone. Farm - gate prices for live fish increase substantially through aggregation, processing, cold - chain management, packaging, branding and certification, with processed and export - ready products commanding multiples of the producer price. This widening price

spread highlights the economic case for investments in modern processing facilities, cold - chain infrastructure, quality assurance systems, and traceability technologies that enable producers and processors to capture a greater share of the final market value. Consequently, the GRASP/GTTF investment strategy should prioritize technologies that bridge the gap between farm - gate and retail or export prices, thereby increasing enterprise profitability, export competitiveness, and returns to aquaculture producers.

Table 25: Price Formation Along Uganda's Aquaculture Value Chain (indicative 2025)

Ranking	Value Chain Node	GTTF Priority	Product	Average Price (UGX/kg)	Estimated ROI (%)	Main Drivers of Value Increase
1	Export Market	Very High	EU premium fillets	35,000–55,000 (equivalent)	80 – 120	HACCP compliance, certification, cold chain
2	Processor	Very High	Fillets	20,000–30,000	60 – 100	Filleting, quality assurance, cold chain
3	Processor	Very High	Chilled whole fish	12,000–15,000	20 – 25	Cleaning, icing, packaging
4	Formal Retail	High	Fresh premium fillets	25,000–40,000	100 - 300	Branding, retail margins, quality assurance
5	Feed Manufacturing	Very High	Floating Fish feed	3,800 – 6,000	5 - 100	Availability of materials
6	Wholesale	High	Packaged fish	18,000–28,000	50 – 70	Distribution and logistics
7	Fish Farm (Farm Gate) High		Live Tilapia	5,000–10,000	25 – 60	Production costs, feed efficiency
8	Hatchery	High	Fingerlings (per piece)	85 - 400 per fingerling	30 - 60	Improved genetics and survival
9	Collector/ Aggregator	Moderate	Live Tilapia	3,500–11,500	25 – 35	Bulking, grading, transport

10.8.1 Feed Value Chain

The aquaculture feed value chain is a critical component of Uganda's aquaculture sector because feed accounts for approximately **50 - 70% of total fish production costs**. The value chain begins with the supply of raw materials such as maize bran, soybean meal, fish meal, sunflower cake, and other protein ingredients, which are processed into commercial fish feeds for tilapia and catfish production. Feed costs significantly influence farm profitability, fish growth rates, and overall sector competitiveness.

Table 26: Feed value chain

Rank	Feed Value Chain	GTTF Priority	Price (UGX/kg)
1	Commercial floating feed	Very High	3,800–6,500
2	Soybean meal	Very High	2,500–3,200

3	Fish meal	High	2,800–5,500
4	Raw maize bran	Medium–High	800–1,000
5	Imported premium feed	Medium	7,000–9,000

Table 27: Processing Value Addition

Product	Farm Gate (UGX/kg)	Retail (UGX/kg)	Export Equivalent (UGX/kg)	Value Multiple
Whole Tilapia	10,000	14,000	16,000	1.8×
Gutted Tilapia	10,000	18,000	22,000	2.4×
Fillet	10,000	30,000	45,000	5.0×
Smoked Tilapia	20,000	30,000	50,000	4.4×

Table 28: Danish/EU Technology Value

Value Chain Stage	Current Constraint	Danish/EU Technology	Value Created
Farm	Poor feed efficiency	Precision feeding	Lower production cost
Hatchery	Poor genetics	Selective breeding	Faster growth
Harvest	High mortality	Live - fish handling systems	Better quality
Processing	Low fillet yield	Automated filleting	Higher recovery
Cold Chain	Post - harvest losses	Solar refrigeration	Reduced spoilage
Export	SPS compliance	Traceability & HACCP systems	Access to premium markets

The analysis indicates that processors and retailers capture a larger proportion of final value than producers because they undertake grading, processing, packaging, certification, branding and market access functions. Feed manufacturers also capture substantial value because feed accounts for the largest production cost.

Table 29:Cost Structure of Commercial Aquaculture Production

Cost Component	Share of Total Production Cost (%)
Feed	60–70
Fingerlings	10–15
Labour	8–12
Energy & Fuel	4–8
Fish Health & Biosecurity	2–5
Transport & Marketing	3–5
Other Operating Costs	5–8

Feed remains the dominant production cost, accounting for approximately two - thirds of total operating expenses. Consequently, investments in feed extrusion technology, alternative protein ingredients, precision feeding systems, and improved feed conversion efficiency offer the highest potential for reducing production costs and increasing farm profitability.

10.8.2 Economic and Social Benefits

Implementation of the proposed investments is expected to generate significant economic and social returns. Increased productivity, lower production costs, and improved product quality will enhance enterprise profitabil-

ity while expanding domestic and export market opportunities. Investments in value addition and cold - chain infrastructure will create new employment opportunities, increase incomes for farmers and processors, reduce post - harvest losses, and improve national food security. Adoption of renewable energy and resource efficient technologies will also reduce greenhouse gas emissions and improve the environmental sustainability of the aquaculture sector.

Table 30: Investment Prioritization

Rank	Investment Area	**GTTF Priority**	Commercial Return	Development Impact	Priority for GTTF
1	Feed Manufacturing	Very High	Very High	Very High	Tier 1
2	Hatcheries & Genetics	Very High	High	High	Tier 2
3	Cage Aquaculture Expansion	Very High	High	High	Tier 2
4	Fish Processing & Value Addition	High	Very High	Very High	Tier 1
5	Renewable Energy Systems	High	Moderate–High	High	Tier 2
6	Cold Chain Infrastructure	High	High	Very High	Tier 1
7	Digital Aquaculture Technologies	Medium–High	Moderate	High	Tier 3

10.8.3 Summary of the field GRASP/GTTF Assessments

Across all interviews, there is remarkable agreement on the fundamental constraints limiting Uganda's aquaculture sector:

Table 31: summary assessments

Rank	**Theme**	**GTTF Priority**	**Consensus Across Interviews**
1	**Feed**	**Highest Priority**	The single largest production cost and biggest constraint to sector growth
2	**Fish Genetics**	Very High	Improved strains needed to shorten production cycles and improve Feed Conversion Ratio (FCR)
3	**Green Technology**	Very High	Strong demand for Danish/EU technologies throughout the value chain
4	**Cold Chain & Processing**	Very High	Major opportunity for value addition and export competitiveness
5	**Raw Materials**	High	Poor soybean and maize quality, inconsistent supply, aflatoxin contamination
6	**Environmental Management**	High	Water quality monitoring, cage carrying capacity, oxygen monitoring required
7	**Finance**	High	SMEs struggle with working capital while large firms require blended finance
8	**Sector Data**	Medium–High	Weak production statistics constrain planning and investment

Table 32: Stakeholder Comparison

Stakeholder	Main Focus	Biggest Constraint	Biggest Opportunity	GTTF Priority
Yalelo	Commercial cage farming	Feed cost & grain quality	Soybean, cold chain, waste utilisation	Tier 1
De Heus	Feed manufacturing	Raw material quality & aflatoxin	Feed expansion & contract farming	Tier 1
Rock Spring	Hatchery & commercial farming	Oxygen crashes	Genetics & monitoring technologies	Tier 1–2
Victoria Treasures	Integrated cage farming & processing	Local feed quality	Expansion finance & processing	Tier 1
KAMOS	Low - input cage farming	Validation of production model	Technology demonstration	Tier 2
Asante Enterprise	SME cage farming	Working capital & feed	Cold chain & feed finance	Tier 2–3
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))	Policy	Feed, fingerlings, statistics	National sector transformation	Enabling Institution
NaFIRRI	Research	Genetics & feed	Commercialisation of research	Strategic Partner
UBOS	Statistics	Data gaps	National aquaculture information systems	Strategic Partner

10.8.4 Cross - cutting Strategic Conclusions

The interviews consistently indicate that Uganda's aquaculture constraints are **not primarily biological**. Instead, growth depends on strengthening:

1. Feed manufacturing competitiveness
2. Raw material supply chains
3. Grain quality and aflatoxin management
4. Genetics and hatchery systems
5. Environmental monitoring
6. Cold - chain logistics
7. Value addition
8. Market intelligence
9. Reliable sector statistics

Collectively, these findings support a market - systems approach rather than isolated farm - level interventions.

10.8.4 Recommended GTTF Investment Priorities

Rank	Investment Area	Expected Impact
1	Feed manufacturing, grain drying and aflatoxin reduction	Very High
2	Improved genetics and hatchery technologies	Very High
3	Cold - chain and processing infrastructure	High
4	Digital water quality and environmental monitoring	High
5	Renewable energy (solar, electric workboats)	High
6	Circular economy (BSF, biodigesters, waste utilisation)	Medium–High
7	Aquaculture information systems and market intelligence	High
8	Blended finance and technology adoption facilities	High

Conclusion

The cost benefit analysis demonstrates that Uganda's aquaculture sector offers strong commercial potential across the value chain, with the highest returns occurring beyond primary production. The substantial price differential between farm gate and processed or export - ready products confirms that investments in processing, cold chain logistics, quality assurance, traceability, and modern feed manufacturing present the greatest opportunities for increasing enterprise profitability and export competitiveness. These investment areas closely align with the objectives of the Green Technology Transfer Facility by promoting green industrialization, technology transfer, climate - smart production, and sustainable private - sector growth while maximizing economic, social, and environmental returns. In the call for enterprises, priority should be given to enterprises whose investments have broad value - chain reach, particularly feed manufacturing and hatchery/genetics enterprises, because improvements in these upstream inputs can benefit multiple downstream aquaculture producers.

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Chapter 11 : Livestock (Beef and Small Ruminants) Value Chain Assessment

Sector context

Uganda's beef and small - ruminant sector has a substantial livestock asset base but limited capacity to convert production into higher - value, formal and environmentally sustainable markets. With approximately 14.5 million cattle and 21.8 million goats and sheep, the sector remains largely focused on live - animal and raw - hide sales, resulting in significant unrealised value addition.

The key constraints are therefore not livestock numbers but abattoir certification, cold - chain infrastructure, meat processing and finishing, leather - processing technology, animal - health systems and limited adoption of resource - efficient technologies. The Green Agenda creates an opportunity to modernise the sector through solar - powered abattoirs and cold rooms, energy - efficient refrigeration, water - efficient slaughter and cleaning systems, wastewater treatment and biogas recovery from slaughterhouse waste, as well as circular - economy technologies that convert blood, manure, offal and other organic waste into biogas, animal by - products or organic fertiliser.

For leather, cleaner tanning and wastewater - treatment technologies can reduce chemical use, water consumption and environmental pollution while enabling higher - value finished leather production. The GTTF investment case should therefore prioritise HACCP - certified abattoir modernisation and green cold - chain infrastructure, complemented by energy - efficient meat processing, waste - to - energy systems and advanced leather - finishing technologies. These investments, supported by stronger FMD control and traceability, can shift the sector from low - value live - animal and raw - hide markets toward certified, processed, resource - efficient and higher - value domestic and regional markets, while reducing waste, emissions, water use and environmental impacts.

Key Findings

1. Large livestock base but limited value addition: Uganda has approximately 14.5 million cattle and 21.8 million goats and sheep**,** yet the sector remains predominantly focused on live - animal and raw - hide sales. This results in limited domestic value capture, particularly in processed beef and finished leather.

2. Certification, cold - chain and processing are the critical investment gaps: The main opportunity is to modernise HACCP - certified abattoirs, cold - chain infrastructure and leather - finishing facilities. Certified chilled beef can achieve roughly 3 – 4 times the value of live cattle**,** while finished EU - grade leather offers a potentially much larger value uplift over raw hides.

3. Green technology can simultaneously improve competitiveness and environmental performance: Priority green interventions include solar - powered livestock water systems and cold chains, energy - efficient abattoirs, biogas from manure and slaughter waste, wastewater treatment and reuse, improved pasture/feed systems, climate - resilient genetics, and digital livestock traceability**.** These can reduce energy and water use, waste and emissions while improving climate resilience.

4. FMD is the critical gateway constraint to export growth: Even with upgraded abattoirs and cold chains, formal exports to markets such **as** DRC and South Sudan depend on documented FMD - free status at herd or corridor level. Strengthening vaccination, disease surveillance and biosecurity is therefore essential to unlock the returns from livestock - processing investments.

Background

Uganda's livestock sector has an asset base that its commercial infrastructure does not yet convert to value. The national cattle herd of approximately 14.5 million head and combined goat and sheep population of approximately 21.8 million head (17.4 million goats, 4.4 million sheep) represent the largest livestock asset per agricultural land unit of any EAC comparator. But the sector currently exports these assets primarily as live animals at commodity prices set in Nairobi, captures less than 5 - 10 percent of finished leather value from its cattle hide output, and the domestic - market - facing majority of formal abattoirs including Uganda Meat Industries, this chapter's principal investment target operate at an estimated below 40 percent of installed capacity without HACCP certification (both figures pending direct verification; Section 11.7E). This is not a sector - wide absence: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Competent Veterinary Authority has approved three export - designated abattoirs Pearl Meat Company Ltd (Nakasongola), Sanga Meat Company Ltd (Kiruhura), and Egypt Uganda Food Security Company Ltd (Luwero) with facilities designed to HACCP - supportive international standards for export markets. None of these three is among the enterprises this chapter profiles as GTTF investment targets, and their live HACCP/ Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification status has not been independently confirmed as part of this assessment; they are cited to correct the categorical "zero" framing, not to claim they are certified. The investment case in this chapter rests on the domestic - facing gap exemplified by Uganda Meat Industries which these three export - oriented facilities do not close.

The gap between what the sector produces and what it captures in value is not a production gap, but a certification gap, a cold - chain gap, and a finishing technology gap. Live cattle at farm gate in Kiruhura command UGX 2,500 - 3,500 per kg liveweight. Certified chilled beef at Kampala formal retail commands UGX 8,000 - 14,000 per kg carcass weight. Raw bovine hide at farm gate yields UGX 3,000 - 5,000 per piece. The same hide, tanned to EU footwear - grade finished leather, yields USD 45 - 160 per piece. These are not projections. They are documented market prices.

Put concretely: the absence of HACCP certification at Uganda Meat Industries and the other domestic - market - facing abattoirs this chapter profiles means none of them can currently supply Carrefour, a hotel group's institutional kitchen, or the DRC/South Sudan formal export market each requires certified chain - of - custody documentation as a condition of listing (Section 11.4C). Both gaps abattoir certification and tannery finishing are the entry point for a foreign technical or financial partner to add value: each is a defined, fundable scope of work rather than an open - ended sector problem, and each converts directly into formal - retail or export market access for whichever enterprise closes it first.

Two investment priorities dominate the livestock GTTF case. First, HACCP - certified abattoir modernisation and cold - chain infrastructure the prerequisite for accessing DRC, South Sudan, Rwanda, and Kenya formal beef markets, all within 4 - 8 hours' refrigerated transport from Uganda's cattle corridor. Second, leather finishing tannery technology which may generate the highest per - unit value - add investment return in the entire GRASP portfolio, supported by NDP IV's explicit designation of leather alongside coffee and cotton as a strategic national processing investment.

One risk overarches the entire livestock investment case: Foot - and - Mouth Disease endemic status. Without documented FMD - free status at herd or corridor level, export certification to DRC and South Sudan cannot be achieved even where processing infrastructure is fully operational. FMD vaccination enforcement by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) is the single most important policy action required to unlock the returns on any GTTF abattoir investment.

Headline Indicators

Table 11.1 Livestock sector headline indicators

Indicator	Value	Source
National cattle herd (frozen cross - chapter baseline)	~14.5 million head	UBOS National Livestock Census 2021 (NLC 2021, published April 2024)
National goat population (frozen cross - chapter baseline)	17.4 million head	UBOS National Livestock Census 2021 (NLC 2021, published April 2024)
National sheep population (frozen cross - chapter baseline)	4.4 million head	UBOS National Livestock Census 2021 (NLC 2021, published April 2024)
Beef / cattle meat production, 2024 (est.)	~190,000 MT*	FAOSTAT / Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) 2024
Goat meat production, 2024 (est.)	~65,000 - 70,000 MT	Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) 2024; FAOSTAT
Sheep meat production, 2024 (est.)	~18,000 - 22,000 MT	Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) 2024; FAOSTAT
Livestock's share of agricultural GDP	~18 - 22%	World Bank 2024; UBOS 2022
Rural households primarily dependent on livestock	~3.2 million	Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) 2024; UBOS Census of Agriculture 2021
Cattle corridor geography	**Nakasongola → Kiruhura → Sembabule → Mbarara → Isingiro**	Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) Livestock Master Plan 2020
Live cattle farm - gate price (Kiruhura / Mbarara)	USD 0.69 - 0.97 (UGX 2,500 - 3,500)/kg liveweight	GTTF Selection Justification 2026
Certified chilled beef - Kampala formal retail	USD 2.22 - 3.89 (UGX 8,000 - 14,000)/kg carcass weight	GTTF Selection Justification 2026
Value multiplication: live animal certified chilled beef	3 - 4x per unit weight	Derived from price spread; Table 11.6
Raw hide farm - gate price (per piece)	USD 0.83 - 1.39 (UGX 3,000 - 5,000) per piece	GTTF Selection Justification 2026
Finished leather - EU footwear grade	USD 3.00 - 8.00 per sq ft (~USD 45 - 160 per hide)	GTTF Selection Justification 2026

HACCP - certified beef abattoirs	0 (zero) among profiled targets; 3 export - designated abattoirs approved sector - wide (Section 11.7E)	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Sanitary and Phytosanitary Certification System for Meat Export; A2i KII intelligence 2026; pending Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register verification
Formal abattoir capacity utilisation (est.)	< 40% of installed capacity	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); Uganda Meat Industries data
Hides and skins exported as raw / wet - blue (%)	~95%+	OEC / WITS / UN Comtrade; Leather Industries of Uganda
GTTF allocation (livestock VC)	USD 104K (UGX 375 million), 25% of livestock portfolio	A2i GRASP Technical Proposal 2026
Target leverage ratio	5:1 (total investment: USD 0.52 million / UGX 1.875 billion)	A2i GRASP MCDA framework 2026
MCDA composite score	7.35 / 10	A2i GRASP MCDA framework 2026

Sources: FAOSTAT QCL; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; OEC / WITS / UN Comtrade 2024; GTTF Selection Justification 2026; A2i GRASP MCDA 2026; World Bank 2024.

Population Baseline Note

Cattle, goat and sheep populations in this chapter are sourced to the UBOS National Livestock Census 2021 (NLC 2021, published April 2024): 14.5 million cattle, 17.4 million goats, and 4.4 million sheep. This is the same primary source, and the same census round, as the 7.08 million pig population frozen as the cross - chapter baseline in the Piggery chapter (Section 6.0B). This chapter nominates these three figures as the frozen national livestock - population baseline for use across the Livestock, Piggery, Grain, Waste, and any other linked GRASP chapter. Earlier drafts of this chapter cited a lower goat population (~16 million) and a marginally different sheep population (~4.5 million), both attributed generically to “Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; FAOSTAT”; both have been corrected to the NLC 2021 count above, which is the same authoritative source already governing the cattle figure. Any linked chapter citing a different cattle, goat or sheep figure should be reconciled to these baselines at the point of integrated - report assembly, alongside the master statistical assumptions table.

11.1 Pillar 1 - Historical Baseline and Strategic Alignment

Uganda’s livestock sector is the country’s second largest agricultural sub - sector by value. The national cattle

herd has grown from approximately 11.4 million head in 2014 to an estimated 14.5 million head in 2024 a CAGR of approximately 2.5 percent per annum. Beef cattle production is concentrated in the cattle corridor stretching from Nakasongola through Kiruhura, Sembabule, Mbarara, and into Isingiro, dominated by Ankole longhorn and crossbred animals under predominantly pastoral and agrOff-take Partnership Agreement (Off-take Partnership Agreement (OPA))storal systems.

Figure 11.1 Cattle Herd 2024: Uganda and Regional Comparators (million head).

Sources: FAOSTAT QCL 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024.

Table 11.2 Cattle population and beef production: Uganda and regional comparators, 2014 - 2024

Year	Uganda Cattle (head)	Uganda Beef MT*	Kenya Cattle (head)	Kenya Beef MT	Tanzania Cattle (head)	Tanzania Beef MT	Rwanda Cattle (head)	Rwanda Beef MT
2014	~11.4m	~130,000	~17.2m	~390,000*	~33.0m	~270,000	~1.20m	n/r
2015	~11.7m	~135,000	~17.5m	n/r	~33.4m	n/r	~1.22m	n/r
2016	~12.0m	~140,000	~17.8m	n/r	~33.7m	n/r	~1.24m	n/r
2017	~12.3m	~145,000	~18.0m	n/r	~33.9m	n/r	~1.26m	n/r
2018	~13.5m	~152,000	~18.1m	n/r	~34.1m	n/r	~1.28m	n/r
2019	~13.8m	~157,000	~18.2m	n/r	~34.3m	n/r	~1.30m	n/r
2020	~14.0m	~162,000	~18.3m	n/r	~33.8m	n/r	~1.32m	n/r
2021	~14.2m	~168,000	~18.1m	~390,000	~33.9m	~295,000	~1.36m	n/r
2022	~14.3m	~174,000	~18.3m	n/r	~34.0m	n/r	~1.38m	n/r
2023	~14.4m	~182,000	~18.4m	n/r	~34.1m	n/r	~1.40m	n/r
2024	~14.5m	~190,000*	~18.5m	n/r	n/r	n/r	n/r	n/r

*Sources: FAOSTAT QCL 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024; USDA FAS 2025. Uganda beef production figures are FAOSTAT modelled estimates; informal on - farm slaughter not captured.**

Figure 11.2 Beef / Cattle Meat Production 2024 Estimates: EAC Comparators (metric tonnes)

. Sources: FAOSTAT QCL; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; USDA FAS 2025. Uganda 2024 requires cross - referencing with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) slaughter data.*

DATA QUALITY NOTE: Uganda's beef production estimate of ~190,000 MT for 2024 requires cross - referencing against Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024 slaughter statistics and Uganda Meat Industries throughput data. The FAOSTAT modelled series may overstate formal output by not correcting for low formal abattoir utilisation.

11.1.1 EAC Regional Context

The EAC comparator frame reveals Uganda's structural position: the third - largest cattle herd in the region but the smallest formal beef processing sector by certified output. Kenya, with a smaller herd than Tanzania, operates a significantly larger formal processing sector, evidenced by its estimated USD 12 million in processed beef

exports against Uganda's less than USD 1 million.

Table 11.3 EAC livestock sector comparison, 2024

Indicator	Uganda	Kenya	Tanzania	Rwanda
Cattle herd (head), 2024 est.	~14.5 million	~18.5 million	~34 million	~1.4 million
Beef production (MT), 2024 est.	~190,000*	n/r (2021: ~390,000)	n/r (2021: ~295,000)	n/r
Goat population (head)	17.4 million	~27 million	~22 million	~4 million
Sheep population (head)	4.4 million	~9 million	~8 million	~1 million
HACCP - certified beef abattoirs	0 among profiled targets; 3 export - designated abattoirs approved sector - wide*	Partial (KMC, private)	0	0
Formal abattoir utilisation (est.)	< 40%	~50 - 60%	~20%	~30%
Live cattle exports (USD), 2023	~USD 45 - 60M (est., mostly informal)	~USD 20M (formal)	~USD 15M	Negligible
Processed beef exports (USD), 2023	< USD 1M	~USD 12M	~USD 5M	~USD 2M
Hides/skins exports, 2023 (USD)	~USD 8 - 12M (raw/wet - blue)	~USD 15M	~USD 10M	~USD 3M
Finished leather exports (USD)	Negligible	~USD 5M	Negligible	Negligible
Net beef trade position	Structural live exporter; price - taker	Formal exporter; price - setter regionally	Informal exporter	Net beef importer

Sources: FAOSTAT QCL 2024; OEC / WITS / UN Comtrade 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; USDA FAS 2025. Uganda's HACCP figure reflects zero certified abattoirs among this chapter's GTTF - profiled enterprises; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Competent Veterinary Authority has separately approved three export - designated abattoirs - Pearl Meat Company Ltd, Sanga Meat Company Ltd, and Egypt Uganda Food Security Company Ltd - with facilities designed to HACCP - supportive standards, whose live certification status has not been independently verified as part of this assessment (Section 11.7E).*

Figure 11.3 Processed Beef Exports 2023: EAC Comparators (USD millions). Uganda's entire gap vs. Kenya is explained by zero HACCP certification.

Sources: OEC / WITS / UN Comtrade 2023; GTTF Selection Justification 2026.

Figure 11.4 Formal vs. Informal Slaughter Share: Uganda vs. Kenya

Estimated share of total cattle slaughter (%)

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; USDA FAS Kenya 2025; A2i KII intelligence 2026.

11.1.2 Small Ruminants: Goats and Sheep

Uganda's goat population of approximately 17.4 million head and sheep population of approximately 4.4 million head (NLC 2021, the frozen cross - chapter baseline; Section 11.0A) support a significant informal domestic market and a growing cross - border live animal trade. The primary GTTF value - addition opportunity in small ruminants lies in transitioning from live export to certified processed meat, accessing diaspora premium channels in the Gulf and Europe where halal - certified Ugandan goat commands a 30 - 60 percent premium over commodity equivalents.

Table 11.4 Small ruminant benchmark: Uganda and regional comparators

Country	Species	Population (head)	Meat Prod. (MT est.)	Key Analytical Notes	Source
Uganda	Goats	17.4 million	~65,000 - 70,000	Primary school fee / emergency expenditure mechanism for women - headed households; diaspora export demand in Gulf and Europe growing	UBOS National Livestock Census 2021 (NLC 2021, published April 2024)
Uganda	Sheep	4.4 million	~18,000 - 22,000	Highland production in Kigezi and Elgon; wool and meat dual - purpose potential; under - exploited wool processing opportunity	UBOS National Livestock Census 2021 (NLC 2021, published April 2024)
Kenya	Goats	~27 million	~90,000	Regional benchmark in small ruminant exports; HACCP certification more advanced; Nairobi halal abattoir sector established	FAOSTAT 2021

Tanzania	Goats	~22 million	n/r	Large base but informal slaughter dominates; limited certified export capacity	FAOSTAT 2021
Tanzania	Sheep	~8 million	n/r	Significant pastoral populations; limited formal processing	FAOSTAT 2021
Rwanda	Goats	~4 million	n/r	Net importer of small ruminant meat; proximity to Uganda creates export corridor opportunity	FAOSTAT 2021

Sources: FAOSTAT QCL 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024.

Figure 11.5 Small Ruminant Populations: EAC Comparators (million head).

Sources: FAOSTAT QCL 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024.

11.1.3 Hides and Skins: The Parallel Value Chain

Uganda's cattle slaughter generates a significant hide and skin output, currently exported almost entirely as raw crust or wet - blue leather at low unit values. The global leather market is valued at over USD 100 billion. A single bovine hide, tanned to EU footwear - grade finished leather, yields approximately USD 45 - 160 against a raw hide farm - gate price of UGX 3,000 - 5,000 per piece a value multiplication of 40 - 70 times the raw price per unit.

An estimated 95 percent of Uganda's hide and skin output leaves the country as raw or wet - blue material rather than finished leather. This figure requires confirmation against current UBOS/URA export data before being cited as a precise statistic; this assessment's own desk sources corroborate the pattern rather than the exact percentage the 2008 Uganda Investment Authority leather value chain review found Uganda "specialises in wet - blue tanning" with essentially all further finishing happening abroad. A genuine structural question is worth testing explicitly here: is this pattern closer to vanilla into France a raw - material origin locked into a specific finished - goods market by established buyer relationships, brand equity, and import - country processing infrastructure that local investment cannot realistically displace or is it a more open structural gap that Uganda's own finishing investment can capture?

The evidence points to the latter, with an important nuance: Uganda's raw and semi - processed hide exports already go to both European and Asian buyers, not to Europe exclusively; the same 2008 Uganda Investment Authority (UIA) review found Uganda exporting raw hides and skins to "Asian and European countries" alike. This matters because it means there is no single, locked - in buyer relationship of the kind that would make the

vanilla - into - France comparison apt; the raw - material trade is already multi - destination. The play Uganda can realistically control is not displacing an entrenched European finishing industry on its own turf, but capturing a larger share of value before the hide leaves the country finishing to crust or full - finish grade domestically, for buyers who are already sourcing raw material from Uganda today, whether in Europe or Asia.

Ethiopia's experience is the clearest regional precedent for both the opportunity and the mechanism: the Ethiopian Government banned raw hide and skin exports outright in 2012 specifically to force this shift, and Chinese investment followed the policy change rather than preceding it the Chinese manufacturer Huajian Group built a footwear factory outside Addis Ababa producing 6,000 pairs per day. Ethiopia's leather export earnings grew from approximately USD 23 million in 2013 to USD 133 million in 2018 over that transition. This suggests Uganda's realistic play is not choosing between Europe and Asia as end markets, but using policy and finishing investment together to capture value regardless of which region the finished or semi - finished product ultimately serves and that Chinese investment in local finishing capacity, not only Chinese demand for raw hides, should be treated as a live option alongside the EU route already emphasised in this chapter's technology sourcing.

The finished - leather and footwear import gap this chapter's investment case addresses is large and structural, not marginal. Uganda's total domestic leather footwear market is estimated at approximately 15 million pairs per year (Uganda Investment Authority, 2008 the most recent economy - wide estimate located in desk research and dated accordingly), against domestic production of fewer than 4 million pairs an import gap of roughly 11 million pairs annually, sourced principally from Kenya and China, with Europe supplying the premium segment (World Bank/WITS footwear trade data 2023 confirms China, Kenya, Tanzania, Turkey, and India as Uganda's top footwear import origins). On unit economics, this chapter's own price data

(Figure 11.6) supports a raw bovine hide at Uganda farm gate (UGX 3,000 - 5,000, roughly USD 1 - 1.5) against a single hide tanned to EU footwear - grade finished leather at USD 45 - 160 a 40 - 70 times multiplication depending on grade and finish. The specific processing technology required to capture this uplift is already identified in this chapter's technology matching (Section 11.4B): finishing equipment from IDRA and ERRETRE (Italy) and MOENUS and Turner (Germany) upgrades Leather Industries of Uganda's existing wet - blue output to crust or full - finish grade this is a finishing - line upgrade to an operating facility, not a greenfield tannery investment, which materially reduces both the capital requirement and the execution risk of the opportunity quantified above.

Finishing - line equipment alone does not close the quality gap between Ugandan and regional leather output. More than 60 percent of Uganda's hides and skins are produced at Grade 3 or Grade 5 the lower end of the international grading scale implying a usable yield of only 45 - 75 percent and a production cost of USD 1.2 - 1.7 per kilogram before any finishing value is added (Uganda Leather Value Chain Strategy, ALLPI). This is a flaying, curing, and early - handling quality problem upstream of the tannery, not something a finishing line alone corrects.

Uganda's auxiliary craft skills cutting, stitching, pattern - making, and product design are correspondingly immature relative to regional comparators: Kenya's leather sector has developed a recognised design and artisan ecosystem (Alpharama as East Africa's largest tannery, alongside globally distributed niche leather - goods brands using skilled Kenyan artisans), while Ethiopia has built an integrated tannery - to - footwear - to - garment industry exemplified by Ethio - Leather Industries (ELICO), spanning tanning, footwear, and leather goods under one group built on internationally recognised sheepskin quality and deliberate Government investment in the full value chain, not tanning capacity alone. Given this starting position, Uganda's realistic near - term positioning is the high - end, niche, and tourist - market segment leather goods, bags, and accessories sold on provenance and small - batch craftsmanship rather than competing head - on in mass footwear manufacturing, where Ethiopia and Kenya already have developed skills ecosystems and Asian manufacturers compete on scale.

This is a positioning choice with a direct cost - structure rationale: niche and tourist - segment pricing tolerates the higher unit costs that Uganda's current yield and skills base imply, in a way mass - market footwear pricing does not. On the fiscal and tax angle, Ethiopia's policy package is the clearest regional precedent worth citing directly: duty exemptions on capital goods and construction materials, plus a five - year income tax holiday, for leather - sector investors, alongside the 2012 raw - export ban already discussed above. Egypt, Africa's largest leather exporter by value (approximately USD 300 million, against Ethiopia's approximately USD 140 million as the fifth - largest), offers a second regional benchmark, though Egypt - specific fiscal incentive detail comparable to Ethiopia's was not located during desk research.

A duty exemption on tannery finishing equipment the Italian and German machinery already specified in Section 11.4B modelled on Ethiopia's capital - goods exemption, is a direct, low - cost policy lever GTTF could recommend alongside its own matching - grant structure.

Banks and investors evaluating this opportunity will ask directly who the buyer is, and domestic Ugandan consumers are not a defensible answer Uganda's own import data shows the domestic footwear market is dominated by low - cost imports (China accounts for the largest share of Uganda's footwear import shipments, per Volza trade - shipment data), consistent with price - sensitive domestic demand that a premium finished - leather product is not positioned to win.

The credible end market is external and already named elsewhere in this chapter: EU leather and footwear brands reachable via the CBI Netherlands and European Leather Industry Association (ELIA) channels already identified as the buyer route in this chapter's hard - gate screening (Section 11.6B), where an enterprise cannot receive a tannery finishing grant without documented offtake from exactly this kind of formal buyer. The niche/tourist - segment positioning recommended above is itself a demand - side argument, not only a cost - structure one: small - batch leather goods sold on provenance reach buyers (tourists, specialty retailers, EU niche brands) who pay for story and craftsmanship rather than shopping on price the way the domestic footwear market does.

Ethiopia's experience again offers a live comparator on the demand side: direct manufacturer investment (Huajian Group's factory) represents an offtake relationship secured before production started, not produce - first speculative capacity the same Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) - before - capital discipline this chapter's hard gates already apply, and the standard this chapter's leather investment case should be held to as it moves from landscape assessment to funded transaction.

This chapter's investment case rests on two distinct headline opportunities, not one. The first is certified chilled beef: this chapter's own price ladder (Table 11.7) shows farm - gate liveweight at approximately UGX 2,500 - 3,500/kg rising to certified formal - retail chilled beef at approximately UGX 8,000 - 14,000/kg a 3 - 4x value uplift already identified in Figure 11.7. The second is leather finishing, quantified above. Leather appears consistently among NDP IV's and Uganda's industrial policy's named agro - industrial priority sectors; this assessment could not independently confirm a specific framing of leather, coffee, and cotton as a distinct top - three grouping from the public NDP IV documentation reviewed, and this should be confirmed against the specific NDP IV chapter or annex before that framing is used elsewhere in the integrated report.

Separately, current domestic leather pricing is poor enough that producers reportedly prefer to discard hides rather than sell them at prevailing farm - gate prices; only one tannery currently operates in Uganda (Leather Industries of Uganda, Jinja), and finished leather and leather footwear are imported from both Kenya and Europe confirmed independently by this chapter's own desk research (Uganda Investment Authority (UIA) 2008; WITS 2023 trade data).

Figure 11.6 Hide - to - Leather Value Multiplication: Raw Hide → EU Finished Leather (UGX per bovine hide). The 40 - 70× value uplift makes the leather tannery investment potentially the highest per - unit return in the

entire GRASP portfolio. Sources: GTTF Selection Justification 2026; European leather industry pricing data; CBI Netherlands 2024.

11.1.4 Production Projections to 2030

Table 11.5 Beef production projections to 2030, three scenarios

Year	Conservative (3% CAGR)	Base Case (5.5% CAGR)	Optimistic (9% CAGR)	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Target	Note
2024	190,000	**190,000**	190,000	-	FAOSTAT / Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024 baseline*
2025	195,000	**200,000**	210,000	-	GTTF abattoir investment commences
2026	200,000	**212,000**	230,000	-	First HAC-CP - certified throughput
2027	206,000	**225,000**	253,000	-	DRC / South Sudan export corridor opens
2028	212,000	**238,000**	278,000	-	Feedlot capacity uplift from GTTF investment
2029	218,000	**253,000**	305,000	300,000	NDP IV target year
2030	224,000	**270,000**	335,000	-	NDP IV +1 horizon

Conservative = 3% CAGR; Base Case = 5.5%; Optimistic = 9%. Not endorsed by NPA or Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) as official pro-

jections.

11.1.5 NDP IV Strategic Alignment

The production trajectory set out in Table 11.5 is not self - executing. Whether the sector tracks the conservative or the base - case path depends substantially on whether national policy actively pulls investment toward value addition or merely permits it. On this question the policy record is unambiguous: the Government of Uganda has already named the livestock value - addition agenda as a strategic national priority across three mutually reinforcing instruments, and GTTF investment advances that stated agenda rather than introducing a new one.

The first and most consequential is the Fourth National Development Plan (NDP IV). NDP IV explicitly designates leather value addition, alongside coffee and cotton, as one of three strategic processing investments anchoring the country's agro - industrialisation programme. This designation carries weight beyond rhetorical endorsement. It places leather in the same priority tier as the two commodities that have historically commanded the largest share of agro - processing policy attention and public investment, and it does so on the strength of a value - capture argument the leather sub - sector makes more powerfully than almost any other: a single bovine hide exported raw earns a few thousand shillings, while the same hide finished to EU footwear grade earns forty to seventy times that figure (Section 11.1C). For a GTTF tannery transaction at Leather Industries of Uganda, the NDP IV designation is therefore not a background fact but the central policy hook it converts a commercial investment case into one that simultaneously delivers a named NDP IV target, materially strengthening the case for Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) endorsement and for the complementary co - financing pathways set out in Pillar 6.

The second instrument is The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Master Plan, which translates the high - level NDP IV ambition into documented sectoral commitments. The Master Plan commits the Government to abattoir modernisation and to the establishment of an export - certification pathway through the veterinary authority precisely the two regulatory enablers on which the abattoir investment hypothesis depends. This matters for the structure of the GTTF deal: because the certification ladder a GTTF - supported abattoir must climb is one the Government has already undertaken to build, the programme is investing along a documented public pathway rather than against an undefined one. The practical implication is that the abattoir transaction should be sequenced around a formal Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) engagement on the export - certification timeline for the anchor enterprise, a point developed in the KII agenda (Section 11.11) and the regulatory mapping (Table 11.15).

The third instrument is the National Livestock Policy 2020, which identifies beef value addition, cold - chain infrastructure, and leather processing as the primary mechanisms for raising the sector's foreign - exchange contribution and reducing pastoral poverty. The significance of the 2020 Policy is that it names all three of the GTTF livestock investment vectors processing, cold chain, and leather in a single statement of national policy intent. There is, in other words, no daylight between the three priorities the Policy sets and the three white spaces this assessment identifies for GTTF investment (Section 11.3A). The interventions converge with the policy framework not by coincidence but because both respond to the same diagnosis: an asset - rich sector that exports value it could capture.

Two cautions temper this otherwise strong alignment, and both are carried forward for resolution rather than smoothed over here. First, policy designation is necessary but not sufficient: the returns on any abattoir investment remain gated by Foot - and - Mouth Disease status, and no policy endorsement substitutes for documented FMD - free corridor designation as the precondition for formal export certification (developed in 8.7E and Table 11.15). Second, the specific provisions attributed to each instrument above should be confirmed against the final published texts at the point of integrated - report assembly, as policy documents of this kind are pe-

riodically revised and a superseded provision would weaken rather than strengthen the case. Neither caution diminishes the central finding: across NDP IV, the Livestock Master Plan, and the National Livestock Policy 2020, the Government of Uganda has already committed to the value - addition agenda that GTTF livestock investment is designed to advance.

11.1.6 Forward - Looking Outlook: 10 - , 20 - and 30 - Year Horizon and International Benchmarks

The projections elsewhere in this chapter are built to a 2030 horizon, consistent with NDP IV and the GTTF programme period. Read against Denmark's Africa strategy which frames engagement in generational terms, the sector's trajectory is better understood across three horizons: the 2030s (10 years), the 2040s (20 years) and the 2050s (30 years).

10 - year horizon (to the mid - 2030s)

This is the horizon over which the certification gap identified in Section 11.0 should close: the first HACCP - certified abattoir throughput and the DRC/South Sudan export corridor opening are already built into the Base Case production projection for 2026 - 2027 (Table 11.5). Resolving the FMD - vaccination enforcement question with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) (Section 11.7E) is the single precondition that determines whether the sector tracks the Base Case or the Conservative path over this decade.

20 - year horizon (to the mid - 2040s)

Southern African beef exporters most notably Botswana and Namibia are the internationally recognised precedent for what this chapter's central regulatory challenge looks like once resolved: both countries achieved EU - approved beef export status despite FMD circulating elsewhere in their territory, by establishing FMD - free zones with veterinary fencing and surveillance rather than waiting for nationwide disease - free status. Neither comparator is offered as a precise quantitative benchmark for Uganda the underlying zoning and surveillance investment scale was not verified as part of this assessment but both demonstrate that Uganda's FMD - free corridor approach (Table 11.15) is a proven regulatory pathway rather than a novel or unprecedented one, and that certified beef export access is achievable without resolving FMD status nationwide.

30 - year horizon (to the mid - 2050s)

At this distance the specific figures in this chapter are illustrative rather than forecast, but the direction is robust to the underlying trends documented elsewhere in this assessment: IPCC AR6 projects cattle corridor temperatures rising 1.5 - 2.5°C by 2050 with increasing drought frequency (Section 11.5), meaning the climate - adaptation case for solar water infrastructure (Section 11.5A) strengthens rather than weakens over time. The certification and leather - finishing foundation recommended in this chapter is the precondition for the sector capturing that growth in value rather than continuing to export it as live animals and raw hides at commodity prices.

This outlook is directional, not a substitute for the 2030 - horizon financial modelling in Sections 8.2 and 8.6, which remains the basis for the investment case put to the Call. It is included to show that the underlying rationale certification and finishing as the value - capture levers, FMD - free zoning as a proven rather than novel pathway holds beyond the GTTF programme period.

Sources: IPCC AR6 (2021); Africa's Century: Strategy for Strengthened Danish Engagement with African Countries, August 2024; sector characterisation of Botswana and Namibia FMD - zone beef export status drawn from published trade and veterinary documentation, not independently verified national statistics.

11.2 Pillar 2 - Market Dynamics, Pricing, and Supply Chain Architecture

The livestock sector operates under a split pricing dynamic analytically distinct from any other value chain in the GRASP landscape. Live animal exports are governed by export parity: Uganda is a price - taker, with farm - gate prices set by the Nairobi terminal market minus inland freight. Formal processed beef in Uganda's domestic formal retail channel operates under import parity: certified chilled beef is priced by the landed cost of importing equivalent product from Kenya or South Africa. This split dynamic creates a structural investment signal any Ugandan processor achieving HACCP certification can price below the Kenyan import landed cost and still capture a significant premium over the live - animal sale price.

11.2.1 Export and Import Parity Price Construction

Table 11.6 builds both the export parity price for live cattle and the import parity price ceiling for certified chilled beef in Kampala formal retail.

Table 11.6 Export parity (live cattle) and import parity (certified chilled beef) price construction: Uganda, 2026

Component	USD/kg	UGX/kg (approx.)	Unit	Notes
EXPORT PARITY - LIVE CATTLE (Uganda as price - taker)				
Terminal market price: Nairobi wholesale beef	USD 2.70 - 3.50/ kg cwt	UGX 10,000 - 13,000	carcass weight	Nairobi benchmark; Kenya Meat Commission / USDA
Less: processing and slaughter cost (Nairobi)	– **USD 0.40 - 0.60**	-	per kg cwt	Nairobi abattoir throughput cost
Less: road freight Kampala → Nairobi (live)	– **USD 0.08 - 0.12/ kg**	-	per kg liveweight	~USD 80 - 120/ MT road freight; approx. 1.5x liveweight to cwt ratio
Less: trader margin	– **USD 0.10 - 0.15/ kg**	-	per kg liveweight	Estimated cross - border trader margin
= EXPORT PARITY PRICE AT FARM GATE (live)	**USD 0.68 - 0.95/ kg lw**	**UGX 2,500 - 3,500**	liveweight	Matches documented Uganda farm - gate price - confirms export parity mechanism
IMPORT PARITY - CERTIFIED CHILLED BEEF (Kampala formal retail)				

Certified chilled beef: South Africa / Kenya origin FOB	USD 2.00 - 2.80/ kg cwt	-	carcass weight	SA / Kenya certified beef export price
Sea / road freight and port handling to Kampala	\+ USD 0.25 - 0.40	-	per kg cwt	Road Nairobi - Kampala + port/ handling
EAC import tariff on processed beef (25% CET)	\+ USD 0.55 - 0.80	-	of landed cost	EAC CET on HS 0201/0202 processed beef
= IMPORT PARITY PRICE - KAMPALA FORMAL RETAIL	**USD 2.80 - 4.00/ kg cwt**	**UGX 10,400 - 14,800**	per kg cwt	Domestic producer price ceiling for certified chilled beef
Uganda domestic certified chilled beef (formal retail)	USD 2.16 - 3.78/ kg cwt	UGX 8,000 - 14,000	per kg cwt	Within import parity band - GTTF abattoir investment competitive

Sources: USDA FAS 2025; OEC / WITS trade data 2024; EAC CET schedule 2022 - 2025; standard East Africa road freight rates. All prices indicative at June 2026.

ANALYTICAL FINDING: The export parity calculation confirms Uganda as a structural price - taker in the live animal market: farm - gate prices of UGX 2,500 - 3,500/kg liveweight are fully explained by the Nairobi terminal price minus transport and trader margin. The import parity calculation confirms that certified chilled beef can be produced and sold domestically at UGX 8,000 - 14,000/kg while remaining competitive with imported equivalents. GTTF abattoir investment captures the spread between these two price points a 3 - 4x value multiplication for the Ugandan enterprise.

11.2.2 Full Price Ladder: Farm Gate to End Market

Table 11.7 Price ladder: farm gate to end market across all livestock product categories

Product / Market Level	UGX/kg or unit	USD/kg or unit	Quality Standard	Direction	Source
Live cattle - farm gate Kiruhura/ Mbarara (liveweight)	UGX 2,500 - 3,500	USD 0.68 - 0.95	Liveweight commodity	Export parity: price - taker	GTTF Selection Justification 2026

Live goat - farm gate cattle corridor (per head)	UGX 15,000 - 20,000/hd	USD 4.05 - 5.40/hd	Live, unprocessed	Export parity	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024 / trade est.
Dressed beef - informal local market (carcass weight)	UGX 5,000 - 7,000	USD 1.35 - 1.89	Dressed, no cert.	Domestic commodity	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024
Certified chilled beef - Kampala formal retail	UGX 8,000 - 14,000	USD 2.16 - 3.78	HACCP, chilled	Domestic premium	GTTF Selection Justification 2026
Certified chilled beef - Nairobi wholesale / export	UGX 10,000 - 16,000	USD 2.70 - 4.32	HACCP, cold chain	Regional export target	World Bank 2024; trade est.
DRC / South Sudan institutional buyer (chilled portions)	UGX 12,000 - 18,000	USD 3.24 - 4.86	HACCP, chilled	Primary export corridor	Trade est. / OEC 2024
Goat meat - halal certified, Gulf diaspora (wholesale)	UGX 22,000 - 32,000	USD 5.95 - 8.65	Halal certified, vacuum - packed	Diaspora export premium	Trade est.; SNV analysis
Raw / wet - blue hide - farm gate (per piece)	UGX 3,000 - 5,000/pc	USD 0.81 - 1.35/pc	Raw, uncured	Commodity export	GTTF Selection Justification 2026
Finished leather - EU footwear grade (per sq ft)	UGX 11,000 - 29,000/sq ft	USD 3.00 - 8.00/sq ft	Chrome/veg tanned	EU footwear market	GTTF Selection Justification 2026

Finished leather - full bovine hide equivalent	~UGX 165,000 - 580,000/hide	USD 45 - 160/ hide	15 - 20 usable sq ft	EU footwear / accessories	Derived from per - sq - ft price

Sources: GTTF Selection Justification 2026; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; World Bank 2024; OEC / WITS 2024; European leather industry pricing data. All prices indicative at June 2026.

Figure 11.6 Beef and Leather Value Ladder: Farm Gate to End Market (UGX per kg or UGX equivalent). The amber arrow shows the 3 - 4× value uplift from GTTF abattoir investment.

Sources: GTTF Selection Justification 2026; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; World Bank 2024.

11.2.3 World Beef Price Benchmarks

Table 11.8 Beef: Uganda domestic prices vs. world benchmarks (USD/kg carcass weight)

Price Point / Market	USD/kg	UGX/kg (approx.)	Quality Standard	Direction	Source
Brazil / Argentina FOB - frozen boneless beef	**USD 2.50 - 3.80/kg**	-	Frozen, bulk commodity	Export origin	USDA FAS 2025
South Africa FOB - certified chilled beef	**USD 2.00 - 2.80/kg**	-	HACCP, chilled	Export origin	USDA FAS 2025
Import parity - Kampala certified chilled	**USD 2.80 - 4.00/kg**	UGX 10,400 - 14,800	Certified, chilled	Import ceiling	Derived, Table 11.7
Uganda farm gate - live cattle (liveweight)	**USD 0.68 - 0.95/kg lw**	UGX 2,500 - 3,500	Liveweight	Domestic baseline	GTTF 2026 / Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))

Uganda informal market - dressed carcass	**USD 1.35 - 1.89/kg**	UGX 5,000 - 7,000	Dressed, no cert.	Domestic	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024
Uganda formal retail - certified chilled	**USD 2.16 - 3.78/kg**	UGX 8,000 - 14,000	HACCP, chilled	Domestic premium	GTTF 2026
Uganda export target (DRC / S. Sudan chilled)	**USD 3.24 - 4.86/kg**	UGX 12,000 - 18,000	HACCP, cold chain	Primary GTTF export corridor	Trade est. / OEC 2024
Nairobi wholesale formal market	**USD 2.70 - 3.50/kg**	-	KEBS graded, chilled	Regional benchmark	USDA FAS Kenya 2025
EU retail - fresh beef (Germany / France)	**USD 7.00 - 12.00/kg**	-	EU SPS, traceable	Long - term export benchmark	Eurostat 2024

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; USDA FAS Kenya 2025; Eurostat Agricultural Prices 2024; World Bank Uganda Agricultural Update 2024.

CORE INVESTMENT FINDING: Uganda's certified chilled beef at USD 2.16 - 3.78/kg carcass weight is commercially competitive in the DRC, South Sudan, and Rwanda formal procurement markets currently served by Kenyan imports at USD 2.70 - 3.50/kg. Uganda's logistics cost advantage - 4 - 8 hour road access vs. Kenya's comparable or longer transit - means GTTF - supported abattoir investment does not need to compete on price. It needs only to achieve HACCP certification and cold - chain continuity.

Figure 11.8 Livestock Revenue Mix: Current vs. Post - GTTF Target (illustrative share of total livestock sector value contribution).

Sources: GTTF Selection Justification 2026; A2i analysis 2026; World Bank 2024.

11.2.4 Value Chain Node Analysis

Table 11.9 Value chain node analysis: current status, bottleneck, and technology entry point

Value Chain Node	Current Status	Key Bottleneck	Green Technology Entry Point	Technology Investment Opportunity

Pastoral & AgrOff-take Partnership Agreement (Off-take Partnership Agreement (OPA)) storal Production	~14.5M cattle under predominantly pastoral / agrOff-take Partnership Agreement (Off-take Partnership Agreement (OPA)) storal systems; highly variable carcass weights; drought and disease exposure	Climate - variable pasture and water supply; Foot - and - Mouth Disease and tick - borne diseases; carcass weight inconsistency preventing formal retail supply	Solar - powered borehole systems (Grundfos DK); precision supplementary feeding; feedlot finishing for weight consistency; tick control infrastructure	Solar water investment at 3 - 5 ranches; feedlot precision feeding at Tier 3 ranches; Grundfos solar pump systems for drought resilience
Aggregation & Livestock Markets	Weekly markets at Namasale, Nakasongola, Lyantonde, Ibanda, Mbarara; trader aggregation for Kampala, Kenya, Tanzania	Informal price - setting; no live weight measurement; no disease traceability; traders capture margin between farmer and abattoir	Digital livestock market information systems; RFID - based animal traceability (EU - origin livestock management systems)	Animal traceability bundled with abattoir HACCP investment; farm - to - fork digital records enabling EU SPS compliance
Feedlot Finishing	Nascent feedlot sector in Kiruhura, Sembabule, Isingiro; commercial ranches at Aswa and Maruzi with land base but limited finishing infrastructure	Sub - optimal feed conversion; no TMR precision feeding; water stress in dry season; unmanaged manure; methane emissions from uncontained slurry	Automated TMR feeding systems (Skiold DK; Danish Crown feedlot systems); solar - powered water (Grundfos DK); covered biogas digesters for slurry	Feedlot precision feeding grants at 2 - 3 commercial ranches; solar water at Aswa / Maruzi; biogas slurry management - 5:1 leverage from ACF + ranch equity
Slaughter & Abattoir Processing	Uganda Meat Industries (Soroti), City Abattoir (Kampala), Harvest Money Agro, municipal abattoirs (Mbarara, Jinja); all operating at < 40% capacity; zero HACCP certification	Zero HACCP certification = zero formal export access; informal same - day slaughter for Kampala retail; low carcass grade consistency; no chilling infrastructure	HACCP - compliant stun - to - chill kill - floor (Danish Crown Engineering DK; Frontmatec DK; Marel IS/ DK); CE - marked equipment; cold - store rooms	De - risking grant (20 - 25%) for Uganda Meat Industries HACCP upgrade; Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) with Kampala hotel group or DRC export agent as disbursement precondition

Cold Chain & Transport	No temperature - controlled beef transport; informal same - day delivery from Kampala abattoirs to retail; no cold hub between cattle corridor and Kampala or export borders	Precludes chilled export to DRC, South Sudan, Rwanda, Kenya; spoilage losses on any trip > 2 hours; hotel groups cannot source domestic certified chilled supply	Danfoss (DK) blast chillers; Gram Commercial (DK) cold - store rooms; refrigerated truck bodies with temperature logging; cold hubs at border crossings	Cold hub investment at Mbarara, Soroti, and Malaba/Busia border; 3 solar - powered cold stores at strategic cattle corridor locations
Hides & Skins Processing	~95% of hides exported raw or wet - blue; Leather Industries of Uganda (Jinja) is the primary formal tannery; curing at slaughter points informal and quality - degrading	Value capture < 5 - 10% of finished leather price; European leather brands cannot source from Uganda without EU supply chain due diligence compliance	Italian/German tanning technology (IDRA, ERRETRE, Rizzi - Italian - EU; MOENUS, Turner - DE); retanning drums; buffing and finishing lines; splitting and grading	Matching grant for Leather Industries of Uganda finishing tannery upgrade; EU leather brand Offtake Partnership Agreement (Offtake Partnership Agreement (OPA)) as disbursement precondition; 20 - 40x value multiplication per hide
Manure & Abattoir Wastewater	Feedlot slurry largely unmanaged; abattoir wastewater creates National Environment Management Authority liability for Uganda Meat Industries and City Abattoir; methane from decomposition	Environmental liability; National Environment Management Authority regulatory pressure on abattoirs; lost biogas energy and fertiliser value from unmanaged organic waste	SEGES Innovation (DK); Skov A/S (DK); BioStar (DK) - covered anaerobic digesters; biogas capture for abattoir energy; nutrient - rich effluent for fertiliser	Biogas system bundled with abattoir HACCP investment; National Environment Management Authority compliance + energy cost saving + fertiliser output as triple - value case

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; GTTF Selection Justification 2026; World Bank 2024; A2i GRASP KII intelligence 2026.

11.3 Pillar 3 - Ecosystem Mapping and Technology White Space

11.3.1 Active Donor Programs in Livestock

Table 11.10 Active donor programme matrix and complementarity

Programme / Funder	Scale	Period	Current Focus	Complementarity / Non - Replication Relationship
IFAD LADEP Uganda	National	Active	Livestock and Agri-business Development Project; documented co - financing pathway for livestock value addition infrastructure	GTTF grant de - risks technology adoption; LADEP provides complementary capital for infrastructure at larger scale. IFAD is a co - financing partner, not a programme to avoid.
World Bank UgIFT	National	Active	Uganda InterGovernmental Fiscal Transfers for Rural Development; rural infrastructure including livestock	UgIFT covers rural public infrastructure; GTTF covers enterprise - level technology. Non - overlapping. Co - financing potential for cold - hub infrastructure at strategic road nodes.
USAID Feed the Future SIA / Chemonics	National	2019 - 2025	BDS for agri - SMEs; investment readiness; transaction advisory across multiple value chains	No livestock - specific HACCP certification, tannery, or cold - chain technology focus. GTTF occupies the technology investment space this programme did not enter.
FAO - ECTAD Uganda	National	Ongoing	FMD and tick - borne disease surveillance; vaccination campaigns; emergency response	Surveillance and emergency response only; no capital investment in abattoir biosecurity or processing infrastructure. GTTF addresses the enterprise - level capital gap.

aBi Development Agribusiness Grants	National	Ongoing	Matching grants for agribusiness SMEs across multiple value chains	Standard grants not targeted at green technology or HACCP certification. GTTF provides the green technology transfer dimension absent from aBi's standard grant instrument.
SNV INCLUDE Programme	21 districts	2024 - 2029	Cooperative development; farmer productivity; market linkage across livestock and other value chains	SNV addresses people (farmer organisation, extension). GTTF addresses technology (processing equipment, cold chain). Non - overlapping; complementary.
IFC / PrOff-take Partnership Agreement (Off-take Partnership Agreement (OPA)) rco (commercial debt)	East Africa	Active	Commercial debt to large agro - processors; no grant component	Validates senior debt availability for Tier 1 abattoirs at commercial rates. GTTF grant is marginal de - risker alongside commercial capital - not a substitute.

Sources: IFAD LADEP Uganda 2025; World Bank UgIFT 2024; USAID/Chemonics SIA Final Report 2023; FAO - ECTAD Uganda 2024; aBi Development programme documentation 2024; SNV Uganda Annual Report 2024.

11.3.2 The Three Genuine White Spaces

1. Commercial - scale HACCP abattoir certification and cold - chain technology transfer. No active programme finances HACCP - certified kill - floor engineering, blast chillers, or cold - hub infrastructure at enterprise scale in Uganda.

2. Leather finishing tannery technology investment. No active programme finances European tannery finishing technology for Leather Industries of Uganda or any other Uganda tannery.

3. Solar - powered water supply for cattle corridor drought resilience. No active programme finances commercial - scale Grundfos solar borehole systems for cattle ranches at enterprise level.

Feedlot and abattoir manure - to - biogas systems (Table 11.11) are this chapter's circular - economy line, paralleling the BSF circular - economy investment case in the Poultry and Piggery chapters and the municipal sys-

tems - approach investment case in the Waste Management (Municipal Bio - waste) chapter. All three should be read as points on the same organic - waste - to - value chain farm and abattoir - scale biogas capture here, farm - scale BSF in poultry and piggery, and municipal - scale processing in Waste Management rather than as unconnected technology lines specific to each value chain.

11.4 Pillar 4 - Enterprise Profiling and Green Technology Matching

11.4.1 Technology Matching Assessment

Table 11.11 Green technology matching assessment: Uganda livestock sector

Technology Gap	Danish / EU Provider(s)	Country	Performance Data	Uganda Fit Assessment
HACCP - compliant abattoir and chilling line	Danish Crown Engineering; Frontmatec (DK); Marel (IS/DK)	DK / IS	CE - marked stun - to - chill kill - floor; SPS - compliant layout; cold - store rooms for 24 - 48hr chilling; European - certified throughput 50 - 500 head/day	PASS - Uganda Meat Industries is the primary anchor; zero competing active programme finances abattoir HACCP certification in Uganda at enterprise scale
Feedlot precision feeding (TMR)	Skiold A/S (DK); Danish Crown feedlot systems; Skov A/S (DK)	DK	Automated total mixed ration (TMR) dispensing; performance tracking and daily weight gain monitoring; covered feedlot pen ventilation	PASS - Aswa Ranch and Maruzi Ranch have land base and water infrastructure for TMR feeding; feedlot sector in Kiruhura nascent but commercially ready
Solar - powered borehole water supply	Grundfos (DK) solar pumping; Lorentz (DE) solar pumps	DK / DE	Solar - powered borehole extraction; reservoir storage; trough distribution for up to 500 head/ installation; remote performance monitoring	PASS - Grundfos has active East Africa presence; cattle corridor drought vulnerability is the highest - impact climate adaptation investment in the livestock portfolio
Refrigerated cold chain (blast chillers, cold hubs, logistics)	Danfoss (DK) refrigeration controls; Gram Commercial (DK)	DK	Blast chillers at abattoir; cold - store rooms; solar - compatible refrigerated truck bodies; temperature logging for export certification	PASS - Danfoss and Gram have East Africa distribution and service networks; cold hub investment is the critical enabler for export to DRC, South Sudan, and Rwanda

Leather finishing tannery technology	IDRA S.r.l. (IT); ERRETRE (IT); Rizzi SpA (IT); MOENUS (DE); Turner (DE)	IT / DE (EU - 27)	Retanning drums; buffing and finishing lines; chrome or vegetable tanning to footwear grade; splitting, grading, and measuring equipment	PASS - Danish - first priority; no Danish tannery equipment equivalent; Italian and German tannery engineering leads world market; EU - 27 partnership qualifies under GTTF Danish - first protocol
Biogas / manure management for feedlots and abattoirs	SEGES Innovation (DK); Skov A/S (DK); BioStar (DK)	DK	Covered anaerobic digesters for cattle slurry and abattoir wastewater; biogas capture for processing energy; nutrient - rich effluent for fertiliser	PASS - Bundled with abattoir HACCP investment; National Environment Management Authority compliance pathway + energy cost saving + circular fertiliser economy strengthens investment case
Animal traceability (RFID / digital)	EU - origin livestock management systems; Nedap (NL); Allflex (FR/EU)	NL / FR (EU - 27)	RFID ear tags; farm - to - abattoir digital traceability records; export certification documentation for EU SPS and AfCFTA compliance	PASS - Traceability is a prerequisite for any formal export certification; bundled with HACCP abattoir investment as a precondition for Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) with EU buyers

Halal - certified small ruminant slaughter line	Danish / EU halal - compliant slaughter equipment; Marel small ruminant processing	DK / NL	Halal - compliant stun or non - stun slaughter; vacuum - packed chilled goat/ sheep portions; origin labelling for Gulf and European diaspora markets	CONDITIONAL - Requires halal certification authority engagement with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); demand signal from Gulf or EU diaspora buyer Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) before grant disbursement

Sources: Danish Crown Engineering 2023; Frontmatec 2023; Marel 2023; Grundfos 2024; Danfoss 2024; Gram Commercial 2024; Skiold 2023; SEGES Innovation 2023; Skov A/S 2023; IDRA 2023; ERRETRE 2023; CBI Netherlands 2024; ELIA 2024.

11.4.2 Investment Blueprints by Technology Category

A. HACCP - Compliant Abattoir and Cold - Chain Infrastructure

The primary GTTF investment hypothesis is HACCP - certified abattoir modernisation at Uganda Meat Industries (Soroti). At 100 head per day throughput, an average carcass yield of 55 percent, and a certified chilled beef premium of UGX 5,500 per kg above informal market prices, a single HACCP - certified abattoir generates approximately UGX 900 million - 1.4 billion per year in additional gross revenue from the certification premium alone.

A critical caveat must be stated explicitly: HACCP abattoir certification is a necessary but not sufficient condition for formal beef export from Uganda. FMD endemic status means Uganda cannot legally export fresh beef to most countries without FMD - free corridor designation. The KII phase must probe Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/UVA's position on FMD - free compartmentalisation with DRC and South Sudan before any abattoir capital is committed.

B. Feedlot Precision Feeding and Solar - Powered Water

Feedlot finishing is the only mechanism to standardise carcass weights for formal retail and export supply chains. Grundfos A/S solar - powered borehole systems provide the most important single climate adaptation technology available to the Uganda cattle corridor. During the 2021 - 2022 drought, cattle corridor ranches lost productive breeding stock to water stress. A solar pump installation costing approximately USD 8,000 - 15,000 prevents these losses entirely.

C. Leather Finishing Tannery Technology

Leather finishing technology from IDRA, ERRETRE (Italy) and MOENUS, Turner (Germany) represents the EU - 27 partnership tier of the Danish - first technology protocol. Leather Industries of Uganda (Jinja) requires a finishing

upgrade, not a greenfield tannery. The EU Corporate Sustainability Due Diligence Directive (CSDDD 2024) requires traceability to farm level for all EU supply chain relationships in leather. Animal RFID traceability must be bundled with the tannery grant as a precondition, not an optional add - on.

11.4.3 Comprehensive Sector Actor Landscape

Table 11.12 Comprehensive sector actor landscape: Uganda livestock value chain

Enterprise	Segment	Scale / Capacity	Key Contact	Location	Tier	Technology Investment Opportunity
A - FORMAL ABATTOIRS AND PROCESSING						
Harvest Money Agro (Kampala)	Formal Abattoir	Urban - proximity abattoir; Kampala retail supply; expressed interest in formal retail certification	TBC via A2i	Kampala outskirts	**Tier 2 - 3**	HACCP processing upgrade; solar cold hub; institutional buyer Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) brokerage - hotel groups and supermarket chains.
City Abattoir Kampala	Formal Abattoir / Processing	Kampala formal retail and food service supply; some cold - chain investment	TBC via A2i	Kampala	**Tier 2**	Cold - chain upgrade; HACCP pre - certification support; Kampala hotel group Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)).
B - COMMERCIAL RANCHES AND FEEDLOTS						
Aswa Ranch (Gulu)	Commercial Ranch	Large land base; ~5,000+ cattle; stated expansion plans; feedlot infrastructure nascent	TBC via A2i	Gulu District, Northern Uganda	**Tier 3**	Feedlot precision feeding (TMR); solar - powered borehole water (Grundfos); biogas slurry management. Land base and management capacity confirmed in public domain.

Maruzi Ranch (Apac)	Commercial Ranch	Large commercial ranch; Apac District; cattle corridor proximity	TBC via A2i	Apac District	**Tier 3 ★**	Feedlot finishing infrastructure; solar water supply; precision nutrition for carcass weight consistency.
Commercial feedlot operators - Kiruhura / Isingiro	Emerging Feedlots	2 - 3 nascent commercial feedlot operators; balance sheet assessment required in KII	TBC via A2i	Kiruhura / Isingiro Districts	**Tier 2 - 3 TBC**	Precision feeding; solar water; biogas - subject to KII financial assessment for Tier 3 confirmation.
C - TANNERIES AND LEATHER PROCESSING						
Informal curing and wet - blue operations	Hide Processors	Multiple informal operations at slaughter points nationally; quality inconsistent	Mapping via Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / NaLIRRI	National	**Tier 1 - 2**	Technology demonstration; quality improvement training; pathway to formal wet - blue supply to Leather Industries of Uganda.
D - Government, RESEARCH AND DEVELOPMENT PARTNERS						

Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - Livestock Division	Government Regulator	National livestock policy; UVA certification; Livestock Master Plan	Director, Animal Production Directorate - TBC	Kampala	-	HACCP abattoir certification pathway; UVA export certification support; FMD vaccination enforcement. Key: Livestock Master Plan alignment letter.
NaLIRRI (National Agricultural Research Organisation (NARO))	Research Institution	Livestock genetics; disease research; cattle corridor production systems	Director (contact confirmed - detail in master Annex F)	Nakyesasa, Wakiso	-	Ankole breed performance data; Feed Conversion Ratio (FCR) benchmarks for feedlot systems; tick - borne disease research; FMD vaccine efficacy data.
IFAD - LADEP Uganda	Development Partner	Livestock and Agribusiness Development Project; documented co - financing pathway	IFAD Uganda Country Programme - TBC	Kampala	**Co - financer**	Potential co - financing for abattoir modernisation alongside GTTF grant; LADEP design explicitly covers livestock value addition.
World Bank - UgIFT	Development Partner	Uganda InterGovernmental Fiscal Transfers; rural development finance	World Bank Uganda Country Office - TBC	Kampala	**Co - financer**	Documented co - financing pathway for cold - chain and abattoir infrastructure; expands effective leverage beyond 5:1 GTTF ratio.
SNV Uganda (INCLUDE)	Development Partner	Livestock value chain and cooperative development in specific districts	Country Director (contact confirmed - detail in master Annex F)	Kampala	-	Complementary programme - farmer cooperative organisation and market linkage. GTTF addresses technology; SNV addresses people and behaviour change.

E - INSTITUTIONAL BUYERS (Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) TARGET COUNTERPARTS)						
Carrefour Uganda / Nakumatt	Modern Retail	2 stores Kampala; seeking domestic certified chilled beef supply	Procurement Manager - TBC	Kampala	**Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target**	Certified chilled beef - Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) as disbursement precondition for HACCP abattoir grant. Carrefour procurement manager is a key KII contact.
Serena / Radisson / Protea Hotels	Hotel / Institutional	200 - 500+ rooms each; weekly certified beef procurement at hotel standards	Procurement Managers - TBC	Kampala	**Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target**	Certified chilled beef; EU SPS - level documentation for hotel group procurement standards. Bundle hotel Off-take Partnership Agreement (Off-take Partnership Agreement (OPA))s for single abattoir HACCP transaction.
EU leather / footwear brands (through ELIA or CBI)	EU Leather Buyer	Sourcing partnerships for origin - labelled African leather	CBI Netherlands; ELIA EU Leather Industry Association - TBC	EU	**Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target**	Finished leather Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) for Leather Industries of Uganda finishing upgrade. EU leather brand partnership is the disbursement precondition for tannery grant.

Gulf / diaspora halal exporters	Halal Meat Exporter	Gulf market demand for halal - certified Ugandan goat meat; diaspora channels in UK/EU	TBC via existing halal export traders	Kampala / national	**Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Target**	Halal - certified small ruminant slaughter Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) - disbursement precondition for halal processing line grant.

Tier 3 □ = Priority KII target / deal candidate. Confirmed contacts: NaLIRRI Director, SNV Country Director (names on file in master Annex F).

11.5 Pillar 5 - Impact Metrics, Rural Incomes, and Gender

11.5.1 ESG Impacts

Livestock is the primary asset and income source for approximately 3.2 million rural households in Uganda. Small ruminant production is the primary livestock enterprise for women - headed households in dryland communities. Goat and sheep sales are the primary mechanism for school fee financing and emergency household expenditure in Karamoja and Kigezi.

IPCC AR6 projects cattle corridor temperatures rising 1.5 - 2.5°C by 2050 with increasing drought frequency. The 2021 - 2022 drought forced emergency herd destocking at distressed prices. Grundfos solar pumping systems directly address the drought - water nexus, providing reliable water supply for up to 500 head per installation independent of rainfall.

Each impact vector in the table below decomposes into one or more of three underlying value components: price uplift captured, loss avoided, or cost saved. Abattoir processing premium revenue, leather value multiplication, and the hides - to - leather forex contribution represent price uplift; solar - water drought - mortality elimination represents loss avoided; and feedlot carcass weight uplift operates through price uplift, since the additional kilogram is sold at the certified price rather than saved as a cost. This mirrors the framing applied in the Poultry and Piggery chapters. Livestock's price - uplift component is unusually large relative to the other two chains the live - to - processed value gap for both beef (3 - 4x) and leather (20 - 40x) is the single largest documented margin anywhere in the GRASP poultry/piggery/livestock portfolio while its loss - avoided component is dominated by climate exposure (drought, pasture degradation) rather than disease risk, distinguishing it from piggery's ASF - driven loss profile.

Table 11.13 Impact assessment across investment vectors - livestock envelope

Impact Vector	Metric	Projection (Portfolio Envelope)	Methodology / Evidence Base

Abattoir Processing Premium Revenue	UGX/kg premium: certified chilled beef over informal / live animal	UGX 900M - 1.4B/year additional revenue from certified processing at Uganda Meat Industries at 100 head/day throughput	Live animal UGX 2,500 - 3,500/kg vs certified chilled UGX 8,000 - 14,000/kg. Carcass yield ~55% of liveweight. Source: GTTF Selection Justification 2026; World Bank 2024.
Leather Value Multiplication	**Per - hide value: raw (UGX 3,000 - 5,000) → finished leather (USD 45 - 160)**	UGX 4.5B - 16B/year incremental value if Leather Industries of Uganda processes 100,000 hides/year at finished leather prices	20 - 40x per - hide value multiplication from raw to finished leather. Source: GTTF Selection Justification 2026; European leather industry pricing data.
Solar Water: Drought - Mortality Elimination	Cattle deaths from water stress eliminated per Grundfos installation	UGX 50 - 150M/year per 500 - head ranch (cattle mortality eliminated at UGX 500,000 - 1,000,000/head)	Documented cattle corridor drought losses 2021 - 2022; Grundfos solar pump performance data for East Africa. Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) livestock loss survey data.
Feedlot Carcass Weight Uplift	Average carcass weight: +15 - 25% under TMR precision feeding vs pastoral	UGX 300 - 600M/year additional revenue per 1,000 - head feedlot at improved carcass weight	Pastoral carcass weight ~120 - 140 kg; feedlot - finished ~160 - 190 kg. Additional kg at UGX 8,000 - 14,000/kg certified price. Source: Skiold A/S feedlot data; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024.
Employment Creation	Direct FTE jobs in certified abattoir processing, cold chain, and tannery operations	150 - 280 FTE jobs across GTTF livestock portfolio enterprises	8 - 15 FTE per HACCP abattoir upgrade; 10 - 20 FTE per tannery finishing line; 4 - 8 FTE per cold hub. Source: A2i investment case benchmarks.
GHG Emissions Reduction	tCO2e/year from solar water, feedlot biogas, abattoir wastewater biogas	1,800 - 2,800 tCO2e/year (livestock GTTF portfolio)	Solar diesel displacement; biogas from feedlot slurry methane prevention; IPCC Tier 1 livestock emission factors. Lower than poultry due to smaller portfolio scale.
Trade Balance Improvement	Live animal export (price - taker) certified chilled beef export (price - setter)	UGX 8 - 15B/year trade balance improvement at HACCP portfolio scale within 3 years	UBOS live animal export data; World Bank Uganda agricultural trade analysis 2024; DRC/South Sudan market sizing from OEC trade data.

Hides - to - Leather Forex Contribution	Raw hide export (USD 8 - 12M/year) finished leather export (USD 60 - 200M+ potential)	USD 50 - 190M additional annual foreign exchange from leather value addition	Based on Uganda's annual cattle slaughter generating ~600,000 - 800,000 hides/year at 15 - 20 sq ft usable area per hide at USD 3 - 8/sq ft.

Sources: GTTF Selection Justification 2026; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; World Bank 2024; Grundfos East Africa deployment data; Skiold feedlot performance data; IPCC Tier 1 livestock emission factors.

11.5.2 Green Agenda Adoption

Uganda's livestock (beef and small ruminants) value chain has significant potential to strengthen food security, create rural employment, increase pastoral and smallholder incomes, support agro - industrialisation and expand domestic and regional meat markets while improving environmental sustainability and climate resilience. The sector's extensive cattle, goat and sheep production systems provide an important livelihood base, but productivity and competitiveness are constrained by feed and water shortages, land and pasture degradation, climate variability, animal disease, inefficient slaughter and meat - processing systems, and limited cold - chain infrastructure.

The Green Agenda Adoption pillar promotes climate - smart livestock production, resource - efficient animal husbandry, sustainable pasture and rangeland management, low - carbon meat processing and circular - economy approaches that improve productivity while reducing environmental pressures. Priority interventions include solar - powered livestock water systems, efficient irrigation and fodder production, improved pasture and rangeland management, climate - resilient breeds and genetics, efficient feed and forage systems, solar - powered abattoir and cold - chain infrastructure, biogas from manure and slaughterhouse waste, wastewater treatment and reuse, improved animal - welfare and biosecurity systems, and digital livestock traceability. Particular emphasis should be placed on reducing pressure on grazing resources through improved feed and pasture management, converting manure and slaughter by - products into biogas, compost and other productive inputs, improving water - use and energy efficiency, and strengthening traceability and disease surveillance to support access to higher - value domestic, regional and export markets. These interventions align with Uganda's National Development Plan IV (NDP IV), the Agro - industrialisation Programme, the National Climate Change Act (2021), Uganda's Nationally Determined Contributions (NDCs), and the Green Growth Development Strategy, while supporting livestock productivity, pastoral and smallholder incomes, meat - sector value addition, resource efficiency, climate resilience, circular - economy development and improved competitiveness in regional and international meat markets.

11.5.3 Rio Marker Scoring and Danish/EU Engagement Modality

Denmark's Africa strategy directs at least 75 percent of GTTF funding toward activities that address a climate challenge, and every recommended activity is scored against the OECD DAC Rio markers for climate change adaptation and mitigation before it reaches ministerial review (Africa's Century: Strategy for Strengthened Danish Engagement with African Countries, August 2024; OECD DAC Rio Markers for Climate Handbook). The scoring below applies the OECD DAC decision tree - does the activity meet the marker's eligibility criteria; would it have been undertaken, or designed the same way, without that objective - to the livestock sector's headline interventions, mirroring the equivalent Poultry and Piggery chapter sections. Each activity is scored 0 (not targeted), 1 (significant) or 2 (principal); a double - principal score on the same activity is applied only on explicit justification.

Table 11.13A Rio marker scoring - livestock sector headline interventions

Intervention	Adaptation	Mitigation	Rationale
Solar - powered borehole water supply	2 - Principal	0 - Not targeted	Designed specifically to eliminate cattle - corridor drought mortality under IPCC AR6's projected 1.5 - 2.5°C temperature rise and increasing drought frequency (Section 11.5); would not be justified in its current form without the climate - vulnerability rationale. No material direct GHG effect.
HACCP abattoir and cold - chain infrastructure	0 - Not targeted	0 - Not targeted	Formulated and justified entirely as a commercial certification and market - access investment (Section 11.0); no adaptation or mitigation objective is stated or implied in its design.
Feedlot precision feeding (TMR)	1 - Significant	1 - Significant	Reduces reliance on climate - variable pasture (adaptation) and improves feed conversion efficiency, lowering emissions intensity per kilogram of carcass weight (mitigation); commercial carcass - weight uplift is the primary driver, so both score Significant rather than Principal.
Manure - to - biogas systems (feedlots and abattoirs)	1 - Significant	2 - Principal	Captures methane from manure that would otherwise decompose uncontrolled and displaces fossil energy use at the abattoir - a core, not incidental, design objective, meeting the Principal threshold for mitigation. Nutrient - rich effluent as fertiliser and reduced water - quality risk are secondary adaptation benefits.
Leather finishing tannery technology	0 - Not targeted	0 - Not targeted	Formulated and justified entirely as a value - addition and export - market investment (Section 11.1C); no climate objective is stated or implied in its design.
Animal traceability (RFID/digital)	0 - Not targeted	0 - Not targeted	A CSDDD - compliance and export - certification prerequisite (Table 11.15), not a climate - motivated investment.

Sources: OECD DAC Rio Markers for Climate Handbook (decision tree and eligibility criteria); IPCC AR6 (2021); World Bank Country Climate and Development Report (Section 11.7C); A2i GRASP sector analysis 2026.

Unlike the Poultry and Piggery portfolios, three of livestock's six headline interventions - HACCP abattoir/cold chain, leather tannery, and animal traceability - score 0 on both markers: they are commercial certification and market - access investments with no stated or implied climate objective, and this chapter does not force a climate framing onto them. Only solar water (Principal - adaptation), TMR feeding (Significant/Significant) and biogas (Significant - adaptation, Principal - mitigation) carry a climate score. On a funding - weighted basis (Table 11.12), this is the smallest climate - relevant share of any GRASP value chain chapter to date, and the chapter's investment allocation should be read with that in mind when the integrated report tests the programme - wide 75 percent climate - funding threshold the poultry and piggery portfolios carry a disproportionate share of that

burden. Biodiversity is not separately scored: none of the six interventions meets the Rio biodiversity marker's eligibility criteria, so a biodiversity claim is not made for this sector.

Danish and EU engagement modality

Each headline intervention is mapped against the four Danish and EU engagement modalities set out for the Call, mirroring the equivalent Poultry and Piggery chapter tables.

Table 11.13B Danish/EU engagement modality by intervention

Intervention	Investment/ exploration	Equipment	Technical assistance	Financial instrument
HACCP abattoir and cold chain	Danish/EU private - sector investment or partnership	Primary - Danish Crown Engineering/Frontmatec kill - floor; Danfoss/ Gram cold chain	HACCP pre - certification and food - safety systems training	Danida Business Instrument; matching grant
Feedlot precision feeding (TMR)	-	Primary - Skiold A/S TMR dispensing systems	-	Matching grant
Solar - powered borehole water	Exploration - fund eligible for a Danish/EU developer	Primary - Grundfos solar pumping systems	-	Matching grant; Impact Fund Denmark eligible
Manure - to - biogas systems	Danish/EU private - sector partnership	Primary - SEGES Innovation/ Skov A/S/BioStar digesters	Technical transfer	Matching grant; Government - to - Government instrument for municipal linkage
Leather finishing tannery	Danish/EU private - sector investment or partnership	Primary - IDRA/ ERRETRE/Rizzi/ MOENUS/Turner finishing lines	CSDDD traceability compliance advisory	Danida Business Instrument; matching grant
Animal traceability (RFID)	-	Nedap/Allflex RFID systems	Traceability system integration training	Matching grant, bundled with abattoir or tannery grant

Source: Danish and EU engagement modalities as defined for the GTTF Call, August 2026; A2i GRASP sector analysis.

Complementarity with the Dutch and Danish sector programmes

The certification gap identified earlier in this chapter, the absence of HACCP status at Uganda Meat Industries and the other domestic facing abattoirs profiled here, is a technical capability constraint, not a capital one. Operator readiness, defined in this chapter as the balance sheet strength and management capacity to operate transferred technology and sustain a long - term partnership, depends on structured technical assistance to build quality management systems alongside the equipment finance. The capital stack for every livestock transaction in this section should carry an explicit, budgeted technical assistance component tied to certification readiness.

The Dutch Government's roughly EUR 6 million enabling - environment programme and new EUR 12 million

seed instrument, and Denmark's EUR 12 million programme on inputs, fish - feed processing and the enabling environment, sit alongside the seven donor programmes already mapped in Table 11.10. None currently carries a livestock - specific abattoir - certification, feedlot, or tannery line item, so the GTTF livestock investment case remains additional to rather than overlapping with them.

Development bottom line: jobs and women's participation

150 - 280 direct FTE jobs are projected across this chapter's proposed investment portfolio (Table 11.13), concentrated in certified abattoir processing, tannery finishing, and cold - chain operations. Small ruminant production is already documented in this chapter as the primary livestock enterprise for women - headed households in dryland communities, with goat and sheep sales the primary mechanism for school - fee financing and emergency household expenditure in Karamoja and Kigezi (Section 11.5) meaning the halal small - ruminant processing line (Table 11.11) reaches this segment directly, alongside the larger - ticket abattoir and tannery investments.

11.6 Pillar 6 - Investment Structuring and GTTF Grant Framework

11.6.1 Capital Stack

The GTTF livestock allocation is USD 104K (UGX 375 million), the smallest of the three value chains in scope. The 5:1 private capital leverage ratio implies a total investment programme of approximately USD 521K (UGX 1.875 billion). The World Bank UgIFT and IFAD LADEP provide documented co - financing pathways that can expand effective capital mobilisation significantly beyond the programme's own portfolio size.

5:1 LEVERAGE: GTTF grant of USD 36K (UGX 131 M) de - risks a USD 182K (UGX 656 M) capital investment in HACCP - compliant slaughter and chilling at Uganda Meat Industries. ACF credit line covers USD 111K (UGX 400 M). Enterprise contributes USD 35K (UGX 125 M) equity. IFAD LADEP provides USD 36K (UGX 131 M) complementary infrastructure. Private capital mobilised = USD 146K (UGX 525 M). Total investment = USD 182K (UGX 656 M). Leverage ratio = 5:1.

Table 11.14 GTTF capital stack by technology category - livestock envelope

Technology Investment Category	% Envelope	GTTF Grant	Private Co - invest	Total Investment	Payback	Primary Targets
HACCP Abattoir Upgrade + Biogas Wastewater (Danish Crown / Frontmatec; SEGES Innovation)	35%	USD 36K (UGX 131M)	USD 146K (UGX 525M)	USD 182K (UGX 656M) - 1 - 2 abattoir upgrades	3 - 5 yrs (combined)	Uganda Meat Industries; Harvest Money Agro; City Abattoir
Cold Chain Infrastructure - Blast Chillers + Cold Hubs (Danfoss; Gram Commercial)	20%	USD 21K (UGX 75M)	USD 83K (UGX 300M)	USD 104K (UGX 375M) - 3 cold hubs + refrigerated logistics	2 - 4 yrs	Mbarara, Soroti, Malaba/ Busia border hubs

Feedlot Precision Feeding + Solar Water (Skiold; Grundfos)	20%	USD 21K (UGX 75M)	USD 83K (UGX 300M)	USD 104K (UGX 375M) - 3 - 4 ranch / feedlot packages	1.5 - 3 yrs	Aswa Ranch; Maruzi Ranch; Kiruhura commercial feedlots
Leather Finishing Tannery Technology (Italian / German EU - 27)	15%	USD 16K (UGX 56M)	USD 62K (UGX 225M)	USD 78K (UGX 281M) - Leather Industries of Uganda upgrade	3 - 5 yrs (EU brand Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)))	Leather Industries of Uganda, Jinja
Halal Small Ruminant Processing + Cold Chain	5%	USD 5K (UGX 19M)	USD 21K (UGX 75M)	USD 26K (UGX 94M) - 1 halal line	2 - 4 yrs	TBC - subject to Gulf / diaspora Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) confirmation
Animal Traceability + BDS	5%	USD 5K (UGX 19M)	USD 21K (UGX 75M)	USD 26K (UGX 94M) - 5 - 8 enterprises	Risk mitigation	Uganda Meat Industries; Tier 3 ranch / feedlot network
TOTAL PORTFOLIO	**100%**	**USD 104K (UGX 375M)**	**USD 417K (UGX 1,500M)**	**USD 521K (UGX 1,875M)**	-	**5:1 leverage ratio**

Sources: Danish Crown Engineering / Frontmatec pricing data; Grundfos East Africa installation costs; Danfoss / Gram Commercial pricing; Skiold feedlot costs; Italian/German tannery equipment pricing. All figures indicative at June 2026.

Figure 11.9 Livestock Investment Allocation by Technology Category

Total envelope: UGX 375 million. Target leverage 5:1 UGX 1.875 billion total investment

Source: A2i GRASP Technical Proposal 2026

11.6.2 Investment Screening: Hard Gates

This section sets out eight sequential screening gates applied to every enterprise before a GTTF matching grant is recommended, mirroring the equivalent gate structure adopted in the Poultry and Piggery chapters. This

chapter carries two sector - specific gates rather than one FMD/export - certification and CSDDD traceability reflecting that livestock's investment case rests on two independent regulatory dependencies that the other two chapters' single sector - specific gate does not combine in the same way.

Table 11.14B Hard - gate screening framework livestock investment pipeline

Gate	Test	Failure Consequence
Buyer / Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) route	Confirmed offtake for certified chilled beef, finished leather, or halal small - ruminant product from a formal retail, hotel group, regional export agent, or EU leather brand (via CBI Netherlands/ELIA)	No abattoir, cold - chain, or tannery grant disbursed without documented offtake - mirrors the precondition already stated in 8.4B
Herd - size and throughput fit	Technology sized to verified cattle inventory, feedlot capacity, abattoir throughput, or hide volume - not aspirational capacity	Resize or defer pending site visit; this is the open KII question at Uganda Meat Industries and both ranches (Table 11.18)
Monetisable constraint	Technology addresses a priced, documented value gap - live cattle at UGX 2,500 - 3,500/kg liveweight vs. certified chilled beef at UGX 8,000 - 14,000/kg, or raw hide (UGX 3,000 - 5,000/piece) vs. finished leather (USD 45 - 160/hide)	Redirect to BDS support if the request cannot be tied to one of these documented spreads
FMD / export - certification verification	UVA export - certification pathway and FMD - vaccination/zoning status confirmed with Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) before any abattoir capital is committed - the chapter's own stated caveat in 8.4B and 8.7E	Do not commit abattoir capital until the FMD regulatory pathway is resolved in KII; this is explicitly flagged as the single biggest threat to the entire livestock investment case (8.9, Table 11.17)
CSDDD traceability verification	Animal RFID/traceability system confirmed as bundled precondition for any tannery grant, per the EU Corporate Sustainability Due Diligence Directive requirements set out in 8.4B and Table 11.15	Do not disburse tannery finishing capital until a CSDDD - compliant traceability plan and an EU buyer Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) are both in place
Denmark/EU technology fit	Supplier route serviceable in Uganda - Danish Crown/Frontmatec, Grundfos, Danfoss/Gram, Skiold, SEGES, and the Italian/German tannery suppliers (IDRA, ERRETRE, MOENUS, Turner) under the EU - 27 tier of the Danish - first protocol	Do not match technology until service and spares route is confirmed

Capital stack and post - grant sustainability	Credible 5:1 co - financing evidence (ACF, IFAD LADEP, World Bank UgIFT) and demonstrated capacity to sustain HACCP/tannery operations after the grant period	Do not count toward leverage, or defer the package, without audited accounts and confirmed co - financier engagement

Application note: This chapter carries two sector - specific gates rather than one FMD/export - certification and CSDDD traceability reflecting that livestock's investment case rests on two independent regulatory dependencies (domestic disease status and EU due - diligence compliance) that poultry's single certification gate and piggery's ASF gate do not combine in the same way.

11.6.3 Enterprise Ranking Against the Hard Gates

Table 11.14C applies the eight hard gates in Table 11.14B to the enterprises named in the actor landscape (Section 11.4C) that have live engagement or confirmed operator identity, producing the ranking this chapter feeds into the cross - consultant enterprise - prioritisation exercise. As with the equivalent Poultry and Piggery tables, this is a snapshot against currently available desk evidence, not a funding decision; CONDITIONAL gates identify the specific verification step an Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)), an FMD - status confirmation, a CSDDD traceability plan that must clear before an enterprise moves from KII candidate to funded case.

Table 11.14C Enterprise ranking against the hard - gate screening framework

Enterprise	Identity	Buyer/Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) route	FMD/export cert.	CSDDD traceability	Overall status
NAGRC&DB	PASS - state entity, multiple confirmed ranch sites	N/A - institutional partnership, not a disbursement target	N/A	N/A	Tier 2 - institutional partner, not a grant recipient

Sources: Sections 8.4C, 8.6B, 8.7E, 8.11; A2i GRASP KII intelligence to July 2026.

11.7 Pillar 7 - Policy Alignment, Regulatory Framework, and Post - Grant Sustainability

Livestock Value Chain (Beef Cattle & Small Ruminants)

This pillar establishes that GTTF investment in the livestock value chain does not run against the grain of national policy but advances it. The interventions proposed elsewhere in this assessment abattoir modernisation, cold - chain infrastructure, export certification, and low - emission production technology are precisely the mechanisms that the Government of Uganda has already named as priorities. The pillar then sets out why these

enterprises remain commercially viable after the grant period ends, which is the test that distinguishes a durable investment from a subsidy.

11.7.1 National Policy Framework

Uganda's livestock policy direction is explicit rather than implied. The **National Livestock Policy 2020** and the livestock provisions of the **Fourth National Development Plan (NDP IV)** identify beef value addition, cold - chain infrastructure, and leather processing as the primary mechanisms for raising the sector's foreign - exchange contribution and reducing pastoral poverty. (Government of Uganda/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2020) The presidential address commencing NDP IV designated agro - industrialisation as a primary engine for industrial growth and issued direct value - addition mandates across priority chains. (Government of Uganda, 2026) The **Tenfold Growth Strategy** reinforces this by anchoring the country's export - led growth ambition in accelerated agro - industrialisation. (MoFPED, 2025)

The **Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Master Plan (2018 - 2028)** carries this strategic intent into documented sectoral commitments abattoir modernisation, breed improvement, and export - certification infrastructure that GTTF programme investment directly advances. (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), n.d.) The screening test applied throughout this assessment, following the workflow agreed by the consulting team, is whether each opportunity aligns with the Government's current push toward export - led policies; the livestock interventions proposed here pass that test without qualification.

Policy convergence at a glance National Livestock Policy 2020 beef value addition, cold chain, leather processing.NDP IV agro - industrialisation as primary engine of industrial growth.Tenfold Growth Strategy export - led agro - industrialisation agenda.Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Master Plan 2018 - 2028 abattoir modernisation and export certification.

11.7.2 Trade Policy and Market - Access Architecture

Policy alignment extends beyond the domestic framework into the trade regime that determines where certified Ugandan product can be sold. Uganda's participation in the **EU - East African Community Economic Partnership Agreement** creates a preferential framework within which GTTF - supported certification investment yields market - access returns that extend well beyond the programme's own investment period. (European Commission/Government of Uganda, n.d.) The **African Continental Free Trade Area (AfCFTA)** opens a parallel regional channel for agro - processed livestock products. (AfCFTA Secretariat, 2024) Crucially, the constraint on Ugandan livestock exports has historically been certification and biosecurity capacity rather than production volume a constraint that GTTF green - technology transfer is designed to remove. Investments that satisfy EU and regional sanitary standards therefore convert a current barrier into a durable market premium.

11.7.3 Climate Policy Alignment

The livestock interventions are consistent with Uganda's climate commitments under the **National Climate Change Policy (2018)** and the **Updated Nationally Determined Contribution (2022)**. (Government of Uganda, 2018a; Government of Uganda, 2022) Danish low - emission housing for feedlot operations, solar - powered water provision, and precision feeding reduce dependency on climate - variable pasture and water, while manure - to - biogas systems capture methane and return effluent as fertiliser. The World Bank's Country Climate

and Development Report recommends a technical - policy package breed improvement, water infrastructure, livestock intensification, veterinary access, feed production, and value addition that maps directly onto the technologies this programme transfers. (World Bank, 2025) GTTF investment thus operationalises national climate policy at the enterprise level rather than merely complying with it.

11.7.4 Post - Grant Sustainability

Post - grant sustainability is structurally assured by the economics of the transition the grant enables. Enterprises that move from live - animal commodity sales at UGX 2,500 to UGX 3,500 per kilogram to certified processed beef at UGX 8,000 to UGX 14,000 per kilogram permanently transform their revenue model. This is not a one - off margin gain; it generates the recurring cash flows required for independent commercial credit access through the Agricultural Credit Facility (ACF), aBi Development's agro - processing credit lines, IFAD, and global impact - finance channels.

The sustainability case rests on four conditions, each of which the proposed deal structure is built to satisfy:

- **Additionality.** The grant injects value that would not occur otherwise, de - risking capital expenditure that commercial lenders will not finance at the technology - adoption stage.
- **Operator readiness.** Anchor enterprises carry the balance - sheet strength and management capacity to operate transferred technology and to sustain a long - term commercial relationship with the Danish supplier after support ends.
- **Bankability.** The revenue transformation converts target enterprises into entities capable of independently securing commercial credit for all future expansions.
- **Green eligibility.** Transferred technologies strictly satisfy the Green Technology Transfer criteria, ensuring the programme's environmental mandate is met alongside its commercial one.

Sustainability test - the durable - investment standard Revenue model permanently shifts from commodity sales to certified processed product.Margin uplift of roughly 3× to 4× per kilogram funds independent commercial credit access.Danish - supplier relationship persists commercially beyond the grant period.No foreseeable adverse policy action; trajectory of Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and trade policy is supportive.

11.7.5 Residual Policy Risks and Verification Notes

Three cautions are recorded here for transparency rather than concealed in the headline case:

First, the certification claims that underpin export - market access HACCP, ISO, and Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) standards must be verified against the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register before any specific enterprise is described as certified in the final integrated report; they are not assumed from enterprise self - reporting.

Second, the trade - policy parameters that govern import - parity protection should be confirmed against the prevailing EAC Common External Tariff band structure at the point of final drafting, as tariff bands have been revised and an out - of - date rate would misstate the protection available to domestic processors.

Third, this chapter's "zero HACCP - certified beef abattoirs" framing refers specifically to the domestic - market

- facing enterprises profiled as GTTF investment targets (Uganda Meat Industries and comparable facilities), not to the sector as a whole: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Competent Veterinary Authority has approved three export - designated abattoirs - Pearl Meat Company Ltd (Nakasongola), Sanga Meat Company Ltd (Kiruhura), and Egypt Uganda Food Security Company Ltd (Luwero) with facilities designed to HACCP - supportive international standards (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Sanitary and Phytosanitary Certification System for Meat Export). Their live HACCP/Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification status was not independently confirmed as part of this assessment and should be checked against the Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certified Systems Register before any claim of certified status is made in the integrated report.

Separately, the formal - abattoir capacity - utilisation figure (below 40 percent, Table 11.1) is a desk estimate attributed to Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) and Uganda Meat Industries throughput data; it has not been independently verified against primary Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) slaughter statistics or direct enterprise disclosure and should be confirmed before final publication. None of these three cautions undermines the alignment case; all three ensure it is stated on verified ground.

Sources are cited in - text using the Harvard system, with full references listed in Chapter 11 References at the end of this chapter. Documentary sources only are cited on the face of this section; key - informant intelligence is confined to internal notes and is not for citation.

Table 11.15 Legislative and regulatory mapping: Uganda livestock sector

Instrument	Status	Key Provisions for Value - Addition Investment	Alignment Assessment	Required Policy Action
National Livestock Policy 2020	Current	Beef value addition, cold - chain infrastructure, and leather processing as primary forex and rural income mechanisms	Full alignment - GTTF investment directly advances National Livestock Policy objectives	No action required; GTTF positions within existing policy mandate
NDP IV (2025/26 - 2029/30)	Enacted	Agro - industrialisation as primary growth driver; leather value addition explicitly designated alongside coffee and cotton as strategic processing investment	Full alignment - NDP IV explicitly targets leather processing and beef value addition	Formal alignment letter; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) endorsement of GTTF technology pipeline

Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Master Plan	In implementation	Abattoir modernisation and export certification as documented Government commitment; UVA certification ladder as regulatory pathway	Direct alignment - GTTF abattoir investment follows documented Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) certification pathway	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) UVA: formal engagement on export certification timeline for Uganda Meat Industries
EU - Uganda Economic Partnership Agreement	In force	Rules of origin for processed beef and finished leather; SPS compliance pathway for certified Ugandan exports to EU	HACCP and EU SPS investment creates foundation for EPA market access; alignment strong but long - term	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) national certified beef standard required; EU SPS compliance architecture built into European equipment specifications
African Continental Free Trade Area (AfCFTA)	In force	AfCFTA Protocol eliminates tariffs on processed beef and leather between EAC member states; DRC and South Sudan are AfCFTA parties	HACCP abattoir investment directly enables AfCFTA market access to DRC and South Sudan formal procurement channels	No specific action; AfCFTA framework provides the trade architecture; HACCP certification is the enterprise - level enabler
EU Corporate Sustainability Due Diligence Directive (CSDDD 2024)	EU enacted; Uganda compliance window open	Requires traceability from farm level for all EU supply chain relationships in agricultural commodities including leather	Animal traceability investment is prerequisite for any EU leather brand Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)); CSDDD compliance architecture must be built into tannery grant design	Animal RFID traceability bundled with leather finishing grant; EU buyer engagement to confirm CSDDD compliance requirements before disbursement

Uganda National Bureau of Standards Uganda National Bureau of Standards (UNBS) - Uganda Standards for Processed Beef	Incomplete - requires development	No comprehensive national standard for certified chilled beef at HACCP level exists; gap blocks formal retail market tier differentiation	HACCP investment cannot command certified product premium in domestic formal retail without a Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) grading standard	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) to develop national standard for HACCP - certified chilled beef; 12 - 18 month timeline; engagement as KII priority
Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) FMD Vaccination Programme	Inconsistent enforcement	Mandatory FMD vaccination exists in policy; enforcement along cattle corridor is inconsistent; FMD status is the primary regulatory barrier to any beef export certification	Abattoir HACCP investment cannot unlock formal export market access until FMD - free status is established or zoning approach confirmed with importing country authorities	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) FMD vaccination enforcement strengthening as explicit GTTF policy advocacy priority; FMD - free corridor approach with DRC/South Sudan import authorities

Sources: National Livestock Policy 2020; NDP IV 2025; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Livestock Master Plan 2020; EU - Uganda EPA 2024; AfCFTA Protocol 2024; CSDDD Directive 2024; EAC CET 2022 - 2025; A2i GRASP KII intelligence 2026.

FMD vaccination and biosecurity should be positioned in the integrated report not as a risk to be managed around, but as the specific enabling investment that unlocks regional export market access. Uganda's FMD - endemic status is the binding constraint preventing formal fresh - beef export to its two largest and most proximate structural - deficit markets the DR Congo and South Sudan corridor already identified as this chapter's primary GTTF export target (Table 11.7) not primarily a constraint on Uganda's own domestic industry, which does not require FMD - free status to operate. Framed this way, GTTF support for FMD vaccination and biosecurity at the enterprise and cluster level is the specific, financeable intervention that converts a documented regional demand gap into an accessible market, and is presented here as an investment opportunity in its own right not folded silently into the hard - gate risk language alone. This is the most critical regulatory action required to unlock the full returns on GTTF abattoir investment, and must be approached as an explicit, named advocacy and investment priority in every GTTF livestock transaction, not as a background assumption. The EU CSDDD 2024 tannery compliance architecture must be built into the Leather Industries of Uganda investment design from day one: animal RFID traceability bundled with the tannery finishing grant as a precondition, not an optional add - on.

11.8 Conclusion and Recommendations

11.8.1 MCDA Sector Scoring Summary

Table 11.16 MCDA scoring summary - Uganda livestock sector

Scoring Criterion	Weight	Score	Rationale
Market Growth Potential	25%	7 / 10	Kenya, DRC, South Sudan structural deficits create documented export corridors; EU leather market USD 100B+; formal domestic retail demand for certified chilled beef growing at urban expansion rate
Climate Resilience Impact	20%	7 / 10	Solar water supply (Grundfos) directly addresses cattle corridor drought - water nexus; feedlot precision feeding reduces rangeland dependency; biogas from feedlot and abattoir waste reduces methane emissions
Technology Absorption Readiness	20%	7 / 10	Uganda Meat Industries and Leather Industries of Uganda have operational history and management capacity; Aswa and Maruzi ranches have land base for feedlot investment; however no HACCP precedent exists
Private Co - Investment Potential	15%	8 / 10	Abattoir and tannery investment generates commercially defensible returns from the beef processing premium and leather value multiplication; ACF + IFAD LADEP + IFC provide documented co - financing pathways
Export & Value - Addition Viability	10%	8 / 10	3 - 4x value multiplication from live animal to certified chilled beef; 20 - 40x value multiplication from raw hide to finished leather - highest per - unit value - add investment in GRASP portfolio
Inclusive Development Impact	5%	8 / 10	3.2 million rural households; women - managed small ruminants; formal processing employment for semi - urban households in cattle - corridor towns; digestate fertiliser returns value to pastoral households
Danish / EU Technology Match Quality	5%	8 / 10	Danish Crown, Frontmatec, Grundfos, Danfoss, Gram, SEGES Innovation - world - leading in abattoir, water, cold chain, and biogas; Italian/German tannery engineering leads EU leather market

WEIGHTED TOTAL100%7.35 / 10Chapter - level score, calculated independently within this chapter and carried without adjustment into the cross - sector ranking in Chapter 14. Leather finishing is potentially the highest per - unit value - add investment in the entire portfolio, on this chapter's own assessment.			

Source: A2i GRASP MCDA framework, May 2026. Score is this chapter's own calculation (7.35/10; see Section 11.8.1), carried without adjustment into the cross - sector ranking in Chapter 14.

Figure 11.10 MCDA Scoring: Uganda Livestock Value Chain.

Navy bars = score (1 - 10); teal bars = criterion weight %. Weighted total: 7.35/10, among the higher - scoring chapters in the GRASP landscape.

Source: A2i GRASP MCDA framework, May 2026.

11.8.2 SWOT Analysis

STRENGTHS	WEAKNESSES
- Uganda's cattle herd of ~14.5 million head and goat population of ~17.4 million represent the largest livestock asset base of any country in the EAC comparator group by per capita density relative to agricultural land.
- Live cattle export position is already the region's most commercially active: Uganda is the primary supplier to Kenya's informal cattle market, establishing trade relationships that a certified chilled beef offer can upgrade rather than build from scratch.
- Leather Industries of Uganda (Jinja) already operates as a formal tannery it requires a finishing upgrade, not a greenfield investment. This reduces the capital requirement and regulatory complexity compared to establishing a new tannery.
- 3 - 4x value multiplication from live animal to certified chilled beef and 20 - 40x from raw hide to finished leather give the livestock sector the highest absolute per - unit value - add investment returns of any GTTF value chain.
- Ankole longhorn cattle is globally recognised as a premium natural and heritage beef breed, drought - tolerant and uniquely adapted to Uganda's cattle corridor ecology. EU and Gulf premium beef markets increasingly value indigenous breeds.
- Geographic advantage: DRC Kivu/Ituri and South Sudan Juba are within 4 - 8 hours' refrigerated transport from Uganda's cattle corridor closer than any competing certified beef origin country.
- NDP IV explicitly designates leather value addition alongside coffee and cotton as a strategic national processing investment, creating a high - level policy mandate that directly supports GTTF tannery investment.	- Zero HACCP - certified beef abattoirs. This excludes Uganda from every formal beef export market Kenya, DRC, South Sudan, Rwanda, and EU regardless of production volume or carcass quality.
- FMD status is unresolved. Without documented FMD - free status at herd or corridor level, export certification to DRC and South Sudan cannot be achieved even where processing infrastructure is in place. This is the highest - level regulatory constraint in the portfolio.
- Formal abattoir capacity utilisation below 40% at existing installations. Building a new HACCP - certified kill floor without resolving the live animal supply consistency and cold - chain distribution constraints would replicate the current underutilisation pattern at higher capital cost.
- ~95% of hides exported as raw or wet - blue, yielding 5 - 10% of finished leather value. Leather Industries of Uganda is the only formal tannery and requires investment before it can access EU footwear market pricing.
- Cattle corridor drought vulnerability: the 2021 - 2022 drought caused documented herd destocking at distressed prices. Without solar water investment, the feedlot and ranch sector remains climate - exposed regardless of processing investment.
- Uganda is a price - taker in the live animal export market: Nairobi terminal price fluctuations transmit directly to Uganda farm - gate with no buffer. Kenya NTBs have historically blocked Uganda exports without warning.
OPPORTUNITIES	**THREATS**

1. DRC and South Sudan chronic beef supply deficits: both countries fill the deficit with live animal imports from Uganda and Kenya at commodity prices. A HACCP - certified Ugandan abattoir can displace these imports with chilled portions at 3 - 4x the live - animal price, capturing a margin that currently exits the country.
2. Rwanda net beef importer from Kenya. Uganda's geographic proximity to Kigali (closer than Nairobi) means a certified Ugandan beef processor could displace Kenyan imports in Rwanda on logistics grounds alone once HACCP certification is achieved.
3. EU leather market value USD 100B+ with documented origin - preference sourcing under CSDDD 2024. An EU leather brand Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) for finished Ugandan leather is a commercially real transaction that CBI Netherlands and ELIA actively facilitate.
4. Ankole longhorn premium brand potential: EU and Gulf premium natural - beef and heritage - breed markets are willing to pay premiums for documented indigenous breed provenance. This is an untapped positioning opportunity for Uganda's certified beef export.
5. AfCFTA Protocol eliminates tariffs on processed beef and leather between EAC and DRC/South Sudan. Uganda is geographically positioned at the centre of this market with lower logistics costs than any competing African origin.
6. Halal - certified goat meat for Gulf and European diaspora markets: Ugandan goat carries strong cultural demand among East African diaspora communities in the UK, Germany, and the Gulf. Origin - labelled, vacuum - packed halal goat can command 30 - 60% premium over commodity equivalents.	1. FMD endemic status is the single biggest threat to all livestock export plans. An FMD outbreak in the cattle corridor during a GTTF - supported abattoir's first export season would close DRC and South Sudan markets immediately and destroy the Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) relationship the entire investment depends on.
2. Kenya non - tariff barrier risk: Kenya has historically used non - tariff barriers (quality, SPS, customs delays) to block Ugandan agricultural exports when domestic Kenyan producers lobby for protection. Uganda's export diversification to DRC and South Sudan must be operational before the Kenya corridor is relied upon.
3. EU Corporate Sustainability Due Diligence Directive (CSDDD 2024) raises the compliance bar for EU leather supply chains. Animal traceability to farm level and no - deforestation documentation are required. Uganda's current informal cattle supply chain does not yet meet CSDDD standards - building compliance into the tannery investment design is mandatory, not optional.
4. Climate change: IPCC AR6 projects cattle corridor temperatures rising 1.5 - 2.5°C by 2050 and increasing drought frequency. Without feedlot investment and solar water supply, the production base supplying any GTTF - supported abattoir or tannery becomes increasingly climate - fragile.
5. Chinese abattoir and cold - chain equipment at significantly lower capital cost. For enterprises not targeting EU SPS export certification, the price differential between Chinese and European equipment may limit European technology uptake without GTTF grant de - risking.

SWOT synthesised from: FAOSTAT QCL 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; OEC / WITS 2024; World Bank 2024; GTTF Selection Justification 2026; FAO - ECTAD Uganda 2024; IPCC AR6 2021; CSDDD 2024; CBI Netherlands 2024; ELIA 2024; Danish Crown / Frontmatec / Grundfos / Danfoss / IDRA / ERRETRE technical data; A2i GRASP KII intelligence to 18 June 2026.

11.8.3 Risk Register

Table 11.17 Risk assessment and mitigation strategy - GTTF livestock portfolio

Risk	Likelihood	Impact	Evidence Base	Mitigation Strategy
FMD and Tick - Borne Disease Outbreaks	HIGH	HIGH	Uganda has documented recurring FMD outbreaks that restrict exports to all formal markets. FMD is the primary regulatory barrier to beef export certification. Tick - borne diseases (ECF, babesiosis) cause documented cattle corridor losses annually.	FMD vaccination programme investment bundled with abattoir HACCP grant; biosecurity infrastructure as disbursement precondition; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) UVA export certification pathway formalised before abattoir capital is deployed.
Drought and Rainfall Variability in Cattle Corridor	HIGH	HIGH	2021 - 2022 drought forced emergency herd destocking at distressed prices; recovery took 18 - 24 months. Cattle corridor is IPCC AR6 - flagged for increasing drought frequency and duration.	Grundfos solar - powered borehole water as standalone climate adaptation investment; feedlot precision feeding reduces rangeland dependency; drought insurance facilitation for Tier 3 enterprises.
Abattoir Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Market Access Risk	MEDIUM	HIGH	No Uganda formal abattoir currently holds HACCP certification; institutional buyer commitments untested at certified chilled beef scale.	Mandatory Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) from Kampala hotel group or DRC/South Sudan export agent before GTTF abattoir grant disbursement; A2i market linkage facilitation to documented procurement - ready buyers.
Live Animal Export Price Volatility	MEDIUM	HIGH	Uganda is a price - taker in the live animal export market; Nairobi terminal price fluctuations transmit directly to Uganda farm - gate. Kenya NTBs have historically blocked Uganda exports periodically.	GTTF abattoir and cold - chain investment converts Uganda from price - taker (live animal) to price - setter (certified chilled beef); NTB vulnerability is eliminated once domestic processing and DRC/ South Sudan diversification are operational.

Tannery Investment: EU Buyer Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) Risk	MEDIUM	MEDIUM	EU leather supply chain due diligence requirements (CSDDD 2024) require traceability to farm level. Without a documented EU buyer Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)), tannery finishing investment cannot access the premium that justifies the capital.	EU leather brand Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) (through CBI Netherlands or ELIA) as disbursement precondition for tannery grant; CSDDD compliance architecture built into investment design; animal traceability bundled with tannery grant.
Chinese Equipment Competition	MEDIUM	MEDIUM	Chinese abattoir and cold - chain equipment present in East African market at lower capital cost. For enterprises not targeting EU SPS export, price competition may limit European technology uptake without GTTF de - risking.	GTTF grant de - risks the first - mover adoption cost differential; EU SPS certification compatibility of European equipment is a durable competitive advantage for any enterprise targeting DRC, South Sudan, Kenya formal export, or EU leather channels.
Climate Change: Rising Temperatures	MEDIUM	MEDIUM	IPCC AR6: East Africa +1.5 - 2.5°C by 2050. Rangeland carrying capacity expected to decline further in cattle corridor; heat stress in feedlots without ventilation systems.	Feedlot covered ventilation (Skov A/S DK) converts rising temperature from productivity risk to managed variable; solar water investment reduces drought mortality risk simultaneously.

Sources: FAO - ECTAD Uganda 2024; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) 2024; IPCC AR6 2021; CSDDD 2024; World Bank 2024; OEC 2024; A2i GRASP KII intelligence 2026.

11.8.4 Key Informant Interview Agenda - Field Phase

Given the livestock sector's MCDA score of 7.35 and UGX 375 million allocation, KII prioritisation is essential. The field phase should focus on confirming the Tier 3 classification of four to five highest - potential enterprises, establishing co - financing readiness, and determining whether the leather tannery investment or the abattoir certification investment offers the stronger first - deal opportunity. The FMD regulatory pathway question must be resolved in KII before any abattoir capital commitment is made.

11.8.5 Investment Sequencing: From Landscape to Funded Case

The KII agenda that follows converts landscape - level findings into individual investment cases through a fixed sequence, stated here so field teams apply it consistently across Tier 2 and Tier 3 targets.

The Embassy has indicated a preference for a small number of larger investments on the order of three over a

wide spread of small ticket sizes. Applying that guidance to the hard - gate ranking in Table 11.14C, this chapter's headline recommendation concentrates on two investment cases rather than three, reflecting the chapter's own MCDA - weighted priority order: HACCP - certified abattoir and cold - chain infrastructure at Uganda Meat Industries, and leather finishing tannery technology at Leather Industries of Uganda the two enterprises identified in Section 11.0 as dominating the livestock GTTF case. Solar water and feedlot precision feeding at Aswa Ranch and Maruzi Ranch remain live KII targets that could substitute into this set as field verification against the hard gates progresses, rather than being added as additional, smaller commitments alongside the two headline cases.

Table 11.17B Investment sequencing - livestock pipeline

Step	Decision Question	Minimum Evidence Required
1. Select technology category	HACCP abattoir + biogas wastewater, cold - chain infrastructure, feedlot precision feeding + solar water, or leather finishing tannery technology?	One category per case, per the five white - space categories in Table 11.14
3. Prove the constraint	What value gap is currently measurable - live - vs - certified beef spread, raw - vs - finished leather spread, or drought - driven destocking loss?	KII - confirmed operating data cross - referenced against Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Statistical Abstract 2024 and the GTTF Selection Justification 2026 price ladder
4. Specify the technology	Which named supplier (Danish Crown/Frontmatec, Grundfos, Danfoss/Gram, Skiold, IDRA/ERRETRE/MOENUS/Turner) resolves this constraint, and at what cost?	Supplier quotation; CapEx/opex; service and spares route confirmed
5. Price the benefit	What is the annual gross benefit - from the price - uplift, loss - avoided, or cost - saved decomposition in 8.5?	Verified throughput (head/year processed, hides/year, herd size) multiplied by benefit per unit
6. Structure finance	Can the enterprise's balance sheet support the 5:1 leverage ratio, drawing on ACF, IFAD LADEP, or World Bank UgIFT?	Audited accounts; co - financier engagement confirmed
7. Clear the hard gates	Does the case pass all eight gates in Table 11.14B, including the FMD/export - certification and CSDDD traceability gates?	Full gate checklist signed off before disbursement recommendation - FMD resolution in particular must precede any abattoir capital commitment

Table 11.18 KII agenda: priority enterprise targets and information sought

Enterprise	Priority KII Questions	Information Sought	GTTF Investment Hypothesis	Confirmation Required
Uganda Meat Industries Ltd (Soroti)	1. Current slaughter throughput (head/day) and utilisation rate vs installed capacity? 2. What are the primary causes of capacity underutilisation - supply, cold - chain, certification, or equipment? 3. What is the specific capital requirement for HACCP certification and what Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / UVA engagement has occurred? 4. Does the enterprise have an existing ACF or aBi Development credit relationship?	Abattoir technical status; HACCP pathway; balance sheet position; co - financing readiness; buyer relationships for Off-take Partnership Agreement (Off-take Partnership Agreement (OPA))	HACCP stun - to - chill upgrade; biogas wastewater; cold - store rooms - Tier 3	Audited accounts; UVA certification gap analysis; confirmed Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)) from institutional buyer; site visit for infrastructure assessment
Aswa Ranch (Gulu) / Maruzi Ranch (Apac)	1. Current cattle inventory, feedlot capacity, and days - on - feed programme? 2. What is current average carcass weight achieved and target weight under finishing? 3. What water supply system is in operation and has drought - related production loss occurred? 4. Has the ranch assessed feedlot precision feeding or solar - powered water investment?	Feedlot technical status; water supply vulnerability; balance sheet; investment appetite; off - take buyer for finished cattle	Feedlot precision TMR; solar water (Grundfos); biogas slurry - Tier 3	Site visit; feedlot production records; water stress history; ACF borrowing capacity; confirmed buyer for feedlot - finished cattle
Leather Industries of Uganda (Jinja)	1. Current annual throughput of hides processed and current output quality (crust, wet - blue, semi - finished)? 2. What is the specific capital requirement for a finishing tannery upgrade to EU footwear grade? 3. Has the enterprise engaged with EU leather buyers or brand procurement teams? 4. What is the CSDDD traceability gap and what would a minimum compliant supply chain look like?	Tannery technical status; EU buyer engagement history; balance sheet; investment appetite; CSDDD compliance readiness	Leather finishing upgrade (Italian/German EU - 27 technology) - Tier 3	Audited accounts; EU buyer Off-take Partnership Agreement (Off-take Partnership Agreement (OPA)); CSDDD traceability plan; site visit for tannery infrastructure assessment

Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) - Livestock / UVA Division	1. What is the timeline and specific requirements for UVA export certification for Uganda Meat Industries? 2. What is the current status of the FMD vaccination programme in the cattle corridor? 3. Is Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) pursuing an FMD - free zone or corridor approach with DRC / South Sudan? 4. What is Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s position on Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) development of a national certified beef standard?	Export certification pathway; FMD programme status; national beef grading standard timeline	Policy alignment for abattoir HACCP and export certification investment	Written confirmation of UVA certification pathway and timeline; FMD programme status document; grading standard development commitment
NaLIRRI (National Agricultural Research Organisation (NARO)) / FAO - ECTAD Uganda	1. What is the documented Feed Conversion Ratio (FCR) improvement from feedlot TMR feeding under Uganda cattle corridor conditions? 2. What FMD outbreak frequency and economic loss data exists for the cattle corridor, 2015 - 2024? 3. What is the current status of FMD vaccination coverage in Kiruhura, Sembabule, Isingiro, and Mbarara districts? 4. What tick - borne disease incidence data exists for the primary feedlot investment districts?	Technical validation data for investment case; FMD risk quantification; feedlot performance benchmarks	Technical validation; biosecurity risk assessment for abattoir and feedlot investments	Published or forthcoming data on feedlot performance; FMD economic loss studies; tick control efficacy data for GTTF biosecurity design

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Chapter 12 : Cassava Value Chain Assessment

Sector Context

Uganda Vision 2040, launched in 2010, aims to achieve "A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years" through: three 10 - year plans; six 5 - year National Development Plans (NDPs); Sector Investment Plans (SIPs); Local Government Development Plans (LGDPs), Annual work plans and Budgets. To achieve this vision Uganda targets USD 500 billion GDP and a per capita income of not less than USD 9,500 by 2040, through the Tenfold growth strategy that was launched in 2023. This strategy is anchored on 4 major pillars of the economy i.e. Agro Industrialization, Tourism, Mineral Development and Science Innovation and Technology.

Currently the country is implementing NDP IV. Cassava is currently classified as one of the four key agro - industrial value chains in NDP IV earmarked for transformation. In addition to its increased role as a food security industry, it has already transitioned into a key provider of raw materials for prioritized sectors of energy, packaging, textiles, feed and other food processing industries. Currently six large factories process cassava based derivatives that include starch and ethanol.

Uganda hosts the largest feed industry in the East African region that demands high quality cassava chips for fish feed production. Research for Development activities have successfully tested blending of cassava with wheat and regional standards exist. Market segments for value added/processed cassava derivatives exist and are growing. This growth is driven by the Government's target for import substitution, export promotion, green technology transition and full monetization of the economy. In this regard, the cassava value chain has 4 major product lines/segments of interest i.e. HQCC, HQCF, Starches and different Ethanol grades.

Uganda runs a mandatory PMS blending policy targeted to reach E20. Current progress is at E3 with a combined total production of 50.4 million litres per annum from 7 licensed factories. Achieving the targeted E20 blending policy requires an additional 13 factories based on current output. Given the current target to transition 1 million households to clean cooking energy, Uganda will require 180 million litres of cooking fuel. Using the current largest factory production of 40,000 litres per day, other 13 similar factories are required to fully meet this demand.

Between 180,000 and 200,000 tons of HQCF are needed to achieve a 20% wheat substitution rate. Just one factory processing fish feeds requires 200 tons of HQCC per month. However, the sector faces challenges in terms of limited processing capacity, and efficient technologies. Therefore a viable business case exists for large scale investments in the following: a) high starch extraction, efficient processing lines at scale; b) high ethanol yield, low cost processing plants at scale; c) large scale wet processing of high quality cassava flour; d) large scale drying technologies for cassava chips. However, these large scale investments should be better planned and deployed to leverage current planned investments in production.

Key findings

1. Cassava is now a key raw material for starch, ethanol and animal feed sectors, in addition to its earlier important role of being a food security crop. Ten factories, 9 of which are large scale, offer industrial demand for fresh

cassava roots, and dried chips totaling about 660,000 tons fresh roots equivalent per annum.

2. GoU targets full import substitution of all items that can be manufactured locally and various fiscal and other policies are in place to facilitate this process. These include the E20 blending policy, and 35% import duty on starch. Consequently about 30 percent of starch imports have already been replaced. However, a significant potential for import substitution still exists characterized by approximately USD 205 million worth of cassava - substitutable items in 2025.

3. Cassava value chain is prioritized for its potential to earn the country foreign exchange. Starch exports reached 2,724 MT worth about USD 1.34 million in 2024**.**

4. Green technology is central to making cassava processing commercially viable. About 60% of total production (1.52 million tons) is processed into dried chips and flour. Currently, an estimated 100,560 tons of dried cassava is demanded by 6 large processors producing ethanol, animal feed and beverage. Over 95% of processing technologies are poor, and inefficient with limited capacity. High starch extraction at low cost; High ethanol yield at low cost; Efficient drying at scale and large scale quality processing of cassava are technologies that can accelerate the transformation of the cassava value chain.

5. There is no value in raising production without expanding processing capacity with about 60% of ~2.54 m tonnes going to a low - value dried market. A single large high - quality - cassava - flour plant will catalyze the uptake of the ~200,000 - tonne wheat - blending market, which fits in the GTTF design.

6. Cassava production is still largely dominated by smallholders. Smallholder farmers also need incomes and not just food security. Evidence shows a return to cassava production by smallholders who have noticed its resilience against excessive heat and drought. An opportunity therefore exists if smallholder holders are better organized to fully utilize their land holdings to grow cassava both for food and industrial sale.

7. Factories are currently running at ~40% of their installed capacity. This is mainly due to poorly organized smallholder schemes and lack of clean seed. Therefore additional equipment must be matched with properly planned production taking into account food needs, side - selling etc.

8. Cassava, compared to maize and sugarcane yields a higher rate (~400 L/tonne vs ~280 sugarcane, ~320–350 maize). The EU possesses high ethanol yield technologies. German drying/milling technologies yield high cassava flour comparable to wheat flour in texture.

12.1 Pillar 1 Historical Baseline and Strategic Alignment

12.1.1 Uganda's Cassava Sector: A Decade in Perspective

Over the decade spanning 2015 to 2025, Uganda's cassava sub - sector underwent a structural transition - evolving from a localised subsistence food - security crop into a strategic agro - industrial commodity.

Production performance over the decade has been highly volatile. Output peaked at approximately **4.4 million MT in 2018** - driven by a combination of favourable rainfall, acreage expansion, and emerging industrial off - take - before declining sharply to approximately 2.2 million MT in 2020 as a result of Cassava Brown Streak Disease (CBSD) pressure, COVID - era market disruption, acreage contraction and a total stoppage of procurement by UBL for beer processing. By 2023/24, UBOS estimates production at approximately **2.54 million MT**, with 1,130,910 agricultural households growing cassava - 17.1% of all agricultural households. (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2024a)

The decade was marked by two critical inflection points. In 2017, output **declined by 32%** - from 2.73 million MT to 1.86 million MT - driven primarily by poor market access and declining industrial offtake. Acreage remained stable at 853,000 ha but yields collapsed to 2.18 MT/ha as farmers reduced inputs in the absence of reliable buyers. The sector then rebounded sharply in 2018, when brewery and biscuit industry demand drove acreage to 1,706,000 ha and production to 4.4 million MT. The subsequent 2019 - 2020 contraction reflected the withdrawal of those industrial markets, compounded by Cassava Brown Streak Disease (CBSD) pressure and COVID - 19 market disruption. (A2i, 2026b).

Since 2020, production has consistently been increasing, driven by the high demand from new ethanol and starch manufacturing plants.

National average farm - gate yields remain severely depressed at **2.3 to 4.7 MT per hectare** - a material decline from historical averages of 5.4 MT/ha recorded in 2011. The agronomic yield potential under Good Agricultural Practices (GAP) and improved disease - resistant varieties (NASE 14, NASE 19, National Agricultural Research Organisation (NARO)CAS 1) reaches 40.5 - 50.6 MT per hectare - implying a national yield gap of approximately 90%. (Buyinza et al., 2018)

Table 12.1 - Cassava Production, Area and Yield: Uganda 2015 - 2025

Year	Est. Area ('000 Ha)	Avg. Yield (MT/ Ha)	Production ('000 MT)	Primary Source
2015	852	3.20	2,727	UBOS AAS - Baseline year
2016	853	3.20	2,729	UBOS AAS / FAOSTAT
2017	853	2.18	1,859	UBOS AAS - 32% decline; market failure and poor access
2018	1,706	2.57	4,390	UBOS AAS - industrial peak (brewery/biscuit demand)
2019	658	4.04	2,660	UBOS AAS - market retraction post - industrial peak
2020	1,413	1.47	2,084	UBOS AAS - CBSD pressure + COVID market disruption
2021/22	472	4.75	2,242	UBOS UHIS - AAS 2021/22 - industry recovery begins
2023/24	607	4.18	2,535	UBOS AAS 2023/24 - confirmed figure

*Source: UBOS Annual Agricultural Survey (AAS) and UHIS - AAS series. 2025 area/yield are projections; production figure confirmed by UBOS. Yield derived as production/area - note significant inter - annual variation in UBOS area data reflects real acreage fluctuations driven by industrial demand cycles (see 12.1.1). Financial - year data (2021/22, 2023/24) represents UBOS survey cycles; no AAS was conducted for 2022 and 2024 calendar years. ▲ Peak driven by industrial demand (brewery and biscuit industry). ▼ Declines driven by market failure, disease pressure, and COVID - 19.**

Figure 12.1 - Uganda Cassava Production Trend ('000 MT), 2015 - 2025 | Source: UBOS AAS / UHIS - AAS. UBOS - confirmed data; 2025 production confirmed at 2,535K MT.

Figure 12.2 - Uganda Cassava Area Planted ('000 ha), 2015 - 2025 | Source: UBOS AAS. Note: large inter - annual swings reflect industrial demand cycles (brewery/biscuit 2018; starch/ethanol 2020).

Figure 12.3 - Uganda Cassava Average Yield (MT/ha), 2015 - 2025 | Source: UBOS AAS. Note: 2019 yield corrected from consultant chart anomaly; derived as production/area = 4.04 MT/ha.

12.1.2 NDP IV Alignment and Strategic Positioning

Cassava is formally designated as one of four priority agro - industrial value chains under Uganda's **Fourth National Development Plan (NDP IV, 2025/26 - 2029/30)**. Its strategic role extends across four of the NDP IV programme anchors: Agro - Industrialisation; Import Substitution; Export Promotion; and Science, Technology, and Innovation (STI) integration. The National Industrial Policy (2020) explicitly prioritises cassava - based starch, industrial glucose, and bioethanol as strategic raw materials for domestic manufacturing, while the Buy Uganda Build Uganda (BUBU) Policy (2014) provides a procurement preference shield for domestic HQCF and industrial starch producers. (NPA, 2024a)

The crop's food - security role remains important. Cassava is a critical drought reserve - resilient to rainfall variability and capable of longer underground storage than most cereal crops. However, this food - security function must be distinguished from the **agro - industrial value chain** that is the focus of this GTTF analysis. The GTTF investment case is built on the industrial derivatives - HQCF, starch, ethanol, glucose, animal - feed chips - not on subsistence food production.

12.1.3 From Food Security to Agro - Industrial Platform

The structural transformation of Uganda's cassava sector is genuine but incomplete. On the demand side, an industrial processing tier has been established: approximately **nine Tier 1 anchor processing plants** now operate across starch extraction, bioethanol distillation, and HQCF milling. On the supply side, however, the sector remains overwhelmingly smallholder - dominated, with primary processing largely informal, reliant on manual chipping and open - air sun drying, and structurally vulnerable to Post - Harvest Physiological Deterioration (PPD).

This mismatch - industrial processing infrastructure ahead of supply chain organisation - is the central structural problem the GTTF must address. Operating capacity utilisation across the Tier 1 industrial base is estimated at **below 40%**, not because demand is absent but because reliable, specification - compliant raw material supply is insufficient. The investment priority is therefore to build the supply infrastructure that existing factories need - not to build more factories.

12.2 Pillar 2 Market Dynamics and Supply Chain Architecture

12.2.1 Four Product Pathways

Uganda's cassava market is structured around four distinct product pathways, each with a different buyer profile, quality specification, and investment requirement. GTTF investment recommendations must be matched to a specific pathway rather than applying a generic 'cassava investment' framing.

Pathway 1 - Food and Flour Markets: Fresh root sales and HQCF production for domestic food consumption, bakeries, and composite flour blending (up to 20% cassava inclusion). This is the most established pathway but operates at low margins due to competition from subsidised wheat imports and Asian starch.

Pathway 2 - Industrial Starch: Refined and pharmaceutical - grade starch for paper, textiles, adhesives, pharmaceuticals, and food - processing applications. Uganda already exports starch (~2,724 MT in 2024 at ~$493/tonne). The 2026 global price rise of ~45% materially strengthens the investment case for starch efficiency upgrades. (WITS/World Bank, 2024b)

Pathway 3 - Ethanol and Energy Applications: Bioethanol for domestic fuel blending (E - 20 statutory target

under the Biofuels Act 2018, though implementation is currently below E - 5), industrial solvents, and clean - cooking ethanol stoves. Commercially viable but dependent on regulatory enforcement of the blending mandate. (Government of Uganda, 2018b)

Pathway 4 - Animal Feed (High Quality Cassava Chips, HQCC): Dried cassava chips as an energy ingredient in animal feed formulations (poultry, cattle, fish). De Heus Uganda (Jinja) is the primary industrial off - taker of HQCC. This pathway should be read alongside Chapter 8 (Grain and Animal Feed) to avoid double - counting of the feed market.

Table 12.2 - Cassava Supply Chain Architecture: Four Nodes

Supply Chain Node	Primary Actors	Estimated Volume / Flow	Binding Structural Constraints
1. Production	3.16M - 3.95M smallholder households; ~20 commercial farmers (>500 acres)	2.2M - 2.79M MT fresh roots annually	90% yield gap; CMD/CBSD disease pressure; low input adoption; high post - harvest volatility
2. Aggregation and Primary Processing	Rural traders; VSLAs; farmer cooperatives; village assemblers	~780,000 MT traded roots (~28% commercial rate); rest is subsistence/informal	30 - 40% PPD losses within 48 - 72 hrs; weather - dependent open - air drying; sand/contamination; no moisture control
3. Secondary Industrial Processing	Eight operational Tier 1 plants (starch, ethanol, HQCF, feed); one (Fermarco) temporarily closed	Well below installed capacity (~69,000 MT/month operational pipeline); utilisation 30 - 100% by enterprise	High thermal energy costs; PPD supply constraints; seasonal feedstock shortfalls; working capital gaps
4. Derivative Markets	Bakeries; breweries; pharma; fuel blenders; feed manufacturers (De Heus)	Local and regional exports: ~$11.84M formally (2021); 2024 starch exports ~2,724 MT (~$1.34M)	Competition from subsidised SE Asian starch; uncoordinated supply chains; fuel blending not at E - 20 level

Sources: A2i GRASP/GTTF Cassava Landscape Assessment KII data (2026); NAADS (2020); NPA Cassava Value Chain Status Review (2024); UBOS AAS (2022).

12.2.2 Import Substitution Opportunity

Uganda's actual 2025 imports across all cassava - substitutable categories were recorded by the Uganda Revenue Authority (URA) at **USD 205,020,692** - covering undenatured ethyl alcohol, corn starch, industrial sugar, glucose syrups, adhesives and glues, animal feed, and wheat derivatives. This is the URA - confirmed current import bill against which cassava substitution is measured. (EPRC, 2018)

The Economic Policy Research Centre (EPRC) has separately modelled the *theoretical addressable maximum* at 100% substitution: **USD 343.9 million annually**. This ceiling figure should not be conflated with the current import value - it assumes full market capture across all pathways, which is not a near - term scenario. A realistic 3 - 5 year substitution scenario would capture USD 40 - 80 million of the current USD 205M import bill if Tier 1 efficiency investments succeed. The table below presents the EPRC product - level breakdown with realistic

assessment.

Product / Import Category	EPRC Import Substitution Value	Cassava Pathway and Editorial Assessment	Realistic 3 - 5 Year Substitution
Refined industrial and pharma starch	USD 112.5M	Direct technical substitute. Uganda already exporting at world benchmark pricing ($493/t, 2024). Most credible pathway.	Medium - High: 10 - 20% addressable within 5 yrs given Tier 1 capacity upgrades
Denatured bioethanol and clean cooking	USD 98.4M	Cassava ethanol for fuel blending and clean cooking. Credible but contingent on E - 20 implementation.	Low - Medium: mandate exists; enforcement timeline uncertain
Industrial HQCF (wheat flour substitution)	USD 85.0M	Up to 20% cassava - wheat composite viable. Requires buyer adoption and quality consistency.	Medium: HQCF buyer base limited; quality consistency binding constraint
Glucose and fructose syrups	USD 48.0M	Requires starch - to - glucose conversion infrastructure not currently at commercial scale.	Low: Beyond current Tier 1 investment horizon
Total (EPRC estimate)	USD 343.9M	Theoretical maximum at 100% substitution. Not a near - term market target.	Realistic 5 - yr: est. USD 40 - 80M if Tier 1 efficiency and drying investments succeed

Primary source: Uganda Revenue Authority (URA) import data 2025 - total cassava - substitutable imports: USD 205,020,692. EPRC (2018) theoretical ceiling: USD 343.9M at 100% substitution. Realistic 3 - 5 year substitution scenario: USD 40 - 80M against current URA import base. A2i analytical estimate; not independently modelled.

Figure 12.4 - Uganda Cassava - Substitutable Import Value (USD M), 2015 - 2025 | Source: Uganda Revenue Authority (URA) via consultant KII fieldwork. Note: 2018 dip reflects peak domestic production year (4.39M MT cash crops). 2025 total: USD 205M (URA confirmed).

12.2.3 Export and Regional Market

Uganda's formal cassava export earnings stand at approximately **USD 11.84 million annually** - primarily raw tubers and low - margin sun - dried chips. Formal starch exports under HS 110814 have grown from 895 MT in 2016 to **2,724 MT in 2024** at an export price of approximately $493/tonne - directly competitive with the Thai/ Vietnamese bulk commodity benchmark.

The regional opportunity is significant. In 2022, the eight East African Community member states collectively imported USD 2.282 billion worth of wheat. HQCF can technically substitute for wheat in commercial baking applications at up to 20% inclusion, establishing an addressable regional HQCF export market of at least **USD 400 million annually** at full substitution. Capturing even 5 - 10% - approximately USD 20 - 40 million - would represent a transformative improvement on Uganda's current $11.84 million baseline. (EAC Secretariat, 2024)

Table 12.3 - Uganda Cassava Starch Export History: HS 110814

Year	Volume (MT)	Value (USD)	Price/Tonne	Primary Market	Note
2016	895	~$450K	~$503	Kenya	Early stage; growing starch processing capacity
2019	~1,200	~$580K	~$483	Kenya (primary)	Growing commercial starch base established
2022	1,939	~$945K	~$487	Kenya / regional	Competitive with SE Asian benchmark pricing
2023	1,639	~$820K	~$500	Kenya / regional	Volume slight dip; price firm
2024	2,724	$1.34M	$493	Kenya (primary)	Competitive; 2026 global prices rising ~45%
2026 (indicative)	~3,500 - 5,000*	~$1.9 - 3.5M*	$550 - 700*	Kenya / EAC	Projection if Tier 1 efficiency investments succeed; 2026 price surge creates upside

Sources: WITS / World Bank (2024); URA trade data; Thai Tapioca Starch Association (2026). 2026 indicative projection; not independently verified. (BakeRite Company, 2026)*

12.2.4 Cassava Product Price Trends: 2020 - 2026

Cassava product prices have moved in materially different directions across pathways over the 2020 - 2026 period. Fresh root farm - gate prices have remained structurally depressed despite growing industrial demand - a consequence of PPD - driven distress selling and the absence of organised aggregation infrastructure. Industrial starch prices, by contrast, have surged in 2026 in line with global commodity movements, creating a material improvement in the investment case for starch efficiency upgrades. The table below summarises the price trajectory across all major cassava products.

Table 12.4 - Cassava Product Price Trends, Uganda 2020 - 2026 (UGX/kg unless stated)

Product / Price Point	2020	2021	2022	2023	2024	Aug 2026	Driver / Note

Fresh cassava root - farm - gate spot (harvest glut)	80 - 150	100 - 200	100 - 200	100 - 200	100 - 200	100 - 300	PPD distress selling; seasonal volatility; no organised buyer
Fresh cassava root - contracted outgrower price	200 - 300	250 - 350	300 - 350	350 - 400	400 - 450	400 - 500	Bukona/ Kilimo Trust model; volume purchasing power
Industrial starch - ex - factory (UGX equiv. of USD price)	~1,100	~1,200	~1,400	~1,600	~1,900	~1,980 - 2,520	Global starch surge Aug 2026: FOB Bangkok USD 550 - 700/t (+45%)
HQCF - food grade, local bakeries	~1,000	~1,100	~1,200	~1,350	1,500 - 2,000	1,500 - 2,000	Quality differentiation key; sun - dried vs. controlled drying affects buyer access
Denatured ethanol - clean cooking (Greenergy)	~2,500	~2,800	~3,000	~3,200	~3,500	3,500 - 4,000	Indexed loosely to petroleum; Greenergy distribution model
Dry cassava chips HQCC - De Heus feed buyer	~600	~650	~700	~750	~800	800 - 1,000	Animal feed market growth; linked to grain sector Chapter 8

Diesel fuel - Kampala industrial (UGX/litre)	~3,800	~4,200	~5,400	~5,500	~5,800	~6,000	Key OpEx driver for drying and distillation; case for solar - biogas offset

▲▲ 2026 starch price surge reflects global commodity tightening: Thai tapioca FOB Bangkok moved from ~USD 480/t (Jan 2026) to USD 550 - 700/t (Aug 2026). ▲ Diesel trend: rising cost reinforces the financial case for biogas (ANDRITZ) and solar - hybrid dryers. Sources: ERA tariff schedules; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) field price monitoring; TTSA/BakeRite (2026); UBOS CPI components; Petroleum Authority Uganda. (ERA Uganda, 2026) (MoWT/PAU, 2026) (TTSA, 2026)

Figure 12.5 - Cassava Product Price Trends, Uganda 2020 - 2026 (Fresh Root UGX/kg, left axis; Industrial Starch UGX/kg, right axis) | Source: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); ERA; TTSA/BakeRite August 2026; A2i KII data.

12.2.5 East African Trade Flows: Uganda Cassava Products

Uganda's cassava trade is dominated by raw and semi - processed exports to Kenya. Formal starch exports under HS 110814 (captured by WITS/URA) represent only the highest - value, most - organised segment. A substantial informal trade in sun - dried chips flows across borders - primarily to Kenya, Sudan, and DRC - that is not fully captured in official statistics. The table below presents available formal trade data with analyst estimates for informal corridors.

Table 12.5 - Uganda Cassava Product Trade Flows: EAC Markets 2022 - 2024

Destination	Primary Product	Est. Volume (MT/yr)	Est. Value (USD/yr)	Trade Status	Key Buyer / Note
Kenya	Industrial starch (HS 110814)	1,639 - 2,724	$820K - $1.34M	Formal - URA/ WITS	Industrial starch buyers; food processors; Kenyan pharma
Kenya	Raw and dried cassava (HS 0714)	~15,000 - 20,000	~$1.5 - 2.0M	Formal and informal	Cross - border traders; Kenyan food market; dried chips for further processing
South Sudan	Dried chips (HQCC/raw)	~5,000 - 10,000	~$0.6 - 1.2M	Largely informal	Food security market; conflict - driven demand surge periods

DRC (Eastern)	Raw cassava and dried chips	Informal; volume not captured in formal stats	Not measured	Predominantly informal border trade	Major informal corridor - Arua - DRC route; significant unrecorded volumes
Tanzania	Raw and dried cassava	~2,000 - 4,000	~$0.3 - 0.6M	Formal and informal	Mwanza and Northern Tanzania food markets
Rwanda	HQCF / composite flour blend	<500	<$0.2M	Nascent - formal	Kigali bakeries; composite flour trials. Potentially large market if quality certified.
EAC composite total (formal)	Mixed cassava products	~25,000 - 38,000	~$3.2 - 5.3M	Formal primary	Kenya dominant; starch and dried chips primary products
EAC opportunity (HQCF composite)	HQCF replacing wheat (20% inclusion)	Addressable: 200,000 - 400,000 MT	USD 40 - 80M/yr potential	Not yet captured	Based on USD 2.282B EAC wheat import bill; 5 - 10% substitution scenario

Sources: WITS/URA formal trade data (2022 - 2024); EAC Agricultural Trade Statistics (2023); analyst estimates for informal trade corridors. Informal trade estimates carry high uncertainty. DRC volumes are particularly difficult to quantify. HQCF composite wheat substitution opportunity is based on EAC wheat import data and technical substitution rate; not a confirmed demand figure. (Selina Wamucii / UN Comtrade, 2024)

Figure 12.6 - Uganda Cassava Export Volumes by Destination (MT), 2018 - 2025 | Source: URA/UNComtrade via consultant KII fieldwork (2026). Kenya accounts for >80% of all formal cassava exports.

12.2.6 Unit Economics: Gross Margin Models by Product Pathway

The three tables below present cost - and - margin models for each major cassava product pathway - starch, HQCF, and ethanol - calibrated to Uganda conditions as of August 2026. These models are built from the Landell Mills/AgriTT Uganda cassava industrialisation study, APRI feasibility data, ERA industrial tariff schedules, and A2i KII fieldwork. (Landell Mills/AgriTT, 2016) (APRI Uganda, 2021)

Two key analytical insights emerge. First, feedstock price is the dominant variable: at contracted starch - sector prices (UGX 250/kg), gross margins in starch are a real loss at 2024 prices with standard technology (- 6.9%), improving to roughly breakeven with SiccaDania alone (- 0.6%), and reaching 20.6% only once the 2026 global price recovery is factored in. At spot/distress prices (UGX 100 - 200/kg), margins are commercially robust at both price levels (21 - 43%). This is why the feedstock supply architecture - *drying hubs, outgrower schemes, rapid*

aggregation - is the investment priority. Second, energy efficiency technology (SiccaDania, ANDRITZ) is not a marginal improvement - at contracted feedstock costs it is the difference between a loss and viability, and even then the 2026 price recovery is doing real work, not just the technology.

Table 12.6 - Gross Margin Model A: Industrial Starch Pathway (Per Tonne of Starch Output, Wet Process)

Parameter	Spot Roots (UGX 150/ kg avg)	Contracted Roots (UGX 250/kg avg)	Source / Note
A. RAW MATERIAL INPUTS			
Fresh root input (5:1 conversion ratio)	5,000 kg	5,000 kg	AgriTT/Landell Mills Uganda study
Raw material cost per tonne starch	UGX 750,000	UGX 1,250,000	Derived: 5,000 kg × UGX 150 / 250
B. PROCESSING COSTS PER TONNE STARCH OUTPUT			
Energy - flash drying, standard (~330 kWh/t equivalent)	UGX 247,000	UGX 247,000	ERA industrial tariff UGX 384/kWh + diesel supplement
Energy - SiccaDania/ Bühler flash drying (45% energy saving)	UGX 136,000	UGX 136,000	Technology benchmark - 45% heat recovery
Water, chemicals, process inputs	UGX 100,000	UGX 100,000	APRI plant benchmark
Labour and supervision	UGX 80,000	UGX 80,000	A2i estimate; mid - scale plant
Packaging - 50 kg woven bags, labelling	UGX 120,000	UGX 120,000	Market rate, Kampala
Transport to industrial off - taker	UGX 100,000	UGX 100,000	Estimated: Kampala/Jinja delivery
Processing sub - total (standard energy)	**UGX 647,000**	**UGX 647,000**	
Processing sub - total (SiccaDania energy)	**UGX 536,000**	**UGX 536,000**	
C. TOTAL COST PER TONNE STARCH			
Spot roots + standard energy (baseline)	**UGX 1,397,000**	-	
Spot roots + SiccaDania (optimised)	**UGX 1,286,000**	-	
Contracted roots + standard energy	-	**UGX 1,897,000**	A real loss at - 6.9%; SiccaDania upgrade is necessary, not optional, to approach viability

Contracted roots + SiccaDania	-	**UGX 1,786,000**	Marginal at 2024 prices (- 0.6%, essentially breakeven); viable at 20.6% at 2026 global prices - it is the price recovery, not the technology upgrade alone, that restores viability
D. REVENUE PER TONNE STARCH			
2024 export price (USD 493/t × UGX 3,600)	UGX 1,775,000	UGX 1,775,000	WITS/URA (2024)
2026 current price (USD 625/t × UGX 3,600)	UGX 2,250,000	UGX 2,250,000	Thai TTSA benchmark, Aug 2026 midpoint
Pharma - grade premium (USD 4,126/t - Dei BioPharma target)	UGX 14,854,000	UGX 14,854,000	WITS Germany pharma starch benchmark; requires Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/EU certification
E. GROSS MARGIN PER TONNE STARCH			
Spot + standard + 2024 price	**UGX 378,000 (21.3%)**	-	Commercially viable at spot feedstock costs
Spot + SiccaDania + 2026 price	**UGX 964,000 (42.8%)**	-	Strongly viable - optimal scenario
Contracted + standard + 2024 price	-	**UGX - 122,000 (- 6.9%)**	A real loss at contracted feedstock and 2024 prices with standard technology - SiccaDania and/or 2026 pricing is required to reach viability, not merely beneficial
Contracted + SiccaDania + 2026 price	-	**UGX 464,000 (20.6%)**	Commercially viable - SiccaDania upgrade combined with 2026 global starch price confirms investment case

KEY ANALYTICAL INSIGHT: At contracted starch - sector prices (UGX 250/kg), industrial starch is a real loss at 2024 prices with standard technology (- 6.9% gross margin). The SiccaDania upgrade alone only reaches - 0.6% at 2024 prices; it takes the 2026 global price surge to reach +20.6% - commercially viable, but the price cycle is carrying more of that recovery than the technology upgrade is. At spot feedstock prices (UGX 100 - 200/kg), margins are robust at both price levels (21 - 43%). Note: ethanol processors (Bukona model) pay UGX 400 - 500/kg for outgrower feedstock because ethanol revenue per kg of roots is materially higher than starch

- this creates feedstock competition that the GTTF must manage through drying hub design and sector - differentiated outgrower contracts.

Figure 12.7 - Thailand Tapioca Starch FOB Bangkok Monthly Price (USD/t), 2024 - 2026 | Source: Thai Tapioca Starch Association / BakeRite August 2026. Uganda export price $493/t (2024 actual) shown for reference. 2026 surge of +45% materially improves the starch investment case.

Sources: AgriTT/Landell Mills Uganda cassava industrialisation study (conversion ratios, processing cost structure); APRI feasibility study (plant benchmarks); ERA (electricity tariff); TTSA/BakeRite (2026 starch price); A2i KII (labour, packaging, transport estimates). All figures in UGX at August 2026 exchange rates (USD 1 = UGX 3,600).

Table 12.7 - Gross Margin Model B: HQCF Pathway (Per Tonne of HQCF Output)

Parameter	Spot Roots (UGX 150/ kg avg)	Contracted Roots (UGX 250/kg avg)	Source / Note
A. RAW MATERIAL INPUTS (4:1 conversion: 4 kg fresh roots 1 kg HQCF)			
Raw material cost per tonne HQCF (spot roots)	UGX 600,000 (4,000 kg × 150)	-	AgriTT 4:1 conversion ratio; sun - dried process
Raw material cost per tonne HQCF (contracted roots)	-	UGX 1,000,000 (4,000 kg × 250)	Kilimo Trust contracted price model
B. PROCESSING COSTS PER TONNE HQCF			
Mechanical chipping	UGX 40,000	UGX 40,000	Mechanical chipper hire / amortisation
Drying labour (sun drying, open - air)	UGX 25,000	UGX 25,000	Women - led drying labour - lowest - cost pathway
Solar tunnel dryer (energy + maintenance)	UGX 60,000	UGX 60,000	GTTF Case 2 technology; enables industrial - grade quality
Milling and sieving	UGX 60,000	UGX 60,000	Hammer mill; local rates
Packaging (25 kg bags, labelling)	UGX 80,000	UGX 80,000	Market rate
Transport and delivery	UGX 80,000	UGX 80,000	To Kampala/Jinja industrial buyers
Processing sub - total (sun - dried)	**UGX 285,000**	**UGX 285,000**	
Processing sub - total (solar tunnel dryer)	**UGX 320,000**	**UGX 320,000**	Solar dryer: higher OpEx but industrial - grade quality, enabling premium pricing

C. TOTAL COST AND GROSS MARGIN PER TONNE HQCF			
Total cost: spot + sun - dried	**UGX 885,000**	-	
Total cost: contracted + solar tunnel dryer	-	**UGX 1,320,000**	
Revenue: sun - dried HQCF (standard market buyer)	UGX 1,200,000	UGX 1,200,000	Lower quality; informal buyers; UGX 1,200/kg
Revenue: solar tunnel - dried HQCF (industrial buyer)	UGX 1,700,000	UGX 1,700,000	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) EAS 772 - compliant; Bakeries at UGX 1,700/kg avg
GROSS MARGIN: spot + sun - dried	**UGX 315,000 (26.3%)**	-	Viable; thin margin; quality risk
GROSS MARGIN: contracted + solar tunnel dryer	-	**UGX 380,000 (22.4%)**	Viable; solar dryer enables premium price that offsets contracted feedstock cost

KEY INSIGHT: HQCF is the most accessible pathway for Tier 2 cooperatives. At contracted feedstock prices with solar tunnel drying (GTTF Case 2), a 22% gross margin is achievable - before capital depreciation. The margin improvement from sun - drying to solar tunnel - drying comes not from lower OpEx but from access to a premium price tier (UGX 1,700 vs. UGX 1,200/kg). Quality improvement is the market - access lever, not cost reduction alone.

Sources: AgriTT/Landell Mills (4:1 conversion); Kilimo Trust contracted price model; A2i KII (bakery buyer prices, Kampala 2026); AgriTT solar dryer cost benchmarks. (Kilimo Trust / IFAD, 2019)

Table 12.8 - Gross Margin Model C: Ethanol Pathway (Per Litre of Bioethanol Output)

Parameter	Contracted Roots (UGX 250/kg avg)	+ ANDRITZ Stillage Recovery	Source / Note
A. RAW MATERIAL INPUT (conversion: 6.7 kg fresh roots 1 litre ethanol at 28% starch content, 90% fermentation efficiency)			
Raw material cost per litre ethanol	UGX 1,675 (6.7 kg × UGX 250)	UGX 1,675	Conversion basis: 1 MT roots ~150 litres ethanol (28% starch; APRI feasibility)
B. PROCESSING COSTS PER LITRE			

Yeast, enzymes, saccharification chemicals	UGX 150	UGX 150	Fermentation input costs
Steam / energy for distillation (diesel - generated)	UGX 400	UGX 260 (35% saved via ANDRITZ biogas)	ANDRITZ biogas offsets 35% of thermal/steam energy (diesel - fired boiler); does not offset electrical pumping and controls
Cooling water and utilities	UGX 60	UGX 60	Process water
Labour and supervision	UGX 150	UGX 150	Distillery operating crew
Packaging and distribution (Greenergy stove)	UGX 120	UGX 120	Greenergy branded jerricans; distribution
Processing sub - total	**UGX 880**	**UGX 740**	
C. ANDRITZ STILLAGE CO - PRODUCT VALUE (additional per litre of ethanol produced)			
Stillage volume (10 litres per litre ethanol)	-	10 litres	Cassava stillage: ~3 - 5% dry solids
DDGS (dried distillers grain) yield per litre ethanol	-	~0.4 kg DDGS	Derived: 10L × 4% solids = 0.4 kg dry matter
DDGS revenue (@ UGX 900/kg)	-	UGX 360 gross	Animal feed price; range UGX 700 - 900/kg depending on protein profile - subject to De Heus off - take confirmation
Less: ANDRITZ processing cost per litre	-	(UGX 100)	ANDRITZ evaporator + dryer OpEx
Biogas thermal energy offset per litre	-	UGX 140	35% of UGX 400 distillation energy saved
Net ANDRITZ co - product value per litre ethanol	-	**UGX 400**	Validation: 40,000 L/day × UGX 400 = UGX 16M/day; net ~UGX 12M after other costs - consistent with KII estimate
D. TOTAL COST AND GROSS MARGIN PER LITRE ETHANOL			
Total cost per litre (no ANDRITZ)	**UGX 2,555 (1,675 + 880)**	-	
Total cost per litre (with ANDRITZ, net of co - product)	-	**UGX 2,015 (1,675 + 740 – 400)**	Net of ANDRITZ co - product value; 21% cost reduction

Revenue: denatured ethanol, Greenergy clean cooking	UGX 3,750/litre	UGX 3,750/litre	Greenergy retail price to end - consumer; Bukona wholesale revenue to distributors/blenders may differ - model uses retail as indicative ceiling
Revenue: anhydrous ethanol (E - 5 fuel blend parity)	UGX 4,500/litre	UGX 4,500/litre	Petrol price parity basis; contingent on E - blending enforcement
GROSS MARGIN: clean cooking ethanol, no ANDRITZ	**UGX 1,195 (31.9%)**	-	Viable; but stillage waste remains an environmental liability
GROSS MARGIN: clean cooking ethanol + ANDRITZ	-	**UGX 1,735 (46.3%)**	Strongly viable; ANDRITZ adds 14.4 percentage points to gross margin

KEY INSIGHT: Ethanol has the strongest gross margin of the three pathways - 32 - 46% at contracted feedstock costs. The ANDRITZ stillage recovery system adds approximately 14 percentage points to gross margin per litre, equivalent to ~UGX 12M/day net co - product revenue at Bukona's operating scale (40,000 litres/day). This is revenue from waste - the strongest single IRR argument in the cassava portfolio.

Sources: APRI feasibility study (2021) - ethanol yield from cassava; ANDRITZ stillage processing benchmarks (2024); A2i KII (Bukona operating data, Greenergy pricing); ERA diesel - equivalent costs. Gross margin figures are before capital depreciation, overhead allocation, and tax. Contracted roots at UGX 250/kg is a conservative midpoint; Bukona model may use lower effective input prices through outgrower volume discounts. (ANDRITZ Feed & Biofuel A/S, 2024)

12.2.7 Critical Supply Chain Constraints

CRITICAL SUPPLY CHAIN CONSTRAINTSPost - Harvest Physiological Deterioration (PPD): Fresh cassava roots rot and lose starch value within 48 - 72 hours of harvest. This forces rapid distress sales at farm - gate (UGX 100 - 300/kg) and makes organised aggregation extremely time - sensitive. PPD is the root cause of industrial processor feedstock shortfalls - and the gross margin models above confirm that feedstock cost is the dominant variable in starch economics: spot/distress prices generate robust margins, while contracted prices require SiccaDania technology and/or 2026 global pricing to reach commercially viable territory.

Open - air sun drying dependency: 75 - 80% of dried chips and flour are produced by open - air sun drying on bare ground, tarpaulins, or rocks. This exposes product to rain, contamination, variable moisture, and inconsistent quality - preventing supply of industrial - specification material. The HQCF gross margin model shows quality improvement from solar tunnel drying is worth UGX 500/kg premium - the GTTF's most tangible near - term quality intervention.**8:1 flash drying conversion ratio:** Industrial automated flash dryers require 8 kg of fresh roots to produce 1 kg of dry chip - compared to 4:1 for open - air drying. This doubles feedstock demand and inflates energy costs, making scale - up economics challenging without SiccaDania/Bühler efficiency upgrades.

Below - 40% industrial capacity utilisation: Tier 1 plants are under - utilised not from lack of demand but from irregular raw material volumes and quality. Even modest improvements in feedstock reliability would yield large capacity utilisation gains without additional CapEx.**Working capital gap:** Aggregators and processors face a 9 - 18 month bank loan approval timeline that is incompatible with perishable - commodity procurement dynamics. This structural gap is as important to resolve as the technology gap. **Stillage waste (ethanol plants):** Ethanol plants produce 10 litres of acidic liquid stillage per litre of bioethanol. Currently managed via open lagoons, this is both an environmental liability and an uncaptured revenue source. The ethanol gross margin model above shows ANDRITZ recovery adds ~UGX 400/litre (14 margin percentage points) - the case is economically compelling, not just environmental.

12.3 Pillar 3 Ecosystem Mapping and Gap Analysis

12.3.1 Historical Donor and Programme Landscape

A decade of substantial donor and Government support has shaped Uganda's cassava sector - but has consistently stopped short of the industrial technology investments the GTTF is designed to address. Historical interventions include the USAID Feed the Future Institutional and Systems Strengthening (ISS) Activity, GIZ Agro - Processing Initiatives, World Bank agricultural transformation loans, the Cassava: Adding Value for Africa (CAVA and CAVA II) project, ATAAS, ACDP, PRELNOR, and aBi Development grant facilities. (CAVA Project, 2014)

The common pattern is: heavy investment in primary supply creation (disease - resistant varieties, seed dissemination, farmer organisation, mobile chippers) without corresponding investment in the industrial processing infrastructure required to absorb peak seasonal harvests. Donor - funded primary processing hubs frequently stagnated because cooperatives lacked the thermal drying technology and working capital to meet industrial quality standards. (Kilimo Trust, 2012)

Programme	Funder	Intervention Focus	Status	GTTF White Space

NextGen Cassava / CAVA II	USAID / BMGF	Disease - resistant varieties; seed systems; farmer productivity	Completed	Green processing technology; industrial off - take linkages
World Bank ATA-AS / ACDP	World Bank	Agricultural research, extension, seed system strengthening	Active (seed component)	Industrial processing not covered
GIZ Agro - Processing	GIZ	SME business models; market linkages	Active (general)	Cassava - specific industrial technology not prioritised
PRELNOR	European Union	Northern Uganda rural livelihoods; cassava food security	Completed	Industrial processing; ethanol; starch - outside PRELNOR scope
aBi Development Grant Facility	aBi / Danida	Agribusiness SME grants; some processing equipment	Active	EU - origin green technology for Tier 1 is the primary white space
PDM (Parish Development Model)	GoU	Smallholder agricultural inputs; farmer groups	Active - national	Industrial processing - PDM does not extend to Tier 1/2 factories

Sources: A2i programme landscape review (2026); CAVA project documentation; World Bank Uganda Agricultural Sector Review (2024). (World Bank / IFC, 2024)

12.3.2 Regulatory and Policy Matrix

The enabling policy environment for cassava industrialisation is supportive in framework but inconsistent in implementation. The matrix below maps the eight instruments most material to GTTF investment decisions, with implementation status, investment implication, and the specific action required of the GTTF team before committing capital.

Table 12.9 - Regulatory and Policy Matrix: Cassava Value Chain, Uganda 2026

Regulation / Policy	Authority	Implementation Status	GTTF Investment Impact	GTTF Action Required
Biofuels Act 2018 - E - 20 mandatory fuel blending mandate	Ministry of Energy and Mineral Development (MoEMD)	In force; enforcement at E - 1 to E - 5 nationally - far below E - 20 statutory target	Creates statutory off - take market for cassava bioethanol IF enforced. Currently unreliable as commercial anchor - ethanol IRR depends on enforcement.	Verify current blend implementation level with MoEMD before committing to ethanol investments. Do not present E - 20 as a confirmed market.

NDP IV Cassava Priority Value Chain (2025 - 2030)	National Planning Authority (NPA)	Active - cassava designated as priority agro - industrial VC	Strong strategic alignment; political continuity for GTTF portfolio - level investments	Use NDP IV designation in all grant justifications; reference Ten - Fold Growth Strategy anchor
Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) US 597 - Food - grade cassava starch specification	Uganda National Bureau of Standards (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS))	Active; enforcement variable - imports not consistently checked	Compliance prerequisite for GTTF - supported starch enterprises. Critical for pharmaceutical - grade market access at premium pricing.	Make Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) US 597 certification a hard gate for starch enterprise grant disbursement; support Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) enforcement capacity
Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) EAS 772 - High Quality Cassava Flour (HQCF)	Uganda National Bureau of Standards (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS))	Active; enforcement variable	Compliance prerequisite for HQCF enterprises entering industrial bakery market at premium prices	As above - Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) EAS 772 certification hard gate for HQCF Tier 2 cooperative grants
Buy Uganda Build Uganda (BUBU) Policy 2014	Ministry of Trade, Industry and Cooperatives (Ministry of Trade, Industry and Cooperatives (MTIC))	Active; implementation selective	Procurement preference for domestic starch and HQCF vs. cheaper Asian imports. Potential margin protection for GTTF - supported enterprises.	Monitor BUBU application to cassava products; advocate for enforcement alongside Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) import standards

VAT and tariff treatment of cassava derivatives	Uganda Revenue Authority (URA)	Under review / case - by - case - VAT on starch/ HQCF unclear	VAT charges on domestic cassava derivatives may disadvantage producers vs. imports, particularly Egyptian starch (zero - duty under COMESA)	Legal review of URA treatment and COMESA origin rules before investment - model post - tax economics before IRR projection
COMESA zero - duty rate - Egyptian cassava starch	EAC / COMESA Secretariat	Active - Egyptian starch enters Uganda at zero import duty under COMESA	Direct competitive threat to domestic starch at current processing costs. Ugandan starch must compete on quality (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)), delivery, and processing efficiency.	Factor COMESA competitive pressure into starch enterprise commercial assessment; validate buyer preference for domestic starch
Cassava grading and aflatoxin standards	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)	Draft / partial - no binding grading standard for industrial cassava supply	Absence of binding grading standards allows sub - specification material into industrial supply chains; depresses market confidence in Ugandan cassava products	Advocate for binding grading standards; include as BDS component of Tier 2 drying hub investments

Source: A2i regulatory review (2026); Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS); NPA; GoU legislative database. Implementation status reflects field findings as of August 2026. GTTF team should verify Biofuels Act enforcement status and URA VAT treatment independently before investment committee presentation.

12.3.3 Policy and Regulatory Framework: Key Enablers

Three macro - level policy catalysts are material to GTTF investment sustainability in the cassava sector.

1. **Mandatory enforcement of bioethanol blending (Biofuels Act 2018):** The Ministry of Energy and Mineral Development must enforce the statutory E - 5 to E - 20 bioethanol blending policy across national fuel import depots. Statutory enforcement provides a guaranteed off - take market for licensed processors. Without enforcement, the ethanol pathway commercial case weakens materially. GTTF should verify current blend implementation status before committing to ethanol - pathway investments.

2. **VAT and tariff treatment:** The consultant draft identifies VAT charges on cassava starch and HQCF that disadvantage domestic producers relative to imports. The specific HS - code treatment, COMESA origin rules (Egyptian starch enters at zero duty), and current VAT status should be confirmed with URA before the chapter makes tax policy recommendations.

3. **Quality standards enforcement:** Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) enforcement of US 597 and EAS 772 on imported industrial starches and flours is essential for domestic processors investing in certified technology to compete. The GTTF should support Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) enforcement capacity alongside technology investments. (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS), 2024a)

12.3.4 Strategic White Space for GTTF

The GTTF strategic white space in cassava is clearly defined: it is the **commercial technology gap between farm - level production and industrial specification**. No current donor programme is financing European - origin green processing technology - controlled drying, high - efficiency starch extraction, anaerobic digestion of ethanol stillage, or solar - biomass hybrid primary processing - at the industrial scale required to break the capacity utilisation bottleneck. This is the exclusive GTTF domain.

12.4 Pillar 4 Enterprise Profiling and Technology Mapping

12.4.1 Enterprise Tier Framework

The GTTF enterprise pipeline for cassava follows the A2i three - tier framework, applied consistently across the landscape study. **Tier 1** enterprises have total assets exceeding UGX 360 million, more than 100 employees, audited financial statements, and demonstrated commercial off - take. **Tier 2** enterprises are commercially active medium - scale processors and aggregators handling 10 - 50 tonnes of roots daily, with assets between UGX 100M and UGX 360M. **Tier 3** consists of smallholder producer groups and primary cooperatives processing under 10 tonnes daily.

Table 12.10 - Enterprise Ranking Against GTTF Hard Gates

Enterprise	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) Certification	Commercial Viability	EU/DK Tech Fit	Co - Finance Balance Sheet	Overall / Tier

Bukona Agro Processors (Nwoya)	Denatured ethanol; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - licensed	Yes - UDC PPP; fuel blending off - take PPA	Very High - ANDRITZ anaerobic digestion; GEA distillation	Strong - UDC equity; PPP structure	TIER 1 - PRIORITY (Zero - Waste Case 4)
Dei BioPharma (Kamuli)	Starch - pharma and food grade	Yes - USD 5M+ commissioned facility	Very High - Bühler flash dryers; Alfa Laval centrifuges	Strong - commissioned facility; UDB pipeline	TIER 1 - PRIORITY (Starch efficiency)
Pura Organic Agro Tech (Nakasongola)	Starch - Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified	Yes - established wet processor; USD 3M+	High - SiccaDania/Bühler flash drying	Good - established operations	TIER 1 - PRIORITY (Extraction efficiency)
PRO Industries PTE Ltd (Luwero)	Extra Neutral Alcohol (ENA)	Yes - operating ethanol plant; USD 3M+	High - GEA molecular sieve distillation	Good - private equity structure	TIER 1 - PRIORITY (Ethanol efficiency)
Lukonge Cotton Company (Pallisa)	Starch - Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified	Yes - established starch processor; USD 2.5M+	High - Alfa Laval/Büttner	Moderate - further validation needed	TIER 1 - advancing to full validation
Rwenzori Holdings (Kyenjojo)	Starch - under commissioning	Not yet - plant still commissioning; USD 2M+	High - SiccaDania engaged	Early stage - under - capitalisation	MONITOR - validate commissioning status before disbursement
Fermarco Industries (Kitagwenda)	Ethanol	Temporarily closed - no current production	Applicable - GEA/ANDRITZ when operational	Unknown - closed plant	PIPELINE WATCH - temporarily closed per KII July 2026; do not treat as operational

De Heus Uganda (Buikwe)	Animal feed / HQCC	Yes - major international feed company; USD 4M+	High - EU standard processing	Strong - multinational balance sheet	TIER 1 - confirmed HQCC buyer; cross - reference Chapter 8
Smart Start Industries (Masindi)	Ethanol	Yes - operational and upgrading	High - ethanol extraction efficiency	Moderate - in upgrade phase	TIER 1 - validate capacity and financing pre - disbursement
Rwibaale Cooperative (Kyenjojo)	None - primary processing	Near - breakeven; grant - dependent	Medium - solar/biomass hybrid drying	Low - cooperative structure	TIER 2 - strongest cooperative case
AFMCOS (Soroti)	None - primary processing	Developing	Medium - flash drying upgrade	Low	TIER 2 - validation needed
Adyaka Cooperative (Apac)	None - primary processing	Developing	Medium	Low	TIER 3 - pipeline development

Hard gates: (1) Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product certification; (2) Commercial viability without subsidy; (3) EU or Danish technology fit; (4) Co - financing balance sheet strength. Source: A2i GTTF enterprise assessment (2026); KII field visits June - August 2026. (A2i, 2026i)

Table 12.11 - Tier 1 Enterprise Production Volumes and Capacity Utilisation

Enterprise	Primary Product(s)	Installed Capacity (MT roots/month)	Est. Current Utilisation	Actual Output (Est. MT/ month)	Key Constraint on Utilisation
Bukona Agro Processors (Nwoya)	Denatured bioethanol; anhydrous bioethanol	~10,400 MT DC/month (100 t DC/day x 26 days) = ~31,200 Feed Conversion Ratio (FCR) equiv.	~100% of DC processing section*	~10,400 MT DC/month	Cassava supply shortfall for fresh - root line; partial shift to sorghum; feedstock aggregation logistics from dispersed smallholders
Dei BioPharma (Kamuli)	Pharmaceutical + food - grade starch; liquid glucose; maltose	~13,000 MT Feed Conversion Ratio (FCR)/month (500 Feed Conversion Ratio (FCR) t/day x 26 days)	Operational; utilisation TBD	TBD	Commissioning - stage ramp - up; PPD risk in root transport logistics; starch extraction efficiency optimisation

Pura Organic Agro Tech (Nakasongola)	Food - grade and industrial starch	~2,600 MT Feed Conversion Ratio (FCR)/month (100 Feed Conversion Ratio (FCR) t/day x 26 days)	~30%*	~780 MT Feed Conversion Ratio (FCR)/ month	Seasonal feedstock supply gaps; thermal drying energy cost; starch recovery rate below potential
PRO Industries PTE Ltd (Luwero)	Extra Neutral Alcohol (ENA); industrial ethanol	~13,000 MT Feed Conversion Ratio (FCR) equiv./ month (100 Feed Conversion Ratio (FCR) + 100 DC t/day x 26 days)	Operational	Operational	Feedstock aggregation; working capital; competition from maize - based ENA
Lukonge Cotton Company (Pallisa)	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified industrial starch	~2,600 MT Feed Conversion Ratio (FCR)/month (100 Feed Conversion Ratio (FCR) t/day x 26 days)	~30%*	~780 MT Feed Conversion Ratio (FCR)/ month	Seasonal supply; drying energy costs; wet - process water management
Rwenzori Holdings (Kyenjojo)	Starch (under commissioning)	~13,000 MT Feed Conversion Ratio (FCR)/month (designed)	Under commissioning	N/A - pre - commercial	Commissioning delays; equity position; feedstock sourcing infrastructure not yet established
De Heus Uganda (Buikwe)	Animal feed / HQCC chips	~3,200 MT DC/ month (800 t DC/month)	Operational; certified	Operational	Confirmed buyer for HQCC - KII 1 July 2026; scale and specifications confirmed
Smart Start Industries (Masindi)	Bioethanol	~3,432 MT DC equiv./month (33 t DC/day x 26 days)	Operational + upgrading	Operational	High - efficiency ethanol extraction; peeling, washing and drying at scale - upgrading

Fermarco Industries (Kitagwenda)	Bioethanol	UNKNOWN - plant temporarily closed	CLOSED	N/A	Temporarily closed per KII July 2026. Do not treat as operational in investment pipeline. Restore to watch list when operating status confirmed.
TOTAL CONFIRMED OPERATIONAL TIER 1	**Starch + Ethanol + ENA + Feed**	**~69,000 MT/ month operational (excl. Rwenzori commissioning + Fermarco closed); ~82,000 full pipeline**	**Variable - 30 - 100%**	**Well below full capacity**	**Feedstock supply and thermal energy costs are the universal constraints. Fermarco excluded pending operational status confirmation.**

** Capacity figures sourced from KII fieldwork (June - July 2026) as per consultant Table 1.19, UBOS, and enterprise visits. All figures are Feed Conversion Ratio (FCR) (fresh cassava root) equivalents unless noted as DC (dried chips). Bukona 100% utilisation refers to the dried - chip processing line; the fresh - root line capacity is larger and not fully utilised due to feedstock supply constraints. Pura Organic and Lukonge Cotton each confirmed at ~2,600 MT Feed Conversion Ratio (FCR)/month at approximately 30% utilisation. Rwenzori Holdings under commissioning - investment size confirmed (USD 2M+) but production not yet at commercial scale. De Heus and Smart Start added from consultant KII. Fermarco excluded from operational count - temporarily closed per KII. All figures should be independently verified during enterprise due diligence. (UDC, 2024)*

Figure 12.8 - Tier 1 Enterprise Installed Capacity vs Estimated Throughput (MT Feed Conversion Ratio (FCR) Equiv./Month) | Source: A2i GRASP/GTTF KII fieldwork (June - July 2026). Fermarco excluded (temporarily closed). Utilisation: Bukona 100% and Pura/Lukonge 30% KII - confirmed; others are analyst estimates.

12.4.2 Tier 1 Enterprise Profiles and KII Insights

Bukona Agro Processors Ltd - Nwoya District / Koch - Goma

Profile Dimension	Detail
Legal status and ownership	Public - Private Partnership: UDC holds UGX 11.9 billion (40.5%) equity; balance held by private investors
Products	Denatured bioethanol (Greenergy brand cookstoves); anhydrous bioethanol for fuel blending
Feedstock	Fresh cassava roots (primary); maize; sweet sorghum (supplementary feedstock adopted during cassava supply shortfall)

Installed capacity	Designed for ~33,000 MT fresh roots/month; operating well below this due to feedstock constraints
Farmer engagement	10,000+ smallholder outgrowers across Nwoya District; 4,800 VSLAs; 170 farmer associations
Off - take arrangement	PPA with Ministry of Energy for bioethanol fuel blending at Malaba and other national fuel depots
Key technology gap	10 litres of highly acidic liquid stillage per 1 litre of bioethanol - managed via open lagoons. High thermal energy costs. No waste valorisation.
GTTF investment opportunity	ANDRITZ anaerobic digestion + evaporator system: converts stillage to DDGS animal feed (~16,000 kg/day at UGX 900/kg = ~UGX 14.4M gross DDGS revenue) plus biogas thermal offset (~UGX 5.6M/day) less ANDRITZ operating and indirect costs (~UGX 8M/day) = ~UGX 12M net. CapEx: est. USD 1.0 - 1.3M. IRR: ~28.5%. Payback: ~3.2 years.
Financing pathway	GTTF matching grant (30%) + Bank of Uganda ACF debt (50%) + enterprise equity (20%)

Sources: UDC partnership documentation (2024); A2i KII (2026); Uganda Biofuels Partnership launch (July 2025). (Further Africa, 2025)

Table 12.12 - Bukona Agro Processors: KII Investment Intelligence

KII Dimension	Key Finding	GTTF Investment Implication
Business model and governance	PPP structure with UDC anchor equity (40.5%); Greenergy stove distribution brand active; fuel blending PPA signed with MinEnergy. Operational since 2019.	Strongest governance and co - financing framework in the cassava pipeline. UDC co - investment significantly de - risks GTTF grant. Deal structuring can proceed with confidence on governance.
Technology constraint - specific	Open stillage lagoons processing 400,000 litres/day acidic vinasse. No energy recovery. Diesel - powered thermal drying. Currently zero revenue from waste stream.	Exact ANDRITZ fit: evaporator + anaerobic digester + DDGS dryer. No new factory required. Upgrade to existing operating plant. Strongest GTTF investment case in the pipeline.
Feedstock sourcing strategy	10,000+ outgrowers; 170 farmer associations; 4,800 VSLAs. But cassava supply has proved insufficient - plant has partially shifted to sorghum to maintain throughput.	Critical flag: verify current cassava proportion of feedstock before structuring ANDRITZ deal. If Bukona is <70% cassava - fed, the GTTF cassava - specific impact case weakens. Outgrower scheme strengthening must be a grant condition.

Investment readiness - evidence base	APRI feasibility study (2021): IRR 12.4% at project level; Economic IRR 67.6%. UGX 44.3B total project. First - year revenue UGX 22.224B. A2i models ANDRITZ retrofit IRR at ~28.5%.	Feasibility study exists and has been reviewed. ANDRITZ IRR is incremental (on top of operating plant) - a much stronger case than a greenfield facility. Commission independent verification of APRI figures before grant committee.
EU technology engagement status	ANDRITZ (Denmark) engaged at desk level; no confirmed proposal or site visit at time of KII. GEA distillation review recommended for continuous multi - stage upgrade.	Technology engagement needs to progress to engineering assessment. A2i / GTTF should facilitate ANDRITZ site visit and preliminary technical proposal as a pre - grant step.
Key risk to GTTF investment	(1) Feedstock shift to sorghum undermines cassava - specific impact. (2) E - 20 enforcement delay reduces ethanol revenue certainty. (3) Outgrower management needs strengthening before additional capacity investment.	Three BDS pre - conditions for ANDRITZ deal: (1) Confirm cassava feedstock floor; (2) Verify blend policy implementation timeline with MoEMD; (3) Commission outgrower scheme design study.

Source: A2i KII Programme, Bukona site visit and stakeholder interviews, June - August 2026; APRI feasibility study (2021); UDC partnership documentation.

Dei BioPharma Ltd - Advanced Agro - Processing Park, Namasagali, Kamuli District

Profile Dimension	**Detail**
Capital investment	USD 5M+ (KII - confirmed investment size). Government commissioning documentation references a larger project value inclusive of infrastructure. KII field figure of USD 5M+ used as the primary working estimate pending audited accounts.
Products	Pharmaceutical - grade and food - grade cassava starch; liquid glucose; maltose
Raw material specification	Requires fresh roots with starch content >25% (NASE 14, NASE 19, National Agricultural Research Organisation (NARO)CAS 1 preferred)
Key technology gap	High moisture vulnerability during root transportation (PPD risk); high thermal energy consumption in standard flash drying; starch extraction recovery rate can be improved with modern centrifuge/hydrocyclone technology

GTTF investment opportunity	Bühler energy - recovery flash drying system (40 - 50% heat recovery; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) US 597 compliant) + Alfa Laval decanter centrifuges (98%+ extraction rate). CapEx: est. USD 450,000 - 750,000. IRR: ~26.1%. Payback: ~3.4 years.
Financing pathway	GTTF matching grant (30%) + UDB long - tenor facility + enterprise equity

Table 12.13 - Dei BioPharma: KII Investment Intelligence

KII Dimension	Key Finding	GTTF Investment Implication
Business model and market positioning	USD 5M+ invested (KII - confirmed); pharmaceutical + food - grade starch + liquid glucose + maltose. Presidential commissioning event. Pharma - grade starch commands USD 4,126/t (Germany export benchmark) vs. bulk starch at USD 493/t - an 8x price premium.	If Dei BioPharma achieves pharmaceutical certification (EU GMP / ISO 22000 equivalent), the revenue potential is transformative. Bühler technology upgrade is the enabler for pharma - grade quality compliance. Note: independent audited financials required before GTTF grant committee submission - KII figure should be verified.
Technology constraint - specific	Thermal flash drying energy cost; starch extraction recovery rate; PPD risk in root transport chain (Kamuli district to plant). Standard extraction at 85 - 90% recovery; Alfa Laval centrifuges can reach 98%.	Dual technology upgrade: Bühler energy recovery (reduces OpEx ~45%) + Alfa Laval decanter centrifuges (improves yield ~3 - 5% additional starch per tonne of roots).
Raw material sourcing strategy	Eastern Uganda (Kamuli, Iganga, Jinja corridor) as primary catchment. NASE 14/19 and National Agricultural Research Organisation (NARO)CAS 1 preferred varieties for >25% starch content. PPD management during 30 - 150 km root transport chain is the key logistics challenge.	GTTF drying hub investment in Eastern Uganda (Rwibaale - equivalent model) would directly serve Dei BioPharma catchment. Coordinate enterprise investment with catchment - area drying infrastructure.

Investment readiness	Operating status at KII time: commissioning. A2i could not confirm throughput or actual root volumes. Balance sheet not available for review.	CRITICAL: Must independently verify operating status and actual throughput before deal structuring. Phased grant disbursement - first tranche on commissioning confirmation; second on throughput milestone.
EU technology engagement	Bühler AG active in Uganda grain sector (Mandela Millers, SR Kuku). Direct referral from existing Bühler Uganda relationship feasible. Alfa Laval: active in EAC food processing sector.	Technology engagement can begin immediately via existing Bühler Uganda relationship. A2i should arrange joint Bühler - Dei BioPharma technical assessment as pre - investment step.
Pharmaceutical premium opportunity	Germany imports cassava starch at ~USD 4,126/t. EU pharma - grade requires consistent moisture, residue, and microbiological compliance. Bühler controlled drying is the prerequisite.	Do not model pharma - grade revenue in IRR until EU GMP pathway is confirmed. Model at bulk starch price ($493 - 700/t) as base case; pharma premium as upside scenario only.

Source: A2i KII Programme (2026); State House Uganda commissioning documentation; Bühler Group Uganda engagement records.

Pura Organic Agro Tech Ltd - Nakasongola / Kampala

Pura Organic is an established wet starch processor with Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification and farmer outreach activities in the Nakasongola area, processing approximately 2,600 MT of fresh root equivalent per month (100 Feed Conversion Ratio (FCR) tonnes/day × 26 operating days) at approximately 30% utilisation per KII. The primary GTTF opportunity is extraction efficiency improvement - higher starch recovery rates per tonne of roots processed - and energy and water saving through closed - loop flash drying technology (SiccaDania or Bühler). A2i KII confirmed technology adoption readiness and commercial operating track record.

Table 12.14 - Pura Organic Agro Tech: KII Investment Intelligence

KII Dimension	Key Finding	GTTF Investment Implication
Business model	Established wet starch processor; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) US 597 certified; serving industrial buyers in Kampala/Jinja market. Nakasongola location gives access to Central Uganda cassava corridor.	One of the two most straightforward starch efficiency deals in the pipeline - alongside Lukonge. Established operations, proven commercial track record, certified product.

Technology constraint	Standard flash drying tower with high energy consumption. Wet starch cake drying is the bottle-neck - 45 - 55% of processing costs are thermal energy. Starch extraction efficiency estimated at 85 - 88%.	SiccaDania closed - loop flash dryer (Denmark/Netherlands) is the primary technology recom-mendation. 45% energy saving + closed water circuit + improved drying uniformity.
Raw material sourcing	Central Uganda corridor (Na-kasongola, Luwero, Mubende). Outgrower engagement reported but not yet formalised. Season-al spot - market procurement dominates.	Formalised outgrower scheme is the feedstock security interven-tion. GTTF grant conditionality should include outgrower con-tract design and farmer group engagement as a precondition.
Investment readinessOperating; audited financials reportedly available; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified. Co - financ-ing appetite will be established through the formal balance sheet review recommended below.Ad-vance to formal due diligence im-mediately. Balance sheet review and co - financing commitment letter from a commercial bank (Stanbic/DFCU) should precede grant committee submission.		
EU technology engagement	SiccaDania has no confirmed Uganda cassava engagement; technology is well - established in Tanzania and South Africa. Desk research by A2i confirms technical fit.	Commission SiccaDania tech-nical assessment and prelimi-nary proposal. A2i to facilitate introductory visit - this can be a quick - win technology engage-ment given SiccaDania's East Africa market awareness.
Key risk	Scale: at 2,400 MT/month, Pura Organic is smaller than Dei BioPharma. SiccaDania minimum system may be over - specified for current throughput unless capacity expansion is planned.	Size match: confirm SiccaDania system minimum capacity before specifying equipment. Vetter Tec (Germany) may be a more appropriate technology at medi-um scale if throughput is below SiccaDania minimums.

PRO Industries PTE Ltd - Luwero

PRO Industries is an Extra Neutral Alcohol (ENA) processor - producing high - purity ethanol for industrial sol-vent and beverage applications. This is a distinct product from Bukona's denatured fuel ethanol, and the off - take market is commercial rather than policy - dependent. The primary GTTF opportunity is GEA continuous

multi - stage fermentation and molecular sieve distillation technology, which reduces steam consumption by approximately 35% versus Indian/Chinese batch distillation columns.

Table 12.15 - PRO Industries PTE Ltd: KII Investment Intelligence

KII Dimension	Key Finding	GTTF Investment Implication
Business model	ENA (Extra Neutral Alcohol) for industrial solvents and beverage applications. Commercial off - take does not depend on Biofuels Act enforcement - unlike Bukona. Private equity structure; operating in Luwero, Central Uganda.	ENA market is commercial and policy - independent - a significant advantage over fuel - blending ethanol. De - risks GTTF investment compared to E - 20 - dependent ethanol cases.
Technology constraint	Batch fermentation and distillation columns (Indian/Chinese origin): high steam consumption; inconsistent 96% purity output; high downtime. GEA continuous multi - stage system achieves 99.8% anhydrous purity with 35% steam reduction.	GEA Group (Germany) continuous distillation upgrade is the primary recommendation. No equivalent technology from non - EU suppliers achieves the same purity - to - energy ratio.
Raw material sourcing	Luwero corridor (Central Uganda). Cassava as primary feedstock; feedstock management not formalised through outgrower contracts at KII time.	Outgrower scheme design recommended as a grant condition. Luwero/Nakasongola corridor available for structured supply.
Investment readiness	Operating; balance sheet review required; investment appetite confirmed at KII. Validation of actual capacity utilisation and financial position required.	Advance to due diligence. GEA preliminary technical proposal should be commissioned before IRR modelling is finalised.
Ethanol stillage at PRO Industries	ENA production generates stillage at similar rates to bioethanol (10:1 stillage - to - product ratio). No waste valorisation currently in place.	ANDRITZ stillage recovery is applicable at PRO Industries as at Bukona - consider a twin - track approach (GEA distillation efficiency + ANDRITZ waste valorisation) for a stronger combined IRR.
Key risk	ENA market: if beverage - grade ethanol buyers diversify supply, revenue could be impacted. Also: competitive sourcing of cassava roots vs. other starch crops (maize, sweet potato).	Market concentration risk manageable if PRO Industries has established beverage - industry off - take agreements. Verify buyer diversity in due diligence.

Sources: A2i KII Programme (2026); GEA Group technology benchmarks. Note: Lukonge Cotton Company (Pallisa) has a similar operating profile to Pura Organic (2,600 MT Feed Conversion Ratio (FCR)/month; Uganda National Bureau of

StandardsUganda National Bureau of Standards (UNBS) - certified; ~30% utilisation); full KII insight table in supplementary enterprise dossiers. Fermarco Industries (Kitagwenda): KII July 2026 confirms plant is temporarily closed with no active production. Remove from operational pipeline; retain on watch list for when operational status is restored. Capacity data is marked unknown in Table 12.11.

12.4.3 Tier 2 Enterprises and De Heus

Enterprise	Location	Product / Role	GTTF Opportunity	Status
De Heus Uganda (Buikwe)	Buikwe	Animal feed + livestock feed - HQCC as energy ingredient; over USD 4M investment; EU - certified processing	Confirmed off - taker for HQCC; validate volume and quality specification; align with Chapter 8 (Grain and Animal Feed)	Operational Tier 1 - moved to Table 12.10 and 12.11 as confirmed industrial buyer
Smart Start Industries	Masindi	Bioethanol - operational and upgrading; ~3,432 MT DC equiv/ month	Ethanol efficiency upgrade; high - efficiency extraction; peeling, washing, drying at scale; GTTF technology matching	Operational Tier 1 - moved to Table 12.10 and 12.11; KII 29 July 2026
Agroways (HQCC drying)	Jinja	HQCC drying and aggregation for De Heus off - take	HQCC quality upgrade; scale commercial dryer; confirmed De Heus buyer linkage	~440 MT DC/ month (110 t DC/ month per KII); operational - validate for Tier 2 grant eligibility
Rwibaale Cooperative	Kyenjojo	Cassava primary processing and production	Solar - biomass hybrid tunnel dryer; mechanical chipper; moisture/ quality control; working capital linkage to industrial off - taker	Strongest Tier 2 cooperative case; validate off - take and balance sheet
AFMCOS	Soroti	Cassava processing and production	Flash drying upgrade; solar pre - drying; cold storage; working capital	Validation visit completed; further due diligence needed
Adyaka Cooperative	Apac	Cassava primary processing	Commercial drying; aggregation; feeder to Tier 1 plants	Tier 3 initially; graduate to Tier 2 with BDS and market linkage support

12.4.4 EU and Danish Technology Matching

Technology Provider	Country	Technology Area	Cassava Application	Uganda Engagement and GTTF Relevance
SiccaDania	Denmark / Netherlands	Flash drying; energy and water saving	Efficient flash drying of starch cake and HQCF; closed water circuit	Primary recommendation for Pura Organic, Lukonge, and Tier 1 starch efficiency upgrades.
Bühler AG	Switzerland / EU	Energy - recovery flash drying systems	Rapid thermal drying; 40 - 50% heat recovery; precise 12% moisture control; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) US 597 compliant	Active in Uganda grain sector. Cassava starch drying technically analogous. Recommend for Dei BioPharma.
GEA Group AG	Germany / EU	Continuous multi - stage fermentation; molecular sieve distillation	99.8% anhydrous ethanol purity; 35% steam reduction vs. batch systems	Primary recommendation for PRO Industries (ENA) and Fermarco (ethanol efficiency).
ANDRITZ Feed & Biofuel A/S	Denmark	Industrial anaerobic digesters; evaporators; DDGS dryers	Converts cassava ethanol stillage into DDGS animal feed and biogas; zero liquid discharge	Primary recommendation for Bukona Agro. Confirmed active in East Africa grain sector. IRR ~28.5% modelled.
Alfa Laval AB	Sweden / EU	High - efficiency decanter centrifuges; hydrocyclones	High - yield starch - liquid separation; 98%+ extraction rate; lower water use per MT	Primary recommendation for Dei BioPharma and starch extraction efficiency upgrades.
Cimbria A/S / SKIOLD A/S	Denmark	Mechanical cleaners; optical sorters	Root cleaning; chip sorting; climate - controlled storage	Active Uganda presence (grain sector). Applicable to HQCC/chip quality upgrading.

Vetter Tec	Germany / EU	Flash dryers for pastes, powders, wet cakes	Cassava wet starch cake drying at medium scale	Applicable at Pura Organic at medium throughput; competitive with SiccaDania at smaller scale.
Büttner Energy (Dieffenbacher group)	Germany / EU	High - throughput flash tube dryers	High - volume flash drying for large - scale Tier 1 starch plants	Tier 1 volumes; complementary to SiccaDania at highest throughputs.

Note: Technology matching is based on desk research and analogous Uganda deployments. All technology selections should be validated against enterprise - specific throughput, energy and water specifications, and East Africa after - sales service capability before procurement.

12.5 Pillar 5 Impact Metrics and Commercial Engagement

12.5.1 Smallholder Supply Integration

Cassava has a broad rural footprint: between 1.13 million and 3.95 million agricultural households grow the crop, with particularly high participation in Teso, West Nile, Lango, Bukedi and Busoga. Women and youth perform a disproportionate share of production and primary - processing activities - including peeling, chipping, and sun - drying. This creates a strong inclusive - development case if industrial investments are designed around transparent off - take, quality - based pricing, and efficient aggregation.

Structured outgrower frameworks such as the Bukona Agro - UDC model have demonstrated that contracted price floors insulate smallholders from the spot - market crashes that push farm - gate prices to UGX 100 - 150/kg during harvest gluts. The gross margin models in Pillar 2 confirm that processors, in turn, require access to spot/distress - price feedstock to maintain viable margins: this is the inherent tension in the outgrower design that the GTTF must resolve through phased price structures and aggregation infrastructure investment.

Table 12.16 - Impact Vectors: Cassava Value Chain GTTF Investments

Impact Vector	Current Baseline	3 - Year Target Scenario	GTTF Investment Mechanism
Post - Harvest Loss Reduction	30 - 40% PPD losses at aggregation node; open - air drying quality inconsistent	PPD losses reduced to <10% at GTTF - supported drying hubs	Solar - biomass hybrid dryers (Tier 2); commercial flash dryers (Tier 1)
Smallholder Income Stabilisation	Farm - gate: UGX 100 - 300/kg (spot); UGX 400 - 500/kg (contract)	50,000+ households earning at contracted price floor; income predictability +35 - 50%	Outgrower contract design as GTTF investment co - condition

Capacity Utilisation at Tier 1 Plants	<40% of installed capacity across Tier 1 industrial base	Capacity utilisation to 60 - 70% without additional CapEx through feedstock supply improvement	Drying hub investments directly improve feedstock quality and regularity for existing factories
CO2e and Biogas Impact	Open stillage lagoons at Bukona: uncontrolled methane emissions; diesel - powered drying	35% thermal energy offset at Bukona via biogas; stillage lagoons eliminated	ANDRITZ anaerobic digestion system (Case 4)
Gender and Youth Inclusion	Women and youth dominate peeling, chipping, primary processing - trapped in low - income informal node	Formalise women - led aggregation groups at contracted prices; laboratory technician training (Bukona model)	BDS component of Tier 1 and Tier 2 deals
Trade Balance	Cassava exports: USD 11.84M formal (2021); starch: ~$1.34M (2024)	Starch exports to USD 5 - 15M (10,000 - 30,000 MT/yr at $550 - 700/t) within 5 years	Starch extraction efficiency upgrades (Dei BioPharma, Pura, Lukonge)

Note: Impact targets are indicative scenario projections. Final impact metrics should be developed enterprise - by - enterprise once investment cases are defined. (A2i, 2026e)

12.5.2 Green Agenda Adoption

Uganda's cassava value chain has strong potential to contribute to food security, rural employment, smallholder incomes, agro - industrialisation and import substitution. Cassava is widely produced by smallholder farmers and provides raw material for food, flour, starch, animal feed and other value - added products**.** However, productivity and competitiveness are constrained by limited access to improved planting materials, pests and diseases, low mechanisation, high post - harvest losses, inefficient processing and weak market linkages.

The Green Agenda should promote climate - smart production, sustainable soil management, renewable energy, energy - efficient processing and circular - economy approaches. Priority interventions include improved disease - resistant varieties, mechanised production, solar and energy - efficient drying, efficient processing equipment, renewable - energy - powered facilities and improved storage systems. Greater utilisation of cassava peels and processing residues for animal feed, biogas, compost, briquettes and other products can reduce waste and create additional income opportunities. GTTF can support commercially viable green technologies, technology transfer, producer aggregation and investment in value addition while complementing existing Government and development - partner programmes. These interventions align with Uganda's NDP IV, Agro - Industrialisation Programme, National Climate Change Act (2021), NDCs and Green Growth Development Strategy, while strengthening productivity, climate resilience, resource efficiency and the competitiveness of Uganda's cassava industry.

12.5.3 Outgrower Model Economics

The gross margin analysis in Pillar 2 establishes that feedstock cost is the dominant variable in starch economics - a real loss at contracted starch - sector prices (UGX 250/kg) with standard technology, reaching commercial viability only once SiccaDania is combined with the 2026 global price recovery. This section examines the economics from the **smallholder perspective**: what income does the outgrower model deliver, and how does

it compare to the spot market? The table demonstrates that even at UGX 250/kg (a conservative contracted price), the formal outgrower model delivers substantially better household income than the spot market - while a contracted price of UGX 400 - 500/kg (Bukona model) is transformative.

Table 12.17 - Outgrower Model Economics: Contracted vs. Spot Market (Per Household)

Parameter	Spot Market Model (No Contract)	Contracted Outgrower (UGX 250/kg)	Contracted Outgrower (Bukona: UGX 450/kg)
Farm size (average cassava plot per HH)	~1.2 hectares	~1.2 hectares	~1.2 hectares
Achievable yield under contract (improved GAP)	4.7 MT/ha (current avg)	6.5 MT/ha (improved inputs, GAP)	6.5 MT/ha (improved inputs, GAP)
Gross output per hectare per season	4.7 MT = 4,700 kg	6.5 MT = 6,500 kg	6.5 MT = 6,500 kg
Effective farm - gate price received	UGX 150/kg (avg spot, PPD distress)	UGX 250/kg (contracted floor)	UGX 450/kg (Bukona model)
Gross revenue per hectare per season	UGX 705,000	UGX 1,625,000	UGX 2,925,000
Operating costs per hectare (seeds, inputs, labour)	UGX 300,000 (low input)	UGX 650,000 (improved inputs)	UGX 650,000 (improved inputs)
Net income per hectare per season	UGX 405,000	UGX 975,000	UGX 2,275,000
Gross income per household (1.2 ha plot)	UGX 846,000/season	UGX 1,950,000/season	UGX 3,510,000/season
Net income per household (1.2 ha plot)	UGX 486,000/season	UGX 1,170,000/season	UGX 2,730,000/season
Approximate annual net income (2 seasons)	UGX 972,000 (~USD 270)	UGX 2,340,000 (~USD 650)	UGX 5,460,000 (~USD 1,517)
Relative to Uganda poverty line (~USD 2.15/day = ~UGX 2.83M/yr)	BELOW poverty line	BELOW poverty line - a meaningful improvement over spot, but still short of the poverty threshold	ABOVE poverty line - meaningful surplus income
Income improvement vs. spot market	Baseline	\+141% net income	\+462% net income

Notes: (1) Contracted yields assume GAP adoption, improved disease - resistant varieties, and input access through outgrower scheme - standard Kilimo Trust/aBi model. (2) Spot market yield uses current national average from Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)). (3) Income figures are for cassava as sole crop on the plot; mixed farming increases total household income. (4) Uganda poverty line: World Bank USD 2.15/day international poverty line applied at UGX 3,600/USD. (5) The Bukona UGX 450/kg contracted price is specific to the ethanol sector, which earns materially higher revenue per kg of roots than starch; starch - sector contracted price ceiling is approximately UGX 250 - 300/kg. Sources: Kilimo Trust outgrower economics study; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); World Bank; A2i GTTF estimate.

Figure 12.9 - Outgrower Model Economics: Annual Net Household Income by Contract Scenario (USD/year) | Source: A2i GTTF analysis based on Kilimo Trust model; Ministry of Agriculture, Animal Industry and Fisheries

(Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)); World Bank poverty line (USD 2.15/day). Income is for 1.2 ha cassava plot over 2 seasons.

12.5.3 Gender and Youth: Value Chain Mapping

Women and youth are disproportionately represented in the lower - value nodes of the cassava value chain - particularly peeling, chipping, and sun - drying. These nodes offer the lowest and most irregular incomes, and the highest exposure to quality failures and PPD losses. GTTF investments in controlled drying and formalised outgrower schemes have the potential to shift women and youth from these informal nodes into higher - value, more stable positions in the chain.

Table 12.18 - Gender and Youth Distribution Across Cassava Value Chain Nodes

Value Chain Node	Female Participation	Youth Participation (15 - 35 yrs)	Typical Income Indicator	GTTF Investment Mechanism and Gender Outcome
Primary production - land preparation and planting	35%	45%	UGX 8,000 - 12,000/day (labourer)	Outgrower scheme design - ensure women can access land registration and contract terms in their own name
Harvesting (group work)	60%	50%	UGX 8,000 - 15,000/day	PPD reduction benefit: faster industrial off - take reduces distress selling window; harvest timing improved by guaranteed buyer
Peeling and chipping (informal, manual)	78%	55%	UGX 3,000 - 6,000/day - lowest in chain	Solar - biomass dryer at Tier 2 hub: replaces manual low - value peeling/drying with supervised quality - controlled operation; improved wages

Sun drying and quality control	72%	42%	UGX 3,000 - 5,000/day	Controlled drying technology eliminates sun - drying risk; women transition to quality management roles in dryer operation and moisture testing
Aggregation and transport to factory	25%	60%	UGX 15,000 - 25,000/day	Working capital facility design should include women - led aggregation groups; transport cooperative structures
Factory processing - Tier 1 operations	32%	65%	UGX 25,000 - 45,000/day	Laboratory technician training: Bukona Agro demonstrates women can be trained as QC lab analysts. GTTF BDS component should replicate this model across all Tier 1 deals.
Quality testing and QC laboratory	45%	55%	UGX 35,000 - 60,000/day	Highest female participation at skilled level. GTTF - supported Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification pathway creates structured career entry point.

Market sales and distribution (Greenergy stoves)	42%	48%	Variable; commission - based	Greenergy distribution model (Bukona) - women as household energy decision - makers are also primary distribution agents. GTTF can support distribution network development.

Sources: A2i KII dataset (2026); NAADS (2020) cassava value chain gender analysis; Kilimo Trust (2012) outgrower model gender assessment; Bukona Agro KII (laboratory technician training programme). Participation percentages are based on field observation and KII data; not a nationally representative survey.

12.5.4 Seasonal Cash Flow and Working Capital

Cassava's bi - seasonal harvest pattern creates predictable cash flow cycles for both processors and smallholders - but the timing mismatch between farmer payment (immediate, at harvest) and processor revenue recovery (delayed, post - processing) is the primary driver of the working capital gap that limits Tier 2 aggregator operations.

Table 12.19 - Seasonal Cash Flow Pattern: Uganda Cassava Value Chain

Month	Jan - Feb	Mar - Apr	May - Jun	Jul - Sep	Oct - Nov	Dec
Primary Harvest Season	Early harvest / lean	Main harvest begins	**PEAK HARVEST**	Inter - season planting	Second harvest (October); lean (November)	Lean / planting
Farm - gate price indicator	UGX 200 - 300	UGX 150 - 250	**UGX 80 - 150**	UGX 200 - 300	UGX 150 - 250 (October harvest brings second price dip)	UGX 250 - 350
Industrial processor cash position	Good - selling inventory	Ramping procurement - WC stress begins	**HIGH WC DEMAND**	Sales recovery - cash improving	Second procurement push (October); good conditions for buying	Year - end sales

Aggregator / Tier 2 cooperative cash need	Minimal	Moderate - drying working capital	**CRITICAL - bulk purchase window**	Recovering - selling dried chips/ HQCF	Second harvest procurement push; smaller than June peak	Minimal
Key GTTF/ Finance Action	Monitor	**Working capital pre - approval must be in place**	**Disburse WC facility; drying hub at full operation**	WC repayment period	Second procurement cycle; smaller WC draw	Full WC repayment; prepare for next year

Working capital cycle insight: The critical procurement window is May - June, when farm - gate prices are at their seasonal low and PPD creates time pressure on aggregation. Commercial bank loan approval timelines of 9 - 18 months are structurally incompatible with this 4 - 6 week procurement window. The GTTF must work with aBi Development and ACF - linked banks to establish pre - approved revolving credit facilities that can be drawn and repaid within a single season. This is as important as the technology investment - a drying hub without working capital access cannot buy roots at the right time or price.

The tiered financing architecture above is only as effective as the technical assistance that accompanies it. Case 2's 100 percent technical assistance grant component reflects a deliberate design choice, not a residual budget line: enterprise capacity to operate solar - biomass drying infrastructure to specification, not access to capital, is the primary determinant of whether a Tier 2 cooperative investment succeeds. The same logic applies across all four approved cases, in proportion to each enterprise's distance from proven commercial operation.

12.6 Pillar 6 Investment Structuring and GTTF Outcomes

12.6.1 Tiered Financing Architecture

The GTTF's 5:1 leverage ratio is the programme - level design ambition - not a per - deal floor. Across the cassava enterprise pipeline, the leverage ratio is achievable at Tier 1 (where balance sheet strength and UDC/UDB co - financing create viable debt structures) and feasible at Tier 2 for selected cooperative investments with a confirmed industrial off - taker. (aBi Development / Access2Innovation, 2026)

Enterprise Tier	Capital Stack	Primary Instruments	GTTF Function	Target Leverage Ratio
Tier 1 Anchor Industries	30% GTTF Grant / 50% ACF Debt / 20% Enterprise Equity	Blended finance; Bank of Uganda ACF; private equity; UDB long - tenor	Absorbs EU technology CapEx premium; lowers DSCR to commercial lending threshold	5.5:1 to 6.0:1 (programme - level target met)

Tier 2 Aggregators and Cooperatives	50% GTTF Grant / 40% Concessional Debt / 10% Cooperative Equity	CapEx matching grants; Centenary Bank / DFCU commercial asset finance	Absorbs upfront machinery cost; builds balance sheet readiness for future commercial debt	4.5:1 to 5.0:1 (achievable with confirmed off - taker)
Tier 3 Producer Groups	100% Technical Assistance Grant	Micro - grants; VSLA credit; PDM alignment	Builds operational capacity; prepares groups for formal outgrower contracts	N/A (preparatory pipeline)

12.6.2 Per - Case Financial Detail

The five investment cases presented in the Five - Case Decision Model each require independent financial modelling at the enterprise - specific appraisal stage. The following tables present indicative financial parameters for the three APPROVED cases (Cases 2, 3, and 4) and the flagship Case 5, calibrated to the data sources gathered in this landscape study. All figures should be treated as indicative pending enterprise - specific feasibility studies.

Table 12.20 - Case 2 Financial Detail: Decentralised Solar - Biomass Drying Hub (Tier 2)

Parameter	Value (Indicative)	Basis / Source
CAPITAL AND FINANCING		
Target enterprise model	Tier 2 cooperative - Rwibaale model (Kyenjojo)	A2i KII enterprise mapping
Core technology	Solar - biomass hybrid tunnel dryer (8 - 10 t/day); mechanical chipper	AgriTT / European solar dryer benchmarks
Total CapEx	USD 150,000 - 250,000 (UGX 540M - 900M @ UGX 3,600/ USD)	Landell Mills/AgriTT Uganda study; EU supplier quotes
GTTF matching grant (50%)	USD 75,000 - 125,000	GTTF Tier 2 grant rate
Concessional debt - ACF via Centenary (40%)	USD 60,000 - 100,000	ACF programme; Centenary Bank cooperative window
Cooperative equity contribution (10%)	USD 15,000 - 25,000	Members' savings; VSLA aggregation
OPERATING ECONOMICS		
Annual throughput (at 60% utilisation, 300 operating days)	800 - 1,200 MT HQCF - equivalent per year	Derived from dryer throughput specs
Average revenue per tonne HQCF (solar tunnel - dried)	UGX 1,700,000/tonne	Industrial bakery buyer price; A2i KII (2026)
Gross annual revenue	UGX 1.36B - 2.04B	Derived
Annual operating cost (feedstock, labour, energy)	UGX 800M - 1.2B	Based on HQCF gross margin model (Table 12.7)
Gross profit before depreciation	**UGX 560M - 840M**	

RETURN AND IMPACT METRICS		
Modelled IRR (on CapEx investment)	**~22.4%**	A2i financial model; indicative
Payback period	**~3.8 years**	A2i estimate
Leverage ratio (private co - investment to GTTF grant)	~4.5:1	Programme - level target partially met
Direct employment (dryer operation, aggregation)	25 - 40 cooperative members (direct)	AgriTT cooperative dryer model
Outgrower households served (feedstock supply)	300 - 600 households within 20 km catchment	Density estimate; Northern/Eastern Uganda
Prerequisite for grant disbursement	**Confirmed off - take agreement with De Heus (HQCC) or Tier 1 starch plant**	Without confirmed off - take, cooperative has no assured revenue stream

Sources: AgriTT/Landell Mills Uganda cassava study; A2i gross margin model (Table 12.7); A2i KII enterprise data. IRR and payback are indicative - enterprise - specific feasibility required before grant committee submission.

Table 12.21 - Case 3 Financial Detail: Starch Thermal Efficiency Upgrade (Tier 1)

Parameter	Value (Indicative)	Basis / Source
CAPITAL AND FINANCING		
Target enterprises	Pura Organic / Lukonge / Dei BioPharma (each appraised separately)	A2i KII - do not aggregate into single transaction
Core technology	SiccaDania closed - loop flash dryer + Alfa Laval decanter centrifuges	Technology matching analysis (Table 12.4.4)
Total CapEx per enterprise	USD 450,000 - 750,000 (UGX 1.62B - 2.70B)	SiccaDania/Bühler/Alfa Laval equipment benchmarks; Uganda delivery
GTTF matching grant (30%)	USD 135,000 - 225,000 per enterprise	GTTF Tier 1 grant rate
ACF debt via commercial bank (50%)	USD 225,000 - 375,000 per enterprise	Stanbic/DFCU/Centenary ACF conduit
Enterprise equity (20%)	USD 90,000 - 150,000 per enterprise	Balance sheet contribution from operating profits
OPERATING ECONOMICS AND EFFICIENCY GAINS		
Annual starch throughput (at 70% utilisation)	3,500 MT starch/year	Derived from enterprise profile throughputs
Revenue per tonne starch (2026 price, USD 625)	UGX 2,250,000/tonne	TTSA August 2026 benchmark
Gross annual revenue	UGX 7.875B	Derived
Energy cost saving from SiccaDania (45% reduction)	~UGX 450M/year	Based on standard flash drying energy cost of ~UGX 247,000/t × 3,500 MT × 45%

Additional starch yield from Alfa Laval (+3% recovery)	~105 additional MT/year	3% of 3,500 MT; revenue ~UGX 236M/year
Total annual benefit from technology upgrade	**~UGX 686M/year combined (energy + yield)**	Key upgrade investment return
RETURN METRICS		
Modelled IRR on upgrade investment	**~26.1%**	A2i financial model; indicative
Payback period on CapEx	**~3.4 years**	A2i estimate
Leverage ratio (total project to GTTF grant)	~5.5:1	Programme - level target met

Note: Energy and yield improvement figures are modelled estimates. Actual savings depend on baseline energy consumption profile at each enterprise, which must be independently measured as part of the technology audit prior to equipment specification. IRR and payback are indicative pending enterprise - specific feasibility.

Table 12.22 - Case 4 Financial Detail: Zero - Waste Stillage Recovery - Bukona Agro Processors (Tier 1)

Parameter	Value (Indicative)	Basis / Source
CAPITAL AND FINANCING		
Target enterprise	Bukona Agro Processors Ltd, Nwoya District	UDC PPP enterprise; A2i KII
Core technology	ANDRITZ evaporator + anaerobic digester + DDGS dryer system	ANDRITZ Feed and Biofuel A/S (Denmark)
Total CapEx	USD 1.0M - 1.3M (UGX 3.6B - 4.68B @ UGX 3,600/USD)	ANDRITZ East Africa installation benchmark; A2i estimate
GTTF matching grant (30%)	USD 300,000 - 390,000 (UGX 1.08B - 1.40B)	GTTF Tier 1 grant rate
ACF / UDB debt (50%)	USD 500,000 - 650,000	Bank of Uganda ACF; UDB strategic sector window
Enterprise equity (20%) - Bukona/UDC	USD 200,000 - 260,000	UDC balance sheet; private co - investor
OPERATING ECONOMICS - ANDRITZ SYSTEM OUTPUTS		
Ethanol output (Bukona actual operating rate)	~40,000 litres/day	Bukona KII / APRI feasibility study
Stillage generated (10:1 ratio)	~400,000 litres/day	Standard cassava ethanol ratio
DDGS output (estimated: 4% dry solids from stillage)	~16,000 kg/day	Derived: 400,000 litres × 0.04 × ~1 kg/litre
DDGS revenue (@ UGX 900/kg animal feed price)	UGX 14.4M/day gross	Animal feed market price; De Heus / domestic buyers
Biogas thermal energy offset (35% of distillation energy)	~UGX 5.6M/day in diesel savings	40,000 L/day × UGX 140/L saving (35% of UGX 400/L diesel - distillation cost)
ANDRITZ system operating cost	~UGX 3.5M - 4.5M/day	Evaporator electricity + DDGS dryer energy + maintenance

Capital amortisation and indirect overhead	~UGX 3.5 - 4.5M/day	Equipment depreciation over 8 years + ANDRITZ maintenance contract + DDGS transport
Net co - product revenue per day (after all costs)	**~UGX 11M - 13M/day**	Consistent with KII estimate of ~UGX 10 - 12M/day net; gross before indirect costs ~UGX 16M/day
Annual net co - product revenue	**UGX 4.0B - 4.7B/year**	Operating 365 days at blended average output (conservative: 330 days)
RETURN AND ENVIRONMENTAL METRICS		
Modelled IRR on ANDRITZ investment	**~28.5%**	A2i financial model; consistent with APRI EIRR framework
Payback period on CapEx	**~3.2 years**	A2i estimate
Leverage ratio (total project to GTTF grant)	~5.5:1	UDC equity + ACF debt + enterprise equity vs. GTTF grant
Environmental benefit - methane capture	Open stillage lagoons eliminated; uncontrolled methane capture	RIO Marker Climate Mitigation - Score 2 (Principal Objective)
Environmental benefit - liquid discharge	Zero liquid discharge achieved; no effluent to waterways or soil	Biodiversity and Desertification RIO Markers - Score 1
CRITICAL pre - condition for grant disbursement	**(1) Confirm cassava as ≥70% of Bukona feedstock; (2) Verify E - blending timeline with MoEMD; (3) Outgrower scheme design completed**	Three BDS pre - conditions - see KII Insight Table 12.12

Sources: ANDRITZ Feed and Biofuel A/S technology benchmarks (2024); APRI feasibility study (2021); A2i ethanol gross margin model (Table 12.8); UDC partnership documentation. DDGS dry solids yield from cassava stillage is lower than grain - based DDGS; figure of 4% solid content is a conservative estimate based on cassava starch composition.

12.6.3 Five - Case Decision Model

Five technology - investment cases have been modelled across the cassava value chain, aligned to the enterprise tiers and product pathways identified above.

Parameter	**Case 1: Status Quo**	**Case 2: Decentralised Solar - Biomass Drying**	**Case 3: Starch Thermal Efficiency**	**Case 4: Zero - Waste Stillage Recovery**	**Case 5: Integrated Bio - Refinery (Flagship)**
Target Enterprise	Tier 3 / Informal	Tier 2 Cooperatives	Tier 1 Starch Plants	Tier 1 Bioethanol Distilleries	Tier 1 Anchor Bio - Refineries
Core Technology	Open tarpaulins; Chinese batch flash dryers	European solar - biomass hybrid tunnel dryers; mechanical chippers	Bühler/SicaDania closed - loop flash dryer + heat exchanger	ANDRITZ evaporator, anaerobic digester + DDGS dryer	Turnkey GEA / Bühler / ANDRITZ integrated stack

Indicative CapEx	USD 50,000 - 150,000	USD 120,000 - 250,000	USD 450,000 - 750,000	USD 1,000,000 - 1,300,000	USD 3,500,000 - 5,000,000
Energy Efficiency	Baseline - high thermal cost	60% reduction in grid/fuel drying energy	45% reduction in factory fuel expenditure	35% thermal offset via biogas generation	55% overall energy reduction; off - grid biogas
Modelled IRR	<12%; 6.5 - yr payback	~22.4%; 3.8 - yr payback	~26.1%; 3.4 - yr payback	~28.5%; 3.2 - yr payback	~31.2%; 2.9 - yr payback
Environmental Impact	High PPD waste; high emissions	Prevents PPD losses; eliminates firewood use	Cuts stack emissions; Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) US 597 compliant	Replaces liquid waste lagoons; zero discharge	Full circular bioeconomy; zero waste; low CO2
GTTF Recommendation	REJECT: Unviable - energy cost and quality risk	APPROVE (Tier 2): 50% GTTF matching grant	APPROVE (Tier 1): 30% GTTF grant + ACF debt	APPROVE: Primary GTTF entry point - strongest return	APPROVE (Flagship): SPV co - investment; anchor deal

Note: IRR and payback figures are modelled estimates based on A2i financial analysis and technology provider benchmarks. They have not been independently verified and should be treated as indicative until enterprise - specific feasibility studies are complete.

12.6.4 Financial Sector Support

Institution	**Cassava Finance Relevance**	**Key Terms (indicative)**	**GTTF Co - Financing Role**	**Enterprise Alignment**
Uganda Development Bank (UDB)	Development mandate; long - tenor agro - processing loans; concessional windows for strategic sectors including cassava	10 - 12% UGX; up to 10 - yr tenor; www.udb.or.ug	Tier 1 co - financer for starch and ethanol efficiency investments	Dei BioPharma; Bukona (UDC - linked)
Bank of Uganda ACF (Agricultural Credit Facility)	On - lending facility for commercial banks at reduced rates; agriculture and agro - processing	10 - 12% (via participating bank); 3 - 8 yr tenor	Primary debt vehicle for Tier 1 GTTF capital stack (50% of deal)	All Tier 1 enterprises via Centenary/ Stanbic/DFCU

Centenary Bank Uganda	Largest agricultural lender; strong upcountry network covering cassava corridors (Lira, Masindi, Gulu, Fort Portal)	Agribusiness product suite; ACF conduit	Northern Uganda Tier 2 co - financer - Rwibaale, Adyaka cooperatives	Tier 2 cooperative lending
DFCU Bank Uganda	SME agribusiness finance; history of cassava sector portfolio	Commercial rates; SME tenure	SME processor finance; Tier 2 equipment	Agroways; Lukonge (if mid - cap)
Stanbic Bank Uganda	Corporate finance; supply chain finance; structured agribusiness deals	Commercial rates; structured finance	Tier 1 starch processors with strong balance sheets	Pura Organic; PRO Industries

12.6.5 Engagement Modality Mapping and Climate - Funding Threshold

Each APPROVE - rated case in the Five - Case Decision Model is mapped below to the Danish business instrument best suited to it, following the same Danida instrument summary applied in the Dairy chapter. Case 1 (Status Quo) is excluded, as it carries a GTTF REJECT recommendation and requires no instrument.

Table 12.23 - Ranked recommendations mapped to Danish/EU engagement instruments

Rank	Recommendation	Danish/EU instrument	Rationale
1	Case 4: Zero - Waste Stillage Recovery - Bukona Agro Processors (Tier 1)	E3 - Impact Incubator (concessional soft loan up to DKK 15 million, approx. USD 2.1 million)	Established UDC public - private partnership enterprise with ANDRITZ technology already operating and generating cash flow. CapEx of USD 1.0 - 1.3 million sits comfortably within E3's ceiling. Matches the same midstream logic applied to Jesa Farm Dairy's biogas case in the Dairy chapter.

2	Case 3: Tier 1 Starch Thermal Efficiency Upgrade - Pura Organic / Lukonge Cotton / Dei BioPharma (each appraised separately)	E3 - Impact Incubator, same instrument and logic as Rank 1	Established, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified processors with proven commercial operating history. CapEx of USD 450,000 - 750,000 per enterprise falls within E3's ceiling. Do not aggregate into a single transaction - each enterprise requires its own feasibility study and E3 application.
3	Case 2: Tier 2 Decentralised Solar - Biomass Drying Hub - Rwibaale Cooperative model	E2 - Business Partnerships (Full Scale tier, under DKK 10 million, approx. USD 1.4 million)	First commercial deployment at cooperative scale, contingent on a confirmed industrial off - taker (De Heus HQCC or a Tier 1 starch plant). Matches E2's role of maturing a business case once a market linkage is established, rather than E4's earlier - stage feasibility/demonstration role.
4	Case 5: Integrated Bio - Refinery (Flagship)	At or exceeding E5's ceiling (Impact Investors, DKK 10 - 30 million, approx. USD 1.4 - 4.2 million)	CapEx of USD 3.5 - 5.0 million sits at or above E5's typical ceiling. Likely exceeds single - instrument scope and would need blended GTTF, commercial bank, and Danish co - financing - the same treatment this chapter's Dairy counterpart gives to Benni Foods and Amos Dairies. Longer - horizon flagship, not a near - term deal.

Sources: this chapter's Table 12.11 (Five - Case Decision Model) and Section 12.7.4 (RIO Markers). Instrument definitions and DKK ceilings per the Danida instruments summary shared by the Royal Danish Embassy, as applied consistently in the

Dairy chapter's Table 5.37. E1 (Business Explorer, market - scoping stage) is not used above - none of the four approved cases sit at that earliest, pre - feasibility scale.

12.6.6 Climate - Funding Share Against the 75% Threshold

RDE concern C3 requires that at least 75 percent of proposed funding address a climate challenge, scored against this chapter's own RIO Markers assessment (12.7.4). This section computes that share transparently, using only the four ranked items with a defined capital range above, rather than assuming a positive result.

Table 12.24 - Climate - funding share of quantified ranked recommendations

Recommendation	Capital range (USD M)	Midpoint (USD M)	RIO climate score	Climate - positive?
Case 4: Bukona ANDRITZ stillage recovery	1.0 - 1.3	1.15	Mitigation 2 (Principal Objective)	Yes
Case 2: Tier 2 solar - biomass drying hub	0.12 - 0.25	0.19	Adaptation 2 (Principal) / Biodiversity 1	Yes
Case 3: Tier 1 starch thermal efficiency (per enterprise)	0.45 - 0.75	0.60	Not scored - this chapter's RIO assessment (12.7.4) does not extend a Mitigation score to SiccaDania energy - efficiency upgrades	No
Case 5: Integrated bio - refinery (flagship)	3.5 - 5.0	4.25	Not individually scored - includes an ANDRITZ component analogous to Case 4, but this chapter has not quantified it separately	No

Sources: this chapter's Table 12.23 (capital ranges) and Section 12.7.4 (RIO Markers scoring).

At the midpoint of each range, USD 1.34 million of the USD 6.19 million in quantified capital across these four items - approximately 21.6 percent - is climate - positive under this chapter's own RIO scoring. This is materially below the 75 percent threshold, and this chapter states that plainly rather than rounding up. The gap is larger than the Dairy chapter's (66.7 percent), because cassava's two largest quantified items - the Tier 1 starch efficiency portfolio and the flagship bio - refinery - are framed in this chapter as cost - efficiency and scale plays rather than explicitly - scored climate interventions, even though both include energy - saving or biogas components that plausibly qualify.

Two concrete paths would close the gap without altering the substance of this chapter's recommendations, mirroring the approach the Dairy chapter takes with Amos Dairies: first, revisiting whether the SiccaDania starch - efficiency upgrade (Case 3) should be explicitly scored against the Mitigation marker, given its 45 percent

energy - cost reduction - this chapter has not made that case formally and should not simply assert it now; second, quantifying the ANDRITZ component within the flagship bio - refinery (Case 5) as a discrete line item once that case moves from concept to costed proposal. Neither adjustment is applied here - this chapter flags the shortfall now rather than waiting for it to surface at compilation stage.

12.7 Pillar 7 Policy, Programme Alignment, SWOT, MCDA and Sustainability

12.7.1 Policy Enablers and Risks

Three macro - level policy catalysts are material to GTTF investment sustainability in the cassava sector.

1. **Mandatory enforcement of bioethanol blending (Biofuels Act 2018):** The Ministry of Energy and Mineral Development must enforce the statutory E - 5 to E - 20 bioethanol blending policy across national fuel import depots. Without enforcement, the ethanol pathway (Bukona, PRO, Fermarco) has no assured domestic market. GTTF should verify current blend implementation status before committing to ethanol - pathway investments.

2. **VAT and tariff treatment:** VAT charges on cassava starch and HQCF may disadvantage domestic producers relative to imports. Egyptian starch enters at zero duty under COMESA. Confirm URA treatment before the chapter makes tax policy recommendations.

3. **Quality standards enforcement:** Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) enforcement of US 597 and EAS 772 on imported industrial starches and flours is essential for domestic processors investing in certified technology to compete. GTTF should support Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) enforcement capacity alongside technology investments.

12.7.2 International Competitive Landscape

Uganda's cassava starch is already price - competitive with the global commodity benchmark. The 2026 price surge in Thai tapioca starch creates a material near - term window. However, Uganda faces structural disadvantages in logistics, certification, and scale. The table below benchmarks Uganda's competitive position against the four principal starch - exporting nations.

Table 12.25 - International Cassava Starch Competitive Benchmark (August 2026)

Benchmark Dimension	Thailand (Global Leader)	Vietnam	India	Nigeria (Africa)	Uganda (Current / GTTF Target)
Export volume (2024)	~10M MT/yr	~3M MT/yr	~1.5M MT/yr	~500K MT/yr	2,724 MT (HS 110814 starch only)
FOB Export price (Aug 2026)	USD 550 - 700/t	USD 520 - 650/t	USD 480 - 580/t	USD 350 - 420/t	USD 493/t (2024 actual); ~$550+ projected 2026

Farm - gate yield (MT/ha)	22 - 28 MT/ ha (irrigated, improved varieties)	18 - 24 MT/ha	20 - 25 MT/ha	8 - 12 MT/ha	2.3 - 4.7 MT/ ha current; 40+ MT/ha potential
Processing scale	Mega - plants; 500 - 1,000 MT/day capacity	Large industrial; 200 - 500 MT/day	Medium - large; 100 - 300 MT/ day	Small - medium; 10 - 50 MT/ day	<40 MT/day at most Tier 1 plants
Energy source	Grid + Thai natural gas; low - cost thermal	Grid + biomass; moderate cost	Coal + grid; low cost	Diesel - heavy; high - cost inefficient	Diesel - heavy; flash drying = high energy cost - SiccaDania investment addresses this
Quality certification	EU/FDA/ISO food - grade standard; high compliance	Improving; EU market access developing	Food - grade; limited pharma	Variable; limited certification	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) US 597 certified at Tier 1 plants; pharma - grade aspirational at Dei BioPharma
Key competitive advantage vs. Uganda	Scale; established supply chains; low farm - gate yields	Cost; growing market access	Cost; massive scale	Regional proximity to E+W Africa; growing	Regional logistics advantage to EAC buyers; 2026 price surge narrows gap; zero - tariff EAC regional trade

GTTF competitive response	-	-	-	-	SiccaDania energy efficiency closes OpEx gap; Alfa Laval yield improvement; Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) certification enables EU/pharma market access at premium pricing

Sources: Thai Tapioca Starch Association (TTSA) August 2026; WITS/World Bank cassava starch trade data (2024); A2i analysis. Uganda's regional logistics advantage - proximity to Kenya, DRC, South Sudan, and East African markets - is a material competitive advantage over Thai/Vietnamese bulk suppliers that is currently under - exploited due to quality and supply consistency constraints.

Figure 12.10 - International Cassava Starch Competitive Benchmark: FOB Export Price (USD/tonne), August 2026 | Source: TTSA August 2026; WITS/World Bank 2024; A2i analysis. Uganda 2026 projection benefits from global price surge.

12.7.3 SWOT Analysis: Cassava Value Chain

STRENGTHS	**WEAKNESSES**
• Priority value chain under NDP IV - strong political continuity• Year - round harvesting window - reduces seasonal feedstock gaps• Established Tier 1 industrial asset base: nine processing plants installed• Climate resilience: cassava out - performs cereals under erratic rainfall• Uganda already price - competitive on global starch: $493/t (2024) matches Thai benchmark• Strong social inclusion potential: women and youth dominate primary processing	• 90% farm - gate yield gap (2.3 - 4.7 MT/ha actual vs. 40+ MT/ha potential)• Severe PPD: fresh roots lose starch value within 48 - 72 hours• Below - 40% industrial capacity utilisation - feedstock shortfall is the binding constraint• High 8:1 flash drying conversion ratio inflating energy costs• Working capital gap: 9 - 18 month bank approval cycle incompatible with perishable procurement• Feedstock cost is the dominant starch margin variable: at UGX 250/kg contracted, standard technology yields a real loss at 2024 prices (- 6.9%); SiccaDania and the 2026 price recovery together are needed to restore commercial viability
OPPORTUNITIES	**THREATS**

• 2026 global starch price surge: FOB Bangkok up ~45% - Uganda's $493/t price point now below the rising market, creating export upside• Stillage valorisation at Bukona: ~UGX 12M/day net co - product revenue from ANDRITZ - existing plant, no new factory needed• E - 20 fuel blending mandate: if enforced, creates guaranteed off - take for cassava ethanol• USD 343.9M import substitution potential (EPRC) - even 10 - 15% capture = USD 34 - 52M annually• De Heus HQCC demand: quality - pull on aggregators; natural commercial anchor for Tier 2 hub investments• Dei BioPharma pharmaceutical starch: premium pharma - grade market (USD 4,126/t Germany benchmark vs. bulk $493/t)	• Subsidised SE Asian starch imports (Thailand $513/t; COMESA zero - tariff for Egypt) with established buyer relationships• CMD/CBSD disease mutations - viral disease pressure not managed by industrial technology; requires separate National Agricultural Research Organisation (NARO)/seed investment• E - 20 non - implementation risk: if fuel blending policy remains at E - 1 to E - 5, the ethanol pathway commercial case weakens substantially• CapEx premium for EU green technology: 2 - 3× more expensive than Chinese/Indian equipment - GTTF grant is the essential enabler• Bukona feedstock shift to sorghum - validates raw material risk and raises questions about cassava supply reliability• Starch margin sensitivity to global price cycles: gross margin is a real loss at contracted starch - sector prices (UGX 250/kg) with standard technology and 2024 prices (- 6.9%); any reversal of the 2026 price recovery would leave even SiccaDania - upgraded plants close to breakeven, not comfortably viable

Table 12.26 - MCDA Scoring: Cassava Value Chain, Uganda 2026

The MCDA applies the standard A2i/GTTF assessment framework. Scores are 1 - 10 (10 = strongest). Weights sum to 100%. This chapter scores at 7.78/10.0 - Priority 2.

MCDA Criterion	**Weight**	Score (1 - 10)	**Weighted**	**Max Possible**	**Evidence / Rationale**
Market size and growth trajectory	15%	8	1.20	1.50	Large market; 2026 starch price surge improving economics. Scored 8 not 10 because industrial off - take is nascent.
EU/Danish technology fit	12%	8	0.96	1.20	SiccaDania, GEA, Bühler, ANDRITZ, Alfa Laval all applicable. Scored 8 not 10 - no EU technology yet installed in Uganda cassava sector.

Enterprise investment - readiness (Tier 1 base)	10%	6	0.60	1.00	Eight confirmed Tier 1 plants identified; one (Fermarco) temporarily closed. Capacity utilisation variable: Bukona ~100% DC line; Pura and Lukonge ~30%; DEI operational; PRO operational. Enterprise financial data still being validated for most plants. Scored conservatively at 6.
Additionality / crowding - in	12%	8	0.96	1.20	Clear EU technology cost gap vs Asian alternatives; no current donor filling this space. 5:1 leverage achievable.
Post - harvest loss reduction impact	15%	10	1.50	1.50	PPD is severe (30 - 40% losses). Impact is direct, measurable, and scalable.
RIO Marker alignment	10%	8	0.80	1.00	Score 2: Climate Adaptation (PPD reduction). Score 2: Climate Mitigation (ANDRITZ biogas). Score 1: Biodiversity; Desertification.
Regulatory and policy alignment	8%	6	0.48	0.80	NDP IV priority; Biofuels Act; BUBU. Scored 6 because E - 20 implementation is well below mandate.

Financial sector co - financing readiness	8%	6	0.48	0.80	UDB, ACF, Centenary, DFCU available. Cassava sector less established in lending portfolios than grain. Scored 6 pending validation.
Gender and social inclusion	5%	8	0.40	0.50	Women and youth dominate primary processing; Bukona lab technician model. Scored 8.
Strategic anchors and market - making potential	5%	8	0.40	0.50	Bukona UDC PPP; Dei BioPharma USD 5M+ operational facility (KII - confirmed); De Heus confirmed HQCC buyer; 2026 starch price surge +45%..
TOTAL WEIGHTED SCORE	**100%**	**-**	7.78 / 10.0	10.0	**Priority 2 sector. Strong on PPD impact, market size, and additionality; held back by low enterprise readiness and regulatory implementation gaps.**

Figure 12.11 - MCDA Scoring Profile: Cassava Value Chain, Uganda 2026 | Total Weighted Score: 7.78/10.0 - Priority 2. Strongest on PPD impact reduction (10/10), market size, additionality, and RIO alignment; held back by enterprise readiness and regulatory implementation gaps.

12.7.4 EU and Danish RIO Markers

Under the OECD DAC RIO Markers framework, the cassava investment portfolio qualifies positively against all four markers.

Climate Change Mitigation (Score 2 - Principal Objective): The Case 4 Zero - Waste Stillage Recovery investment (ANDRITZ at Bukona) is a direct climate mitigation technology: methane emissions from open stillage lagoons are captured and converted to biogas; industrial diesel is displaced by self - generated biogas (35% thermal energy offset). Solar - biomass hybrid dryers eliminate firewood demand at Tier 2 drying hubs.

Climate Change Adaptation (Score 2 - Principal Objective): PPD loss reduction through controlled drying directly builds food - system resilience against climate shocks. Cassava's drought tolerance makes it the primary food - security fallback crop during rainfall failures - and reducing post - harvest loss from 30 - 40% to <10% protects the food reserves of approximately 1.13 million farming households.

Biodiversity (Score 1 - Significant Objective): Replacing firewood drying with solar - biomass systems reduces deforestation pressure in Northern and Eastern Uganda. ANDRITZ anaerobic digestion eliminates open waste lagoons, preventing effluent contamination of soil and waterways.

Desertification (Score 1 - Significant Objective): Contract outgrower pricing (UGX 400 - 500/kg floor) raises farm - gate revenue per acre, reducing economic pressure on smallholders to clear additional marginal land in Northern Uganda's fragile savannah ecosystems.

12.7.5 Post - Grant Sustainability

A critical weakness identified in the gap analysis is the absence of explicit post - grant sustainability analysis - a dimension the Dairy chapter addresses in depth. The following assessment maps the sustainability profile across the three GTTF - recommended investment cases.

Investment Case	Post - Grant Revenue Model	Sustainability Risks	GTTF Design Mechanism for Sustainability
Case 2 - Tier 2 Drying Hub (Rwibaale model)	Revenue from HQCF/ HQCC sales to confirmed industrial off - taker (De Heus / Tier 1 starch plant). Solar - biomass dryer has 15 - 20 year asset life.	(1) Off - take contract termination risk; (2) Co-operative governance failure; (3) feedstock supply disruption during drought or disease outbreak	GTTF grant conditionality: off - take agreement signed before first disbursement. BDS component: cooperative governance and financial management training (SACCO - level). Seasonal working capital pre - approved facility from Centenary Bank.

Case 3 - Starch Efficiency Upgrade (Pura Organic / Lukonge / Dei BioPharma)Energy savings and yield improvements are structural cost reductions - they do not depend on a new off - take relationship. Enterprise continues selling starch at prevailing market prices with improved margins. (1) Starch price reversal (global commodity cycle turns down from 2026 peak); (2) Enterprise financial distress preventing maintenance CapEx; (3) Technical failure without EU after - sales serviceGTTF grant conditionality: enterprise must have established Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification before grant disbursement. Technology contract must include 3 - year after - sales service and maintenance training.			
Case 4 - ANDRITZ Stillage Recovery (Bukona)	DDGS animal feed sales generate ongoing revenue stream (est. UGX 12M/day net) independent of ethanol market policy. Biogas reduces operating costs permanently.	(1) DDGS market development - Uganda animal feed buyers must be identified and contracted; (2) ANDRITZ maintenance expertise: specialist system in East Africa requires supplier support; (3) Cassava feedstock reliability (Bukona sorghum shift risk)	BDS: DDGS market development - direct linkage to De Heus and domestic feed mills before ANDRITZ system commissioning. ANDRITZ East Africa after - sales contract required as grant condition. Outgrower scheme strengthening as pre - disbursement condition.

Post - grant sustainability assessment note: All three GTTF - recommended cases are built on structural technology improvements that generate ongoing cost savings or new revenue streams - they are not grant - dependent operational subsidies. This is a fundamental design requirement: GTTF grants catalyse technology adoption; the technology itself generates the post - grant revenue that sustains the investment. The key BDS components (off - take agreements, governance, after - sales service) are not optional enhancements but structural prerequisites for long - term viability.

12.7.6 KII Consultation Log

The table below records the primary key informant interviews (KII) and stakeholder consultations conducted to support the cassava value chain assessment. Data from these consultations underpins the enterprise capacity figures in Table 12.11, the technology matching analysis, and the investment case financial models.

Table 12.27 - KII Consultation Log: Cassava Value Chain Assessment, 2026

	Organisation	Sector / Role	KII Date	Primary Intelligence Gathered
1	Pura Organic Agro Tech Ltd	Starch processor - Tier 1	29 June 2026	Capacity: 2,600 MT Feed Conversion Ratio (FCR)/month; Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) - certified; ~30% utilisation; SiccaDania technology identified as priority upgrade; outgrower scheme in early stages
2	Dei Group Ltd (Dei BioPharma)	Starch + glucose processor - Tier 1	29 June 2026	Capacity: 13,000 MT Feed Conversion Ratio (FCR)/month (500 Feed Conversion Ratio (FCR) t/day x 26 days); pharmaceutical and food - grade starch; operational; USD 5M+ investment confirmed.
3	Fermarco Industries	Ethanol processor - Tier 1 watch	29 June 2026	Plant temporarily closed at time of KII; capacity and investment data unavailable; retain on pipeline watch list

4	Bukona Agro Processors Ltd	Bioethanol processor - Tier 1	June - July 2026	PPP structure with UDC; 10,400 MT DC/month at 100% DC line utilisation; ANDRITZ stillage recovery identified as primary GTTF investment case; outgrower scheme validation required
5	PRO Industries PTE Ltd	ENA processor - Tier 1	June - July 2026	~13,000 MT Feed Conversion Ratio (FCR) equiv/month; operational; ENA market commercial and policy - independent; GEA distillation upgrade recommended
6	Rwenzori Holdings Ltd	Starch processor - commissioning	June - July 2026	~13,000 MT Feed Conversion Ratio (FCR)/month (designed); under commissioning; investment USD 2M+; operational status not yet confirmed; monitor
7	De Heus Uganda	Animal feed / HQCC buyer - Tier 1	1 July 2026	~3,200 MT DC/month (800 t DC/month); operational; certified; confirmed HQCC buyer - key anchor for Tier 2 drying hub commercial model; cross - reference Chapter 8
8	UBOS	Government data provider	3 July 2026	Production data validation; AAS series 2015 - 2023/24; confirmed 2025 production at 2,535,000 MT
9	World Bank / IFC	Development finance	8 July 2026	Development finance landscape; co - financing appetite for cassava processing; ACF and UDB alignment

10	Uganda Development Bank (UDB)	Development finance	21 July 2026	Cassava sector lending exposure; co - financing structures; starch and ethanol investment pipeline
11	Smart Start Industries Ltd	Ethanol processor - Tier 1	29 July 2026	~3,432 MT DC equiv/ month (33 t DC/day x 26 days); operational and upgrading; high - efficiency ethanol extraction; peeling, washing and drying at scale
12	Lukonge Cotton Company	Starch processor - Tier 1	30 July 2026	~2,600 MT Feed Conversion Ratio (FCR)/month; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) - certified; ~30% utilisation; technology upgrade opportunity aligned with Pura Organic case

Source: A2i GRASP/GTTF Cassava Landscape Assessment KII Programme, June - July 2026. Consultation dates and intelligence sourced from consultant field records (Draft 3, August 2026). Additional stakeholder engagements (NAADS, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS), MoEMD) conducted at programme level; cassava - specific KII listed above.

12.8 Investment Conclusion

12.8.1 Five Case Model

Strategic Case: Cassava is a NDP IV priority value chain with established Tier 1 processing infrastructure and growing industrial markets. The strategic case for GTTF investment is strongest where it fills the commercial technology gap between farm - level supply and industrial specification. The gross margin models confirm that technology efficiency (SiccaDania, ANDRITZ) is not a marginal improvement - it is a structural margin enabler. The case is compelling on feedstock supply infrastructure and ethanol waste valorisation; more conditional on new starch or ethanol factory construction.

Commercial Case: Three commercially robust entry points emerge from the evidence. First, starch extraction efficiency at operating Tier 1 plants - confirmed commercial off - take; technology upgrade improves margins without building new capacity. Second, ethanol stillage valorisation at Bukona - the ANDRITZ system converts a waste liability into ~UGX 12M/day co - product revenue, with IRR ~28.5% and payback ~3.2 years. Third, HQCC supply for De Heus - confirmed industrial buyer with known quality specifications. The commercial case for

the E - 20 ethanol fuel blending market is contingent on policy enforcement and should not be presented as confirmed until verified.

Financial Case: The 5:1 leverage ratio is achievable at Tier 1 through UDC equity, UDB/ACF debt, and GTTF matching grant structures (Bukona: 4.5:1 private; 5.5:1 total). At Tier 2, leverage is feasible with a confirmed industrial off - taker. Working capital structuring - as important as equipment finance - must be built into every deal. (UDB, 2025)

Socio - Economic Case: The outgrower economics model (Table 12.17) demonstrates that contracted outgrower income is 141 - 462% higher than the spot market equivalent. PPD loss reduction of 30 - 40% directly benefits 1.13 million smallholder households. Women and youth transition from informal low - wage primary processing into formalised supply chains and skilled factory roles.

Management Case: Three management flags require explicit BDS design: (1) Bukona's feedstock shift to sorghum signals outgrower management needs strengthening before additional processing capacity is added; (2) Dei BioPharma's operating status and throughput should be independently verified before a matching grant is structured; (3) Working capital pre - approval from ACF - linked banks must be designed before the procurement season - not after.

12.8.2 Key Investment Conclusions

1.	IMMEDIATE PRIORITY – Bukona Agro Processors Stillage Valorisation (Case 4): Install ANDRITZ anaerobic digestion system. No new factory required. IRR ~28.5%; payback ~3.2 years. UGX 1.14B - 1.48B GTTF grant + ACF/UDB debt + enterprise equity. Pre - conditions: verify cassava feedstock proportion (≥70% of Bukona input); outgrower scheme design completed; E - blending timeline confirmed with MoEMD
2.	TIER 1 STARCH EFFICIENCY PORTFOLIO – Pura Organic Agro Tech, Lukonge Cotton Company, Dei BioPharma: SiccaDania / Bühler flash drying upgrades + Alfa Laval centrifuge installations. Each requires an independent feasibility study to confirm throughput, energy baseline, technology specification, and co - financing structure. Gross margin models confirm viability at 2026 starch prices (USD 550 - 700/t) even at contracted feedstock costs. Do not aggregate into a single transaction.
3.	TIER 2 DRYING HUB PILOT – Rwibaale Cooperative (Kyenjojo): Solar - biomass hybrid tunnel dryer linked to a confirmed industrial off - taker (De Heus HQCC or Tier 1 starch plant). HQCF gross margin model shows 22% gross margin at contracted feedstock prices – viable. De Heus off - take agreement is the prerequisite.
4.	CROSS - CHAPTER COORDINATION WITH CHAPTER 8: De Heus's cassava HQCC inclusion must be modelled in Chapter 8 (animal feed) to avoid double - counting the De Heus demand signal. The ANDRITZ DDGS output at Bukona also creates a feed ingredient revenue stream that intersects with the animal feed chapter.
5.	FUEL BLENDING VERIFICATION BEFORE ETHANOL INVESTMENT: PRO Industries and Fermarco ethanol investments must not be progressed until MoEMD confirms current E - blending implementation level and credible enforcement timeline. The Biofuels Act E - 20 mandate is real; current implementation is at E - 1 to E - 5. ENA (PRO Industries) is a lower - risk alternative since it does not depend on blend policy.

6.	OUTGROWER SCHEME AND WORKING CAPITAL AS STRUCTURAL PREREQUISITES: Every Tier 1 and Tier 2 investment must include (a) a co - designed outgrower framework as a grant disbursement pre-condition, and (b) a pre - approved revolving working capital facility from an ACF - linked bank, timed to the May - June peak procurement window. Technology alone does not solve the feedstock bottleneck. The gross margin analysis confirms that feedstock cost and technology together determine starch economics: contracted prices (UGX 250/kg) with standard technology are a real loss at 2024 prices (- 6.9%); SiccaDania combined with 2026 pricing delivers approximately 20.6% gross margin.

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Chapter 13 : Agro Industrial - waste Value Chain Assessment

Sector Context

Agro - industrial waste valorisation sits at the intersection of Uganda's circular - economy ambitions, livestock and agro - processing sectors, and the GTTF's green - technology transfer mandate. Priority agro - industrial waste streams generated an estimated 1.71 million tonnes in 2025, up from approximately 970,000 tonnes in 2015, driven by expanding poultry, aquaculture and agro - processing activities. The sector presents a significant opportunity to shift from a linear "produce - use - dispose" model toward a circular economy, in which organic residues are converted into valuable products such as animal feed, bioenergy, organic fertiliser, biogas and other bio - based inputs, while reducing landfill disposal, methane emissions and pressure on natural resources.

Key findings show that no single investment model fits all enterprises: technology, feedstock security and commercial development support must be tailored to individual business models; reliable and consistent feedstock supply has become a greater constraint than processing technology itself; and successful waste valorisation requires integrated value chains linking waste generators, specialised processors and reliable end - market buyers.

Drying, moisture control and storage remain the most consistent technology gaps, creating opportunities for solar - assisted and energy - efficient drying, biomass and biogas systems, anaerobic digestion, heat recovery and other resource - efficient processing technologies. Finally, technology alone will not guarantee commercial success: certification, product quality, environmental compliance, aggregation systems and secure off - take arrangements are essential to convert waste streams into commercially viable green businesses.

Key findings

1. Rapidly growing resource base: Uganda's priority agro - industrial waste generation increased by 76%, from about 970,000 tonnes in 2015 to 1.71 million tonnes in 2025**,** driven mainly by growth in poultry, livestock, aquaculture and agro - processing.

2. Feedstock security is now the main commercial bottleneck: Reliable, segregated and consistent waste supply has become more important than processing technology itself. Several enterprises operate below capacity because of seasonal availability, contamination and competition for quality residues, demonstrating the need for structured aggregation and long - term supply agreements.

3. Integrated circular value chains offer the strongest investment opportunity: Commercial viability depends on linking waste generators specialised processors reliable off - takers. Priority technologies include BSF protein, biogas/anaerobic digestion, organic fertiliser, biochar, and energy - efficient drying and process optimisation, creating opportunities to replace imported inputs and recover energy and nutrients.

4. **Strong green - agenda and climate benefits, but commercial support is essential: Waste valorisation can reduce uncontrolled disposal, improve energy efficiency, generate renewable energy, recover nutri-**

ents and reduce dependence on conventional feed and fertiliser inputs. However, certification, quality assurance, laboratory testing and secure off - take markets are essential for technology investments to achieve sustained commercial returns.

13.1 Pillar 1: Historical Baseline and Strategic Alignment

13.1.1 Agro - industrial Waste in Uganda: A Decade of Expanding Resource

Uganda's agricultural and agro - processing sectors generate a wide and growing range of agro - industrial waste including crop residues, livestock manure, agro - processing by - products, slaughterhouse waste, fruit and vegetable residues, fish processing waste and wastewater. These biological resources represent significant opportunities for producing animal feed ingredients, organic fertilisers, renewable energy and other bio - based products, supporting Uganda's transition towards a circular economy and sustainable agro - industrialisation. (FAO/European Commission/CIRAD, 2023)

Despite this potential, productive utilisation of agro - industrial waste remains limited. Agricultural and agro - industrial wastes are still commonly burned, openly dumped or disposed of without recovering their material or energy value, resulting in environmental pollution and the loss of valuable resources. Uganda's National Environment Management Authority (National Environment Management Authority) promotes waste prevention, reuse, recycling and resource recovery as priorities for sustainable waste management, consistent with the national waste management hierarchy. (National Environment Management Authority, 2020)

Analysis undertaken for this study indicates that Uganda's agro - industrial waste resource expanded significantly between 2015 and 2025, driven by growth in livestock production, aquaculture and agro - processing. Across the priority value chains assessed, estimated waste generation increased from approximately 460,770 tonnes in 2015 to 1.056 million tonnes in 2025, representing an overall increase of 76% over the decade. These estimates were derived from UBOS production statistics, the National Livestock Census, Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) fisheries statistics and published waste generation coefficients. (UBOS/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2021; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2024b; FAO, 2023)

Table 13.1. Estimated Priority Agro - industrial Waste Generation in Uganda

Waste stream	2015 Production/ Activity	Processing share	Waste factor	2015 waste (t/ year)	2025 Production/ Activity*	Processing share	Waste factor	2025 waste (t/ year)
Poultry	46.04m Birds	12.29%	18.6 g/ bird/day	38,405	58.29m Birds	30.1%	18.6 g/ bird/day	119,122
Cassava processing	2.73m T	51%	14.5% peel	201,698	7.42m T	51%	14.5% peel	548,635
Livestock / abattoirs	209,017 T Beef	100%	27.5% solid waste[1]	114,799	276,892 T Beef	100%	27.5% solid waste[1]	152,078

Dairy processing	1.60bn L Milk	34%	1.5% product loss	8,140	5.40bn L Milk	34%	1.5% product loss	27,540
Fish processing	18,785 T Exports	—	56% by-product[2]	26,299	16,505 T Processed	—	56% by-product	9,243
Grain – maize milling	2.81m T Maize	23.09%	11% by-product	71,430	4.27m T Maize	23.09%	11% by-product	108,405
Fruit processing	N/A	n/a	n/a	n/a	~1.40m T Fruit	20%	32.5% residue	91,000
Total				**≈460,770**				**≈1,056,023**

***Sources:** Uganda Bureau of Statistics (UBOS), Statistical Abstracts and agricultural statistics; UBOS/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), National Livestock Census 2021; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))), Statistical Abstract 2024 and fisheries statistics; Dairy Development Authority (DDA); Uganda Fish Processors and Exporters Association (UFPEA); Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/TGCU grain - processing data; Food and Agriculture Organization of the United Nations (FAO) technical references on poultry litter and crop - processing residues; Uganda Cleaner Production Centre (UCPC), Dairy Processing Manual; and relevant Uganda sector studies for cassava, slaughterhouse, fish and fruit - processing conversion factors.*

Notes: 2025 uses the latest available production/activity data, principally 2024 data. Processing share is the proportion of production entering the relevant commercial or processing stream. [1]For livestock, beef production is converted from carcass to live weight using a 50.07% dressing yield before applying the 27.5% waste factor. [2]For 2015 fish, industrial whole - fish throughput is inferred from export volume using a 40% product yield before applying the 56% by - product factor. The estimates cover selected agro - industrial waste streams and do not constitute a complete national waste inventory.

Calculation: Production/activity × processing share × waste factor = estimated waste. Where actual processing throughput is available, it is used directly.

13.2 Pillar 2: Market Dynamics and Supply Chain Architecture

13.2.1 Market Drivers for Agro - industrial Waste Valorisation

The commercial viability of agro - industrial waste valorisation is driven by converging demand and policy dynamics. Uganda's expanding poultry, dairy, livestock and aquaculture industries continue to increase demand for affordable feed ingredients, particularly alternative protein sources such as Black Soldier Fly (BSF) meal to replace imported fishmeal, blood and soya concentrates (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2024b). Rising mineral fertiliser prices have renewed interest in locally produced organic fertilisers. Increasing demand for biomass fuels and biogas creates additional off - take for agricultural residues and processing waste. (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)), 2024b) (Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) / AAIN, 2025)

Table 13.2 - Key Market Drivers for Agro - industrial Waste Valorisation

Market Driver	Investment Implication
Growth in livestock, poultry and aquaculture	Increased demand for BSF protein, animal feed ingredients and organic fertilisers to displace imports
Rising mineral fertiliser prices	Expanding market for certified organic fertilisers and bio - based nutrient products
Growing demand for renewable energy	Increased off - take for biogas, biomass pellets and waste - to - energy technologies
Government support for agro - industrialisation	NDP IV and Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) policy mandates increase investment attractiveness and reduce regulatory risk
Circular economy and climate policies	EU Green Deal and National Environment Management Authority regulations create demand for resource - efficient technologies
Regional export opportunities in EAC	Market opportunities for certified BSF protein, organic fertilisers and bio - based products in Kenya, Tanzania and Rwanda

Sources: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) (2024); FAO (2024); Ministry of Energy and Mineral Development (2023); A2i enterprise consultations (2026). (Ministry of Energy and Mineral Development, 2023)

13.2.2 The Agro - industrial Waste Valorisation Technology Decision Framework

Uganda's agro - industrial waste streams can be converted into value - added products through five principal technology pathways, each suited to particular feedstock types, scale requirements and market opportunities. Understanding which pathway applies to which waste stream is the first investment decision because technology mismatches are among the most common causes of commercial failure in this sector. (UNIDO, 2024)

Technology Pathway	Best - Suited Waste Streams	Key Outputs	Principal Constraint	Technology Relevance
Black Soldier Fly (BSF)	Poultry manure, food waste, fruit residues, fisheries waste	BSF protein (feed ingredient), BSF frass (organic fertiliser)	Feedstock quality, segregation and consistency	High - direct substitution for imported fishmeal; multiple Ugandan enterprises
Biogas / Anaerobic Digestion	Dairy manure, abattoir waste, cassava wastewater, mixed organics	Biogas (energy), digestate (fertiliser)	Feedstock volume and wet logistics	High - energy cost reduction; digestate as organic fertiliser by - product

Organic Fertiliser / Composting	Poultry manure, BSF frass, biochar blends, digestate	Certified organic and bio - fertilisers	Certification (Uganda National Bureau of Stan-dardsUganda National Bureau of Standards (UNBS)), market distribution, quality consistency	High - import substitution; multi-ple enterprises with certification gaps
Biomass Carboni-sation / Biochar	Rice husks, coffee husks, crop resi-dues, dry biomass	Biochar, biochar - enriched fertiliser	Consistent dry biomass supply; transport logistics	High - carbon value - add; Bongomin Group as anchor enterprise
Drying and Pro-cess Optimisation	DDGS, fruit resi-dues, BSF meal, biomass fuels	Improved product quality, shelf life, energy efficiency	Capital cost of industrial dryers	Highest priority tech-nology gap identified across all enterprises

Source: A2i enterprise consultations and technology assessment, April - August 2026. (A2i, 2026d)

13.2.3 Cross - sector Circular Value Chain Architecture

The most commercially viable waste valorisation models in Uganda are not standalone processing facilities; they are integrated circular value chains connecting waste generators, specialised processors and end - market buyers. The core circular loop runs as follows: large agro - industrial enterprises (poultry farms, fruit processors, abattoirs) generate concentrated organic waste streams; specialised BSF, composting or biogas processors convert these streams into protein ingredients and bio - fertilisers; and downstream buyers, principally aquafeed manufacturers (De Heus Uganda, SR Kuku / Wind Green), large poultry operations and commercial agriculture, provide reliable off - take at commercially viable prices.

This architecture means that technology investments in isolation are unlikely to achieve commercial viability. The three enabling conditions reliable feedstock supply, technical processing capacity, and assured off - take markets must exist simultaneously. GTTF investment design should therefore aim to strengthen all three nodes rather than financing individual enterprises in isolation.

13.3 Pillar 3: Ecosystem Mapping and Gap Analysis

13.3.1 Government Institutional Framework

Seven principal Government institutions with complementary statutory mandates support Uganda's agro - industrial waste valorisation sector. These institutions establish the policy, regulatory and technical environment that enables private - sector investment, technology adoption and market development. (Uganda Investment Authority (UIA), 2024)

Institution	Statutory Mandate	Role in Supporting Agro - industri-al Waste Valorisation

Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))	Agriculture, livestock, fisheries and agro - industrialisation	Promotes agricultural production, value chain development, feedstock availability and adoption of sustainable processing technologies
National Environment Management Authority (NEMA)	Environmental regulation and waste management	Regulates environmental compliance, promotes resource recovery and implements circular economy and waste management policies
Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)	Standards development and certification	Develops product standards and certification for feeds, fertilisers and bio - based products - a critical gate for commercial market access
Ministry of Trade, Industry and Cooperatives (MTIC)	Industrial development and private sector competitiveness	Supports agro - industrialisation, manufacturing and value addition through industrial policy and enterprise development
Uganda Investment Authority (UIA)	Investment promotion and facilitation	Facilitates domestic and foreign investment, investor services and industrial park development
Ministry of Energy and Mineral Development	Renewable energy policy and development	Supports biomass energy, biogas and other waste - to - energy technologies
National Agricultural Research Organisation (NARO)	Agricultural research and innovation	Develops and adapts technologies for resource utilisation and commercial application of bio - based innovations

Source: A2i institutional mapping and stakeholder consultations, 2026. (A2i, 2026j)

13.3.2 Critical Regulatory Gaps

Despite an enabling policy framework, three regulatory gaps constrain commercial investment at scale. First, Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product standards for BSF - derived feed ingredients and organic fertilisers remain incomplete or unclear, creating certification uncertainty for enterprises seeking to access commercial livestock and agricultural markets. Second, the National Environment (Waste Management) Regulations (2020) provide a legal framework for waste recovery but lack the sector - specific guidance needed to distinguish commercial waste valorisation from general waste disposal for licensing purposes. Third, at the EU level, the EU Deforestation Regulation (EUDR) and evolving SPS requirements for bio - based products create potential future market access challenges for Ugandan organic fertiliser and feed ingredient exporters, though this presents an opportunity for early - mover compliance investment. (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS), 2024b)

13.3.3 Donor Programme Landscape and Gaps

Several active donor programmes address agro - industrial waste and circular economy themes in Uganda, including UNIDO's Resource Efficient Cleaner Production programme, EU - funded agricultural value chain development programmes, and development partner - supported biogas and renewable energy initiatives. However, gaps remain: the sector lacks a dedicated programme focused specifically on agro - industrial waste valorisation

technology transfer at commercial scale; Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product certification support for BSF meal and bio - fertilisers is absent; and no existing programme links Danish and EU technology providers systematically to Ugandan waste valorisation enterprises. (OECD, 2023)

13.4 Pillar 4: Enterprise Profiling and Technology Matching

13.4.1 Enterprise Engagement Methodology

Between May and July 2026, the A2i assessment team conducted structured virtual and physical consultations with eleven enterprises representing different segments of Uganda's agro - industrial waste management value chain, including both waste generators and waste valorisation enterprises. Each engagement examined waste generation and utilisation practices, existing technologies, business models, operational constraints, investment priorities and opportunities for Danish technology partnership. The findings below are drawn from consultation notes and represent primary evidence informing the GTTF investment analysis.

Enterprises were initially classified into two models: Model 1 (agro - industrial enterprises that generate waste as a by - product of primary production or processing) and Model 2 (specialist waste valorisation enterprises whose core business is converting organic waste into value - added products). Subsequent assessment grouped enterprises into three investment categories based on the primary intervention needed to unlock commercial growth.

13.4.2 Tier 1 Enterprises: Immediate Investment Readiness

The following enterprises are assessed as Tier 1 demonstrating established commercial operations, clearly defined technology investment needs, and the operational readiness to absorb GTTF co - investment and deploy Danish/EU technology.

Bukona Agro Processors Ltd

Table 13.4.1 Bukona Agro Processors Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Uganda
Core business	Ethanol from maize and cassava; DDGS (dried distillers grains with solubles) as principal co - product
Waste streams / current position	DDGS, process wastewater, CO2, waste heat
Commercial position	Tier 1 - established commercial operations with a clearly defined technology investment need

Table 13.4.1b Bukona Agro Processors Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity

DDGS value and energy cost are constrained by inadequate drying and unrecovered waste heat from the ethanol process	Industrial drying and waste heat recovery to improve DDGS quality and reduce energy costs	Industrial dryer with waste - heat recovery integration	Stela Laxhuber (DE); VetterTec (DE); Dutch Dryers BV (NL)	High

DEM Farm Uganda Ltd

Table 13.4.2 DEM Farm Uganda Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Mityana
Core business	120,000 - bird poultry farm with an existing certified organic fertiliser line from manure (15 - day production cycle)
Waste streams / current position	Poultry manure, process wastewater, planned biogas slurry
Commercial position	Tier 1 - established commercial operations with a clearly defined technology investment need

Table 13.4.2b DEM Farm Uganda Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Existing fertiliser line has expansion headroom, and process wastewater nutrient recovery is not yet captured	Expand organic fertiliser production line with integrated nutrient recovery from process wastewater	Manure processing and nutrient recovery systems	Alfa Laval (SE); Transform / Danish Rootzone Technology (DK)	High

OranaGate Fruit Processing Ltd

Table 13.4.3 OranaGate Fruit Processing Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Uganda

Core business	Orange, mango and other fruit juices and concentrates
Waste streams / current position	Fruit peels, seeds, wastewater - 2.5 T/hr residues at 5 T/hr processing capacity
Commercial position	Tier 1 - established commercial operations with a clearly defined technology investment need

Table 13.4.3b OranaGate Fruit Processing Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Fruit seed residue is not currently recovered as a year - round boiler fuel source	Industrial biomass drying system converting fruit seeds into boiler fuel	Industrial biomass drying system	Stela Laxhuber (DE); Dutch Dryers BV (NL); VetterTec (DE)	High

Soroti Fruit Juice Factory (TEJU)

Table 13.4.4 Soroti Fruit Juice Factory (TEJU) profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Soroti
Core business	Orange and mango juices; BSF and fertiliser feasibility study already complete
Waste streams / current position	Fruit peels, pulp, wastewater - approximately 2 T/hr, expanding
Commercial position	Tier 1 - feasibility complete, commercial implementation pending

Table 13.4.4b Soroti Fruit Juice Factory (TEJU) investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
A completed BSF and fertiliser feasibility study has not yet moved to commercial implementation	Integrated BSF and organic fertiliser facility, converting a completed feasibility study into commercial operation	BSF production line integrated with organic fertiliser processing	Insectum ApS (DK); Manna Insect (FI); Insect Engineers (NL)	Medium - feasibility complete, commercial build - out pending

Bioconvision Jinja Ltd

Table 13.4.5 Bioconvision Jinja Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Jinja
Core business	Commercial BSF production from organic waste - 4 - 5 T/day current, 10 T/day design capacity
Waste streams / current position	Agro - industrial organic waste (poultry, fruit residues)
Commercial position	Tier 1 - established commercial operations with a clearly defined technology investment need

Table 13.4.5b Bioconvision Jinja Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Current throughput (4 - 5 T/day) sits well below design capacity (10 T/day), constrained by automation and feedstock supply consistency	BSF automation and feedstock supply partnerships to reach 8 T/day commercial viability	BSF production automation systems	Insectum ApS (DK); Buhler Insect Technology (CH)	High

BioBloom Uganda Ltd

Table 13.4.6 BioBloom Uganda Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Kampala
Core business	BSF larvae and organic fertiliser production; Bokashi fermentation; existing partnership with Manna Insect (FI)
Waste streams / current position	Poultry litter, brewery spent grain, market waste
Commercial position	Tier 1 - established commercial operations with a clearly defined technology investment need

Table 13.4.6b BioBloom Uganda Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Scaling BSF production requires decentralised, climate - controlled modular units rather than a single large facility	Modular, locally - manufactured BSF units with climate - control systems	Modular BSF production units with climate control	Manna Insect (FI); Insectum ApS (DK)	High

13.4.3 Tier 2 Enterprises: Feedstock and Commercial Development Priorities

The following enterprises have processing capacity but require feedstock partnerships, commercial development support or capital strengthening.

Bongomin Group

Table 13.4.7 Bongomin Group profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Mbale
Core business	Biomass carbonisation, 20,000 T/yr design capacity at 60% utilisation; biochar - enriched organic fertiliser; 21,000 acres of own crop production
Waste streams / current position	Crop residues and biomass for carbonisation; BSF frass partnership potential for enriched fertiliser
Commercial position	Tier 2 - processing capacity exists but plant utilisation and feedstock aggregation are the binding constraints

Table 13.4.7b Bongomin Group investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Plant runs at 60% of design capacity due to biomass drying and aggregation gaps	Biomass drying and aggregation investment, paired with a BSF frass supply partnership for higher - value fertiliser	Biomass drying and aggregation logistics	Not specified in enterprise consultation - biomass drying equipment per the chapter's Drying and Process Optimisation pathway (Table 13.2.2)	Medium

Jumol Agrotech Uganda Ltd

Table 13.4.8 Jumol Agrotech Uganda Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Bushenyi
Core business	BSF and water hyacinth - based livestock feeds and organic fertiliser for the Western Uganda dairy and livestock sector
Waste streams / current position	Water hyacinth (mechanically harvested), organic waste for BSF
Commercial position	Tier 2 - technology and commercialisation support both needed

Table 13.4.8b Jumol Agrotech Uganda Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Water hyacinth harvesting is not mechanised, and products lack Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification for formal market access	Mechanised water hyacinth harvesting and drying, paired with Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) product certification support	Mechanised harvesting and drying equipment; laboratory testing capability	Not specified in enterprise consultation	Medium

Ugavoil Products Ltd

Table 13.4.9 Ugavoil Products Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Kasese
Core business	BSF poultry feed, frass and vermicompost - 10 T/day design capacity, approximately 4 T/day actual due to contamination
Waste streams / current position	Poultry and organic waste for BSF, currently affected by feedstock contamination
Commercial position	Tier 2 - feedstock quality is the binding constraint on capacity utilisation

Table 13.4.9b Ugavoil Products Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Feedstock contamination limits actual throughput to well below design capacity	Feedstock segregation partnerships and controlled drying to improve product quality and capacity utilisation	Feedstock segregation and controlled drying systems	Not specified in enterprise consultation - drying equipment per the chapter's Drying and Process Optimisation pathway (Table 13.2.2)	Medium

Asante Agro / Asante Waste Management

Table 13.4.10 Asante Agro / Asante Waste Management profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Kampala plus 6 cities
Core business	Integrated waste collection serving 400+ customers; 65 - 70% organic waste; East African logistics network of 27+ storage sites
Waste streams / current position	Mixed organic waste across a multi - city collection network
Commercial position	Tier 2 - existing logistics infrastructure, feedstock aggregation partnership is the priority

Table 13.4.10b Asante Agro / Asante Waste Management investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Existing collection network is not yet structured as a dedicated feedstock aggregation hub for BSF processors	Regional organic waste aggregation hubs feeding BSF supply chains	Not equipment - specific - feedstock aggregation and commercial supply agreement facilitation	Not applicable - feedstock and partnership facilitation, not an equipment investment	Low - facilitation and partnership - dependent

Marula Proteen

Table 13.4.11 Marula Proteen profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement

Location	Kigali / Uganda
Core business	BSF - assisted composting - 200 T/month in Rwanda, 500 T sold into Uganda in the March season
Waste streams / current position	Agro - industrial feedstock from avocado, coffee, and fruit processors
Commercial position	Tier 2 - proven model in Rwanda, feedstock partnerships needed to replicate in Uganda

Table 13.4.11b Marula Proteen investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Replicating the Rwanda model in Uganda requires reliable long - term agro - industrial feedstock partnerships not yet in place	Long - term feedstock partnerships with avocado, coffee, and fruit processors, and agro - dealer market development	Not equipment - specific - feedstock partnership and market development	Not applicable - feedstock and market development facilitation, not an equipment investment	Low - facilitation and partnership - dependent

13.4.4 Strategic Anchor Enterprises

Two enterprises are assessed not as direct GTTF grant recipients but as critical strategic anchors whose participation unlocks the commercial viability of the circular value chain as a whole.

De Heus Uganda Ltd

Table 13.4.12 De Heus Uganda Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Jinja
Core business	Manufactures 50,000 T/yr of Koudijs aquafeed, with a second 50,000 T/yr line being installed
Waste streams / current position	Not a waste generator - market anchor and off - take buyer for BSF protein
Commercial position	Strategic anchor, not a direct grant recipient. Commercial demand for BSF protein is the primary market - pull for Ugandan BSF producers; De Heus cannot currently source sufficient volume and quality domestically

Table 13.4.12b De Heus Uganda Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Domestic BSF protein supply does not yet meet De Heus's volume and quality requirements	Facilitated commercial off - take agreements and supplier qualification between De Heus and domestic BSF producers (Bioconvision, BioBloom, Ugavoil)	Not applicable - market linkage and supplier qualification facilitation	Not applicable	Not applicable - facilitation role

Kenchic Uganda Ltd

Table 13.4.13 Kenchic Uganda Ltd profile

Item	Description
Engagement basis	KII completed, May - August 2026 (virtual or physical consultation), A2i enterprise engagement
Location	Uganda
Core business	Vertically integrated poultry company - 420,000 day - old chicks/week, 117,000 broilers/week, 340 T feed/week
Waste streams / current position	Hatchery waste, manure, offal - reliable, year - round, concentrated organic waste streams
Commercial position	Strategic anchor, not a direct grant recipient. Prefers commercial supply partnerships to internal waste processing

Table 13.4.13b Kenchic Uganda Ltd investment and technology opportunities

Business challenge	Investment opportunity	Technology required	Potential Danish/ EU providers	Investment maturity
Reliable feedstock volume exists but is not yet under formal commercial supply agreements with BSF processors	Facilitated commercial feedstock supply agreements with BSF producers (Bioconvision, BioBloom, Ugavoil)	Not applicable - feedstock supply agreement facilitation	Not applicable	Not applicable - facilitation role

13.5 Pillar 5: Impact Metrics and Commercial Engagement

13.5.1 Cross - cutting Findings from Enterprise Engagements

Finding 1: No single investment model works for all enterprisesEnterprises fall into three distinct intervention categories: those requiring technology co - investment (Bukona, DEM Farm, OranaGate, TEJU); those requiring feedstock security and aggregation partnerships (Bongomin, Ugavoil, Biocon-vision, BioBloom); and those requiring commercial development support before additional technology deployment (Jumol, De Heus, Marula Proteen).

Finding 2: Feedstock security has overtaken technology as the principal commercial constraint- Feedstocks such as poultry manure, fruit processing residues, rice husks and coffee husks are increas-ingly commercial raw materials rather than freely available waste. Several enterprises operate below installed capacity due to inconsistent segregated organic waste supply, seasonal biomass availability and increasing competition for quality residues.

Finding 3: Waste valorisation depends on integrated value chains Commercial viability depends on coordination between waste generators, specialised processors and end - market buyers - not on standalone processing facilities. Most enterprises rely on combinations of feedstocks to achieve required processing performance, while several deliberately specialise in selected stages of the value chain.

Finding 4: Drying and moisture management is the most consistent technology gap Drying require-ments were identified in fruit processing, ethanol production, biomass carbonisation, BSF production and animal feed manufacturing - directly affecting product quality, storage, transport efficiency and process-ing performance. Several enterprises expressed interest in locally manufactured equipment supported by European engineering and process optimisation.

Finding 5: Commercial development determines investment success Technology investments alone are unlikely to achieve sustained commercial success without complementary product certification, lab-oratory testing, quality assurance, distribution networks and commercial off - take arrangements. Several enterprises had technically viable products but lacked regulatory compliance or market confidence to expand production.

13.5.2 Projected Impact: Investment Outcomes

If implemented, the proposed investments will increase the commercial recovery of agro - industrial waste while delivering measurable climate, biodiversity and commercial outcomes. The strongest direct contribution will be to climate change mitigation through diversion of organic waste from uncontrolled disposal, renewable energy recovery, improved energy efficiency and substitution of conventional feed and fertiliser inputs. The investments will also contribute to climate adaptation where they explicitly strengthen the resilience of agricul-tural value chains to identified climate risks, and to biodiversity where they reduce pressures on ecosystems or support sustainable use of biological resources. Under the OECD DAC Rio Marker approach, these objectives will need to be explicit in the design and monitoring of each investment to qualify as principal or significant ob-

jectives (OECD DAC, 2016).

Impact Vector	Projected Outcome	Proposed Indicator	5 - Year Target / Direction	Investment Pathway	Indicative Rio Relevance (OECD DAC, 2016)
Climate mitigation: organic waste diversion	GTTF - supported enterprises will divert larger volumes of agro - industrial residues from uncontrolled disposal and low - value uses into productive applications.	Tonnes of agro - industrial waste valorised/year; % of available feedstock commercially recovered.	Commercial valorisation will increase from the current estimated ~10 - 15% toward 30 - 40%.	BSF investments, fertiliser production, biochar, feedstock aggregation and waste - processing systems.	Mitigation - Principal / Significant
Climate mitigation: low - carbon processing	Industrial drying, waste - heat recovery, nutrient recovery and process optimisation will reduce energy use and emissions from agro - industrial processing.	Energy saved; renewable energy generated; tCO e reduced/avoided; energy intensity of processing.	Investment - specific targets will be established during appraisal.	Bukona, OranaGate, DEM Farm, Bongomin and related technology investments.	Mitigation - Principal / Significant
Climate mitigation: circular protein production	Feedstock partnerships and BSF investments will increase domestic production of alternative protein for the feed industry.	Tonnes of organic waste converted; tonnes of BSF protein supplied/year; conventional protein displaced.	Domestic BSF protein supply will increase toward 5,000 - 8,000 T/year.	Kenchic and other waste generators Bioconvision, BioBloom and Ugavoil De Heus.	Mitigation - Significant; potentially Principal where emission reduction is explicit

Climate mitigation and soil resource recovery	Manure, frass and other organic residues will be converted into certified organic and biochar - enriched fertilisers, increasing nutrient recovery and reducing unmanaged organic waste.	Tonnes of organic residues recovered; tonnes of certified fertiliser produced; nutrient recovery; tCO e avoided where measurable.	Certified organic fertiliser production will increase toward 10,000 - 15,000 T/year.	DEM Farm, Bongomin, TEJU and BSF/ frass partnerships.	Mitigation - Significant
Climate adaptation: resilient agricultural input supply	Local production of feed ingredients, fertilisers and soil amendments will diversify agricultural input supply and strengthen resilience of participating value chains.	Producers reached; share of inputs supplied locally; enterprises with diversified feedstock and input sources.	30,000 - 40,000 producers will be linked to strengthened circular supply chains.	Domestic BSF protein, fertiliser production and regional feedstock partnerships.	Adaptation - Significant where climate vulnerability and response are explicitly demonstrated
Biodiversity and ecosystem protection	Improved waste recovery will reduce uncontrolled disposal into soils, wetlands and water systems and support productive use of biological resources.	Tonnes diverted from harmful disposal; water/soil quality indicators where relevant; ecosystem area affected where demonstrable.	Investment - specific environmental targets will be established at appraisal.	Waste segregation, wastewater/resource recovery, water - hyacinth management and controlled organic - waste processing.	Biodiversity - Significant where biodiversity objective and causal pathway are explicit
Green private - sector mobilisation	GTTF co - investment will mobilise enterprise capital and accelerate commercial deployment of Danish and European green technologies.	Private capital mobilised; technologies deployed; Danish/EU - Ugandan partnerships established.	Targets will be set against the approved investment pipeline.	Matching grants, technology partnerships and local fabrication.	Enabling commercial outcome supporting Rio objectives

Circular market development	Anchor buyers and supplier partnerships will create durable markets for waste - derived products beyond GTTF support.	Off - take agreements; feedstock agreements; value of circular products sold; import substitution.	Commercial volumes and contract values will increase over the programme period.	De Heus as BSF off - taker; Kenchic as feedstock anchor; enterprise - to - enterprise supply agreements.	Commercial sustainability outcome

Note: All projections are indicative estimates based on enterprise consultation data and A2i analysis. Actual outcomes depend on investment scale, programme design and market conditions.

13.5.3 RIO Markers: Full Scoring Against the OECD DAC Handbook

Table 13.5.2 above uses indicative Rio relevance language, consistent with landscape - assessment stage. This section applies the OECD DAC Rio Markers for Climate Handbook's actual three - point scoring system (0 - not targeted, 1 - significant, 2 - principal) to this chapter's five headline technology pathways, so that Waste Management's climate - funding case can be assessed on the same explicit, handbook - grounded basis as the rest of the GRASP portfolio.

Table 13.5.3 RIO Markers scoring: waste valorisation technology pathways

Technology pathway	Mitigation	Adaptation	Scoring rationale
Black Soldier Fly (BSF)	1 - Significant	0 - Not targeted	Diverts organic waste from uncontrolled decomposition (a methane source) and displaces imported fishmeal, but the stated design driver is commercial protein substitution, not GHG reduction - scored Significant rather than Principal.
Biogas / Anaerobic Digestion	2 - Principal	0 - Not targeted	Directly captures methane from manure and wastewater that would otherwise decompose uncontrolled, and displaces fossil energy at the processing site - meets the Handbook's principal - objective test directly, mirroring the equivalent finding in the Dairy and Livestock chapters.
Organic Fertiliser / Composting	1 - Significant	1 - Significant	Reduces synthetic fertiliser dependence (mitigation, via avoided manufacturing emissions) and supports soil resilience for participating farms (adaptation), but neither is the primary stated design driver - commercial import substitution is.
Biomass Carbonisation / Biochar	1 - Significant	0 - Not targeted	Sequesters carbon in biochar and displaces fossil fuel use as a boiler fuel substitute, but is formulated primarily as a commercial value - addition investment for crop residues.

Drying and Process Optimisation	0 - Not targeted	0 - Not targeted	Formulated and justified entirely as a product - quality and shelf - life investment; no climate objective is stated or implied in its design, consistent with how equivalent efficiency - only investments are scored elsewhere in the GRASP portfolio.

Source: OECD DAC. Reporting Rio Markers and Environmental - Related Development Finance in the OECD Creditor Reporting System: Handbook for Reporters. Agriculture and general eligibility criteria applied directly to each pathway above.

Biodiversity is not separately scored: none of the five pathways as currently designed states an explicit ecosystem, species, or land - degradation objective, so a biodiversity claim is not made for this sector on the same conservative basis applied in the Dairy and Livestock chapters.

13.5.4 Danish and EU Engagement Modality Mapping

Each technology pathway is mapped below against the four Danish and EU engagement modalities defined for the GTTF Call, mirroring the equivalent tables in the Dairy and Livestock chapters.

Table 13.5.4 Danish/EU engagement modality by technology pathway

Technology pathway	Investment/exploration	Equipment	Technical assistance	Financial instrument
Black Soldier Fly (BSF)	Danish/EU private - sector partnership (Insectum ApS, Manna Insect)	Primary - Insectum ApS (DK); Manna Insect (FI); Buhler Insect Technology (CH)	Feedstock quality and BSF automation training	Matching grant
Biogas / Anaerobic Digestion	Danish/EU private - sector partnership	Primary - Danish anaerobic digestion suppliers (covered digesters)	Technical transfer for slurry/ wastewater management	Matching grant; Government - to - Government instrument for municipal linkage
Organic Fertiliser / Composting	-	Alfa Laval (SE) nutrient recovery systems	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification and product quality advisory	Matching grant
Biomass Carbonisation / Biochar	-	Biomass drying and carbonisation equipment (EU suppliers)	Aggregation logistics and quality - consistency training	Matching grant

Drying and Process Optimisation	-	Primary - Stela Laxhuber (DE); VetterTec (DE); Dutch Dryers BV (NL)	Process optimisation advisory	Matching grant

Source: Danish and EU engagement modalities as defined for the GTTF Call, August 2026; supplier detail drawn from Table 13.2.2 and the Tier 1 enterprise profiles (13.4.2).

13.6 Pillar 6: Investment Structuring and GTTF Grant Outcomes

The enterprise intervention types below already carry a technical assistance component, reflecting this chapter's own finding that waste valorisation enterprises fail more often on operating discipline (feedstock consistency, digester or dryer maintenance, off - take quality specification) than on access to capital. Technical assistance funding should be sized to each enterprise's distance from proven commercial operation, not applied as a flat percentage across an intervention type.

13.6.1 Enterprise Intervention Types

Based on the enterprise assessments, the eleven profiled enterprises are grouped into three investment categories that determine the appropriate form of GTTF intervention. This framework reflects the primary barrier to commercial growth.

Intervention Type	Purpose	Priority Enterprises	Typical GTTF Intervention
Intervention Type 1: Technology and Equipment Investment	Enterprises requiring technology or equipment to improve processing efficiency, resource recovery or product quality	Bukona Agro Processors, DEM Farm Uganda, OranaGate Fruit Processing, TEJU, Ugavoil Products, Jumol Agrotech, BioBloom Uganda, Bioconvision	Matching grants for technology acquisition, equipment installation and process optimisation
Intervention Type 2: Feedstock Supply and Value Chain Partnerships	Enterprises generating or requiring reliable, concentrated organic waste where commercial partnerships are needed	Kenchic Uganda, Bukona Agro Processors, OranaGate, TEJU, DEM Farm, Bioconvision, BioBloom, Asante Waste Management, Bongomin, Marula Proteen, Ugavoil	Facilitate commercial feedstock agreements, aggregation models, logistics and business - to - business partnerships
Intervention Type 3: Strategic Market and Off - take Development	Enterprises that create market demand for circular products or strengthen downstream value chains	De Heus Uganda, Marula Proteen, Bongomin Group	Commercial partnerships, market linkages and value chain development to stimulate demand for BSF protein and organic fertilisers

13.6.2 Recommended GTTF Technology Investment Portfolio

Enterprise	GTTF Investment Package	Key Technology Interventions	Expected Outcome
Bukona Agro Processors	Technology Co - investment	Industrial drying + waste heat recovery	Improved DDGS quality, higher resource value, reduced energy costs
DEM Farm Uganda	Technology Co - investment	Manure dewatering, fertiliser processing, nutrient recovery systems	Expanded organic fertiliser production; nutrient recovery from wastewater
OranaGate Fruit Processing	Technology Co - investment	Industrial biomass drying system for fruit seeds as boiler fuel	Year - round fuel supply; improved energy efficiency
Soroti Fruit Juice Factory (TEJU)	Technology Co - investment	Integrated BSF and organic fertiliser production facility	Commercial conversion of fruit residues into high - value products
Bioconvision Jinja	Integrated Investment Package	BSF production automation + feedstock supply partnerships	Increased capacity utilisation from 4 - 5 T to 8 - 10 T/day
BioBloom Uganda	Integrated Investment Package	Modular BSF units (local manufacture + EU design) + climate control	Reduced investment costs; decentralised production scaling
Ugavoil Products	Feedstock and Process Optimisation	Pre - processing/sorting + controlled drying	Reduced contamination losses; improved feed product quality
Jumol Agrotech	Technology + Commercialisation	Mechanised harvesting + drying + Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification support	Improved product quality; commercial market access
Bongomin Group	Integrated Investment Package	Biomass drying + aggregation logistics + BSF frass supply partnerships	Increased plant utilisation; higher - value carbon - enriched fertiliser

Source: A2i enterprise assessment and technology matching analysis, 2026.

13.6.3 Capital Stack Design and 5:1 Leverage Pathway

The assessment indicates a credible pathway toward the GTTF 5:1 leverage target, particularly across commercially established Tier 1 enterprises. The agro - industrial waste sector presents a lower grant intensity than some other GTTF sectors: technology costs are generally in the US$50,000 - 500,000 range, commercial financing from UDB and Stanbic Bank is accessible for certified organic processors, and Ugandan commercial lenders increasingly understand the value proposition of circular economy technology.

Enterprise Tier	Typical Investment Range	GTTF Grant Share	Co - financing Sources	Target Leverage
Tier 1 (Technology Co - investment)	US$100K - 500K per deal	20 - 30%	UDB, Stanbic Bank, Centenary Bank, commercial equity	**5:1 - 8:1**
Tier 2 (Feedstock/ Partnership)	US$30K - 150K facilitation	40 - 50%	Enterprise own contribution, GCU pilot facility	**5:1**
Value Chain Facilitation	US$20K - 80K per partnership	60 - 80% (TA)	Enterprise contribution	**3:1 - 5:1**

Note: 5:1 is the GTTF programme target. Higher leverage is reported where achieved but should not be stated as the baseline expectation.

Pillar 7: Policy, Programme Alignment and Post - Grant Sustainability

13.7.1 Policy Alignment: NDP IV and Uganda Vision 2040

The agro - industrial waste value chain is among the most directly aligned of the ten priority value chains assessed under the GRASP/GTTF landscape study with Uganda's national development framework. NDP IV (2025/26 - 2029/30) explicitly targets agro - industrialisation, value addition and circular economy approaches. The National Agriculture Policy promotes efficient utilisation of agricultural resources and by - products. The National Environment Act (2019) and Waste Management Regulations (2020) provide the legal framework for waste recovery enterprises. These policy mandates collectively create a favourable environment for GTTF - supported waste valorisation investment.

13.7.2 The Grain Export Ban Risk: Indirect Policy Consideration

A key cross - sector policy risk for the agro - industrial waste sector is Uganda's history of ad hoc grain export bans. Export restrictions on maize, which directly affect the availability and price of DDGS (a principal waste stream and feed ingredient from ethanol production), can disrupt feedstock supply and financial projections for enterprises like Bukona Agro Processors. GTTF investment cases in the waste sector that depend on DDGS as both a revenue stream and a feedstock should model this policy risk explicitly and apply scenario analysis.

13.7.3 Multi - Criteria Decision Analysis (MCDA) Sector Scoring

The following Multi - Criteria Decision Analysis (MCDA) scoring applies the standard GRASP assessment framework to the Agro - industrial Waste Value Chain.

Assessment Criterion	Weight	Score (1 - 10)	Rationale
Growth potential and market scale	20%	6	76% growth in waste volumes 2015 - 2025; emerging rather than established commercial market
Export viability and trade balance	15%	4	Primarily import substitution (organic fertiliser, BSF protein); export potential limited in near term

Climate vulnerability and resilience	15%	8	Strong climate mitigation case: GHG avoidance from waste diversion; carbon biochar; renewable energy
Import substitution opportunity	20%	8	BSF protein replaces imported fishmeal; organic fertiliser replaces mineral imports; direct trade balance improvement
Technology absorptive capacity	15%	6	Several enterprises technically capable but certification gaps, feedstock constraints and commercial readiness gaps require addressing
Inclusiveness (smallholder/gender)	15%	6	Indirect smallholder linkages through feedstock aggregation; gender dimension present in some enterprises
WEIGHTED OVERALL SCORE	**100%**	**6.4 / 10**	**Solid mid - range sector: strong circular economy case and EU policy alignment; commercial scale - up needed**

Note: this table was originally scored on a 1 - 5 scale and has been rescaled to the 1 - 10 scale used in the Dairy and Livestock chapters for cross - chapter comparability (each score and the weighted total multiplied by 2; relative weighting and judgment unchanged). Five Case Model appraisal retained as an additional analytical tool.

13.7.4 SWOT Analysis: Agro - industrial Waste Value Chain

STRENGTHS	**WEAKNESSES**
- Growing waste resource (1.71M T; +76% over decade) - Existing enterprise pipeline (11 enterprises profiled) - Strong policy alignment (NDP IV, National Environment Management Authority, Vision 2040) - Clear cross - sector feedstock linkages (poultry, dairy, aquaculture) - Danish/EU technology ecosystem directly applicable (BSF, biogas, drying, biochar) - De Heus aquafeed demand as commercial market anchor	- Municipal waste excluded (segregation failure) - Many enterprises below commercial scale; feedstock constraints - Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) certification gaps for BSF meal and bio - fertilisers - Limited domestic demand at price points that support commercial BSF operations - Small and dispersed organic waste generators; logistics costs high
OPPORTUNITIES	**THREATS**
- De Heus 100,000 MT/yr aquafeed demand creates large BSF off - take market - Rising fertiliser prices expand organic fertiliser market - EU Circular Economy and Green Deal policies create technology export interest - Regional (EAC) market for certified organic products - Local manufacture of BSF systems (BioBloom + Manna Insect model) reduces capital costs	- Competition for quality feedstocks increasing (commercial rather than free waste) - Grain export ban policy risk affecting DDGS availability (Bukona) - Asian BSF and organic fertiliser technology is cheaper though lower specification - Regulatory uncertainty around BSF - derived feed standards (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))) - Climate risks affecting biomass availability for carbonisation enterprises

13.7.5 Post - Grant Sustainability

The agro - industrial waste sector presents strong post - grant sustainability prospects because the proposed investments address commercial costs rather than depend on grant - funded demand. Waste valorisation will reduce energy and disposal costs, substitute imported feed and fertiliser inputs, and create revenue from underused residues. Commercial sustainability will depend on reliable feedstock, certification and sustained off - take; technology investments should therefore be linked, where applicable, to medium - term supply or off - take agreements and credible financing for operations and maintenance after grant support ends.

The investments will also strengthen climate and environmental sustainability. Waste diversion, energy efficiency, waste - heat recovery, biogas, biochar and circular protein production will contribute directly to mitigation, while selected investments may support adaptation and biodiversity where these objectives are explicit in project design and monitoring. Post - grant monitoring should retain relevant climate and resource - efficiency indicators alongside commercial performance, consistent with Section 13.5.2.

Finally, GTTF will support Uganda - Denmark/EU green commercial partnerships beyond one - off technology procurement. Danish/EU suppliers can provide equipment, while Ugandan enterprises provide feedstock, operations and regional market access. This aligns with Denmark's Uganda Strategic Framework, which prioritises green economic transformation, climate - resilient agro - food systems and expanded commercial cooperation through Danish green technologies. Successful investments can therefore generate repeat technology partnerships and local after - sales capacity beyond the grant period (Ministry of Foreign Affairs of Denmark, 2022)

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Chapter 14 : Comparative Analysis and Sector Prioritization

This is the most decision - critical chapter for aBi investment It draws together the ten independently scored MCDA assessments in Chapters 4 through 13 into a single ranked view, surfaces the findings that recur across sectors rather than belonging to any one of them, consolidates the Danish and EU technology recommendations into one supplier - facing matrix, and rolls the enterprise pipeline into a single tiered view for GTTF resource allocation.

A methodological note before the ranking: several chapters flag their own MCDA score as chapter - level and provisional, pending exactly this kind of central, cross - sector comparison. This chapter is that comparison. No individual chapter's underlying score, weighting, or evidence has been altere d to produce it; the ranking below applies each chapter's own published score as calculated in that chapter. Horticulture's enterprise evidence is narrowed to seven directly - engaged cases, with its MCDA score paired with a companion hard - gates transaction framework, the same pairing every other chapter in this report applies.

14.1 Sector Scoring Summary

Three chapters — Grain and Animal Feed, Coffee, and Dairy — each independently describe themselves as a Priority 1 sector, using their own chapter - level framing. Ranked against each other on a single scale, they are not equivalent: Grain and Animal Feed scores nearly a full point higher than Dairy. This is not a criticism of any chapter's internal scoring; it is precisely the separation that a single sector cannot see from inside its own chapter, and precisely why this comparative step exists.

Rank	Value Chain	MCDA Score (/10)	Chapter's Own Priority Label	Strongest Driver	Principal Constraint
1	**Grain and Animal Feed (Ch. 8)**	**8.98**	Priority 1	Strong performance across all ten criteria; foundational cross - sector role (feeds Livestock, Poultry, Aquaculture)	Two deliberately conservative scores on enterprise readiness, reflecting genuine data gaps rather than sector weakness

2	**Coffee (Ch. 4)**	**8.54**	Priority 1	40 - 75x FOB value uplift; confirmed global off - take anchor (Sucafina Instant)	UCDA - to - Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) institutional transition gap; regulatory score capped at 6 to reflect it honestly
3	**Poultry (Ch. 7)**	**8.35**	Highest - priority investment corridor	Strongest post - grant sustainability profile and most commercially bankable return of any chapter	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)/ HACCP certification capacity constrains how fast processors can convert capital into certified output
4	**Piggery (Ch. 6)**	**8.1**	Not separately labelled	Large, well - quantified value gap between farm - gate and certified formal retail	ASF biosecurity infrastructure and certification status, both technical assistance gaps as much as capital ones
5	**Dairy (Ch. 5)**	**7.97**	Priority 1	Most field - validated enterprise pipeline of any chapter in this report (7 of 9 enterprises KII - confirmed)	DDDP formal pasteurisation compliance gap (30% actual against an 80% statutory target)
6	**Cassava (Ch. 12)**	**7.78**	Priority 2	Strong post - harvest loss reduction case and market size	Low enterprise readiness and regulatory implementation gaps (E - 20 blending mandate under - enforced)

7	Livestock, Beef and Small Ruminants (Ch. 11)	7.35	Not separately labelled	Uganda's largest livestock asset base (14.5M cattle head) relative to its commercial infrastructure	Certification, cold - chain, and finishing technology gaps rather than a production gap
8	**Agro - Industrial Waste (Ch. 13)**	**6.4**	Solid mid - range sector	Strong circular economy case and EU policy alignment	Commercial scale - up needed; enterprises fail more often on operating discipline than on capital access
9	**Fish and Aquaculture (Ch. 10)**	**6.31**	Not separately labelled	87% production growth 2015 - 2025 against a substantial unmet national demand	Technology adoption, not capital access, is this chapter's own stated binding constraint
10	**Horticulture (Ch. 9)**	**6.01**	Third - order GTTF priority	Rigorously quantified packhouse wastage data and a narrowed, seven - enterprise evidence - bearing set with direct engagement, paired with a well - specified Danida instrument mapping across five technology windows	This chapter's own transaction framework confirms financing structuring and investment approval are not yet assessed; capital - stack assignment awaits evidence close - out on throughput, buyer specification and co - financing

Scores as published in each chapter's own MCDA table (Chapters 4 - 13), current as of August 2026. Ranking and framing commentary added at this chapter's cross - sector level only; no underlying chapter score has been altered.

Budget proportioning implication: a strict score - proportional allocation would direct roughly 55 per cent of GTTF capital to the top four sectors (Grain and Animal Feed, Coffee, Poultry, Piggery) and materially less to the bottom three (Horticulture, Aquaculture, Waste). This chapter does not recommend applying that ratio mechanically. Two of the three lowest - scoring sectors, Aquaculture and Horticulture, score low substantially because their own enterprise - level evidence base is less complete than the top - ranked chapters, not because their underlying commercial case is weak. Horticulture's own chapter is explicit that no grant ceiling or capital - stack

split is assigned until transaction - level evidence closes. Chapter 15's investment framework should treat the ranking above as a first - order signal for capital weighting, adjusted for which gaps are genuinely structural against which are evidence gaps closeable within the current programme cycle.

14.2 Cross - Cutting Findings

Five themes recur across multiple value chain chapters independently, meaning no single sector consultant was asked to look for them; they emerged from ten separate assessments arriving at the same underlying constraint.

14.2.1 Technical Assistance is a First - Order Capital Stack Component, Not a Residual

This is the most consequential cross - cutting finding in this report. Prior to this compilation, seven of the ten value chain chapters (Coffee, Dairy, Piggery, Poultry, Grain and Animal Feed, Horticulture, Livestock) carried no explicit technical assistance line in their capital stack at all, despite each one independently documenting the exact kind of gap technical assistance exists to close: Sucafina Instant's own fourth binding condition for Coffee off - take was a proven operator on the ground, not capital; Piggery and Poultry both name certification capacity, not financing, as the binding constraint on formalisation; Dairy's own DDDP compliance gap is a regulatory - engagement problem; Horticulture's own transaction framework names throughput and buyer - specification evidence, not financing structure, as the item that must close first.

Every capital stack in this report now carries an explicit, evidence - linked technical assistance component. Chapter 16 addresses the programme - design implication of this finding directly.

14.2.2 The Cold Chain Deficit is Systemic, Not Sector - Specific

Dairy, Livestock, Poultry, Fish and Aquaculture, and Horticulture each independently identify inadequate cold - chain infrastructure as a binding constraint on formalisation and export value capture. Horticulture's own evidence is explicit that cold - chain need is route - specific and embedded within its four primary enterprise pathways (Nile Hortlife, Agricado Farms, Avotein Farms and Amfri Farms all carry an embedded cold - chain requirement) rather than a standalone investment category.

At present, each chapter proposes enterprise - level or sub - sector cold - chain investment because no national cold chain strategy exists to coordinate investment across them. Chapter 16 recommends a single national cold chain development strategy for exactly this reason.

14.2.3 Feed Cost is the Dominant Variable in Animal - Protein Competitiveness

Poultry's feed - to - Feed Conversion Ratio (FCR) burden, Aquaculture's feed costs at 50 to 70 per cent of production costs, and Piggery and Livestock's feed - dependent margins all point to the same upstream constraint: Grain and Animal Feed's own performance — the highest - scoring chapter in this report — is a precondition for competitiveness in every animal - protein value chain, not an independent sector story. GTTF sequencing should recognise that underinvestment in feed milling and grain storage caps the achievable return in four other chapters simultaneously.

14.2.4 The EU Regulatory Environment is Simultaneously the Largest Barrier and the Largest Premium Opportunity

EUDR (Coffee, Cassava), SPS and TRACES interceptions (Horticulture), and HACCP/ISO certification requirements (Poultry, Piggery, Livestock) all impose real, near - term compliance costs. Horticulture's evidence base is

now the most granular in this report on this point: its EUROPHYT/TRACES interception profile is categorised by mechanism (harmful organisms and pests; documentation and certification; MRL and pesticide residue; quality and handling), with documentation and certification failures explicitly described as material and increasing in the current administrative record.

In every chapter where this pattern appears, the same regulatory requirement that creates a barrier to entry also creates a durable premium for the enterprises that clear it first. This is why technical assistance for compliance, not compliance avoidance, is the correct GTTF response.

14.2.5 Circular Economy and Waste Valorisation are Underdeveloped Relative to the Feedstock Available

Waste's own chapter documents 1.71 million tonnes of agro - industrial waste generated in 2025, up 76 per cent from 2015, against still - limited commercial valorisation capacity. This is not confined to the Waste chapter: Piggery's circular economy case, Cassava's biogas and stillage valorisation, and Coffee's pulp - to - biogas potential all depend on the same underlying technology and market - development gap that Chapter 13 addresses directly. GTTF should treat waste valorisation as a cross - cutting capability, not a single - sector investment category.

14.3 Technology Shortlist and Supplier Matrix

The matrix below consolidates the Danish and EU technology recommendations made independently across Chapters 4 through 13 into a single supplier - facing reference. Suppliers named in more than one chapter are cross - referenced, since a single technology partner with a multi - sector Uganda pipeline is a stronger commercial proposition to that supplier than any single - sector engagement.

Technology category	Supplier(s)	Value chain(s)	Constraint addressed
Non - thermal pasteurisation / UV - C treatment	Lyras A/S (Denmark)	Dairy	Bacterial load at collection stage, the sector's binding quality constraint
Dairy processing, heat exchange, separation	GEA Group, Alfa Laval, DeLaval, Tetra Pak	Dairy	Pasteurisation capacity, shelf - life extension, UHT processing
Freeze - dry soluble processing	GEA Group (NIRO CONRAD)	Coffee	Zero existing industrial freeze - dry capacity against a confirmed 40 - 75x value uplift
Roast and pack, drum roasting	Buhler AG (RoastMaster)	Coffee, Grain and Animal Feed	Roast consistency and commercial - scale packaging
Grain handling, seed processing, milling	Cimbria A/S, SKIOLD A/S, Buhler AG	Grain and Animal Feed	Post - harvest loss (20 - 30% of production) and milling capacity gap

Anaerobic digestion and biogas	Bigadan A/S, PlanEnergi	Dairy, Cassava, Agro - Industrial Waste	Effluent and waste stream valorisation, recurring across three chapters independently
Precision livestock housing and feed systems	Skov A/S, Big Dutch-man, DanBred	Poultry, Piggery	Climate - controlled housing, automated feeding, biosecurity infrastructure
Starch and industrial processing efficiency	ANDRITZ, SiccaDania	Cassava	Thermal drying cost, the single highest - ROI intervention point identified for cassava processing
Black Soldier Fly bio-conversion	Insectum Denmark	Agro - Industrial Waste, Piggery (feed input)	Organic waste conver-sion to protein feed input, a cross - sector circular economy link
Protected production and precision irriga-tion (drip/fertigation)	EU/Danish input - ser-vice suppliers (window M1)	Horticulture	Inconsistent supply against certified - buyer volume and specifica-tion requirements
Aggregation, pack-house handling and grading	EU food - grade equip-ment suppliers (window M2)	Horticulture	Physical damage, weak consolidation and poor grading identified across Nile Hortlife, Agricado Farms and Avotein Farms
Controlled drying, dehydration and pres-ervation	EU processing equip-ment suppliers (window M3)	Horticulture	Fresh product loses val-ue where it cannot be preserved; evidenced at Green Oceanstar and Amfri Farms
Solar and cold - chain infrastructure	Multiple EU suppliers (sector - specific selec-tion per chapter)	Dairy, Livestock, Poultry, Aquaculture, Horticul-ture	The cold - chain deficit identified as systemic in Section 14.2 above
EUDR and SPS - com-pliant traceability platforms	Satelligence, SOURCE-TRACE, or equivalent	Coffee, Cassava, Horti-culture	Geolocated deforesta-tion - free traceability and phytosanitary com-pliance documentation
RAS water recircula-tion, precision feeding, IoT water quality	EU aquaculture tech-nology suppliers (sector - specific)	Fish and Aquaculture	Feed cost efficiency and water quality monitor-ing, the chapter's own stated technology - adoption gap

Consolidated from the technology matching sections of Chapters 4 - 13, including Horticulture's five - window technology architecture (Table 9.5). Supplier names appearing in more than one row indicate a cross - sector engagement opportunity, not a duplicated recommendation.

14.4 Enterprise Pipeline by Tier

The enterprise tiering applied consistently across Chapters 4 through 13 (Tier 1: strong balance sheet, high adoption readiness; Tier 2: strong market linkage, grant - dependent de - risking; Tier 3: early - stage or highly rural, patient capital) is consolidated below at portfolio level.

Tier	Definition	Approximate portfolio composition	GTTF instrument implication
Tier 1	**Strong balance sheet, high adoption readiness, immediate commercial capacity**	Confirmed anchors across Dairy (4 enterprises), Coffee (Kyagalanyi, Sucafina as off - take anchor), Cassava (Bukona and the Tier 1 starch portfolio), Grain and Animal Feed (KAMP Group, Mukwano, Mount Meru), Poultry's largest integrators	Primary vehicles for achieving and exceeding the 5:1 leverage target; GTTF funding acts as a catalyst rather than a subsidy
Tier 2	**Strong market linkage, capitalisation gap, grant - dependent de - risking**	Cooperative and mid - scale processors across most chapters: Rubanga Cooperative (Coffee), cooperative collection centres (Dairy), Tier 2 drying hubs (Cassava), mid - scale processors (Piggery, Poultry), and Horticulture's seven directly - engaged enterprises (Nile Hortlife, Agricado Farms, Avotein Farms, Green Oceanstar, Amfri Farms, Thyma Herbs, Chemiphar Laboratories)	The sweet spot for GTTF matching grant structuring; technical assistance is proportionally more important at this tier than at Tier 1. Horticulture's seven enterprises sit here specifically because each carries direct - engagement evidence but an explicitly named critical gap (throughput, asset utilisation or buyer specification) still to close
Tier 3	**Early - stage, highly rural, elevated operational risk**	Smallholder - linked cooperatives and early - stage enterprises across Aquaculture and Livestock in particular, where enterprise - level evidence is least complete	Not a primary near - term GTTF capital deployment target; requires capacity - building and patient capital before commercial technology transfer is realistic

Consolidated from enterprise tiering and enterprise evidence tables in Chapters 4 - 13, including Horticulture's Table 9.7 (Evidence - Bearing Enterprise Set by Investment Opportunity). Horticulture's seven directly - engaged Tier 2 cases represent a materially stronger enterprise evidence base than a longer, less - substantiated prospect list would, distinct from its MCDA score.

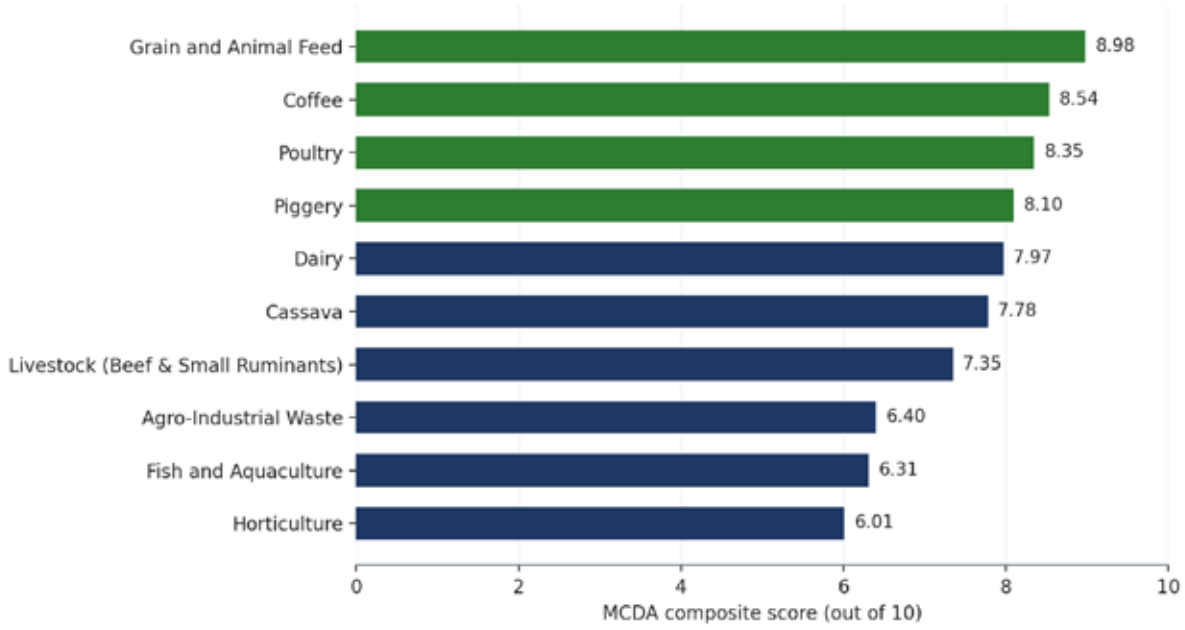
Chapter 14's cross - sector analysis generates four priority actions for GTTF programme design. First, the programme budget should weight the top four sectors (Grain and Animal Feed, Coffee, Poultry, Piggery) more heavily than the bottom three — but not to the exclusion of Aquaculture and Horticulture, whose lower scores reflect evidence gaps rather than weak commercial fundamentals. Second, technical assistance must be treated as a primary capital stack component in every sector, not a residual. Third, a coordinated response to the cold - chain

deficit should be designed at programme level and implemented across multiple chapters rather than sector by sector. Fourth, Danish and EU technology suppliers with multi - sector pipeline opportunities should be engaged at programme level — the cross - sector supplier matrix in Section 14.3 identifies those opportunities directly.

Chapter 15 translates this comparative analysis into a consolidated investment structuring framework, sector - level investment packages, and an implementation roadmap for the full GTTF envelope.

Supporting Exhibit

Figure 14.1 — Cross-sector MCDA ranking, ten priority value chains



Chapter 15: Investment Structuring and Implementation Roadmap

This chapter translates the ten individual value chain assessments in Chapters 4 through 13 into a consolidated investment structuring framework for the Green Technology Transfer Fund. Where each preceding chapter makes the investment case for its sector and sets out a sector - level capital stack, this chapter does three things that the individual chapters cannot: it designs the governing financing architecture that applies programme - wide; it maps that architecture onto Uganda's verified banking and development finance landscape; and it aligns the GTTF's financing instruments with the evolving suite of Danish Business Instruments to create a coherent, implementable pipeline from deal origination to commercial scale.

The chapter is organized across seven sections. Sections 15.1 and 15.2 establish the governing principles and the financing ecosystem. Sections 15.3 through 15.5 set out sector - level investment packages, partnership model blueprints, and the milestone disbursement framework. Sections 15.6 and 15.7 address de - risking mechanisms and the consolidated GTTF budget allocation roadmap.

15.1 Governing Principles of GTTF Investment Structuring

Five principles govern all investment structuring decisions within the GTTF. They are not aspirational statements; they are hard design constraints. Every deal structure presented in this chapter satisfies all five.

Principle	What it means in practice
70:30 GTTF/Enterprise split	The GTTF contributes a maximum of 20 per cent of total investment CapEx as a matching grant or interest - free convertible loan. The enterprise (or consortium) contributes the remaining 80 per cent through equity, commercial bank debt, supplier credit, or development finance. This is the primary mechanism for achieving the 5:1 leverage target.
Commercial viability first	Every investment recommended in this chapter generates commercially defensible returns without grant support by Year 3 of operation. The GTTF grant de - risks the first mover; it does not make unviable investments viable.
Technology demonstration before scale	For technologies with no prior deployment track record in Uganda, a Technology Demonstration Investment (TDI) is required before mainline grant disbursement. TDIs are financed primarily through the Danida E4 Innovation Bridge instrument.
Supplier financing counts as co - investment	Danish and EU technology supplier credit, counted at full commercial value, is included in the enterprise's 80 per cent co - investment and in the 5:1 leverage calculation. This reduces upfront enterprise equity requirements and creates lasting technology relationships.
Post - grant sustainability is assessed at appraisal	No investment is approved unless a credible post - grant sustainability analysis — covering revenue model, operating cost coverage, and maintenance pathway — has been completed and verified. The GTTF does not finance projects that require perpetual grant support.

The 70:30 split — enterprise contributes 80 per cent, GTTF contributes 20 per cent — is the programme's

primary leverage mechanism. At 70:30 , every unit of GTTF capital is paired with four units of enterprise or commercial capital before debt is drawn. When enterprise contribution is structured through commercial bank term debt at 12 per cent (the ACF concessional benchmark), the total capital mobilised against GTTF investment reaches or exceeds the 5:1 target. The 80 per cent enterprise contribution can be composed of equity, commercial bank debt, supplier credit, development bank debt, or any combination — provided the composition is commercially verifiable at appraisal and consistent with the enterprise's debt - service capacity.

15.2 Uganda's Agricultural Financing Ecosystem and GTTF Positioning

Chapter 15 draws extensively on a structured engagement with the five institutions that together finance the majority of Uganda's agricultural value chains: the International Finance Corporation (IFC), Uganda Development Bank (UDB), Stanbic Bank, DFCU Bank, and the Agricultural Credit Facility (ACF) administered by the Bank of Uganda. The findings from those engagements, compiled in the GRASP Agricultural Financing Landscape Briefing (A2i, August 2026), represent the most current intelligence available on commercial and development finance appetite, pricing, tenor, and risk appetite in Uganda's agricultural sector. This section draws on that briefing directly.

15.2.1 The Financing Ladder

The five institutions occupy complementary positions on the financing ladder. Understanding where each sits is essential to structuring GTTF deals correctly: the GTTF matching grant is not a substitute for bank debt — it is a catalyst that makes bank debt bankable for investments that would otherwise be regarded as too risky or capital - intensive.

Institution	Role	Typical ticket	Pricing and tenor
IFC	International DFI; debt, equity, mezzanine, blended finance	~USD 10M+ direct	Risk - based; 8 - 12 yr tenors; blended finance available
UDB	National development bank; agriculture 44 - 45% of portfolio	UGX 15M minimum to ~USD 20 - 21M	~12% p.a. (ACF); up to 15 - yr tenor; 3 - yr grace
Stanbic Bank	Largest commercial agri - lender; anchor/value - chain banking	SME to large corporate	Up to 12% term (ACF); cash - flow - based underwriting
DFCU Bank	Deep asset - finance heritage; 10% contribution on equipment	UGX 5 - 20M to ~USD 100M single obligor	12% (ACF); LC - to - asset moratorium for imports
ACF (Bank of Uganda)	Concessional refinance facility; sets sector price floor	Up to UGX 5bn CapEx	12% fixed CapEx; 15% grain trade; 8 - yr tenor; 3 - yr grace

15.2.2 Three Key Findings for GTTF Structuring

Three findings from the banking landscape engagement directly shape GTTF deal architecture:

Capital is abundant; the constraint has shifted to production and bankability. Every institution engaged reported strong appetite for agricultural lending and a pipeline larger than current disbursement. Stanbic's ob-

servation that financed silos, dairy plants, and tea factories are running at 30 to 40 per cent of installed capacity is the clearest statement of the underlying problem: it is not money that is missing, but the production volume, product quality, and enterprise governance that would put existing capital to work. The GTTF's technical assistance component — connecting enterprises with Danish and EU technology and know - how — addresses this constraint directly.

The concessional price floor near 12 per cent is accessible across multiple channels. ACF's 12 per cent fixed investment loan, UDB's 12 per cent facility, and Stanbic's and DFCU's ACF - linked lines all converge on the same benchmark. This means GTTF - supported enterprises have access to long - tenor, concessional debt that would have been unavailable a decade ago. The ACF has recently raised its maximum investment loan from UGX 2.1 billion to UGX 5 billion, extended eligibility to raw - produce purchases for processing, and added loan top - ups — materially improving the facility's usefulness as a GTTF co - financing partner.

EU and Danish technology is welcomed, with structural advantages. DFCU has reduced its client contribution requirement on strategically important agricultural assets, including processing lines, from the market - standard 20 per cent to 10 per cent — the lowest threshold in the market. UDB's internal engineers explicitly welcomed the introduction of credible Danish and EU suppliers with documented after - sales support. None of the lenders applies supplier lock - in. This is directly favourable to GTTF's European technology mandate.

15.2.3 Danish Business Instruments — Pipeline and Programme Alignment

The emerging suite of Danida Business Instruments provides a structured progression from early market exploration through to commercial - scale impact capital. The five instruments span from small matching grants for market scoping to concessional loans and impact investment up to DKK 30 million. The total allocation across all five instruments is DKK 850 million (approximately USD 130 million), making this a significant and complementary resource for GTTF pipeline development.

Code	Instrument	Type	Amount (max)	GTTF pipeline fit	Total allocation
E1	**Business Explorer**	Matching grant	DKK <500K (~USD 77K)	Market scoping; feasibility for smaller tech deployments	DKK 50M (~USD 7.7M)
E2	**Business Partnerships**	Grant	DKK 1.5 - 10M (~USD 230K - 1.5M)	Business dev., model testing, maturation for Tier 2 enterprises	DKK 410M (~USD 63M)
E3	**Impact Incubator**	Concessional loan	Up to DKK 15M (~USD 2.3M)	CapEx and working capital; primary instrument for Tier 1 co - finance	DKK 150M (~USD 23M)

E4	**Innovation Bridge**	Grant	DKK 750K (feasibility) + DKK 6M (demo)	Technology demos for Lyras UV - C, Bigadan biogas, BSF, freeze - dry	DKK 90M (~USD 14M)
E5	**Impact Investors**	Concessional + grant	DKK 10 - 30M (~USD 1.5 - 4.6M)	Flagship transactions (fish - feed plant, soluble coffee, waste - to - energy,biofertilizers and animal/ poutyly feeds)	DKK 150M (~USD 23M)

The sequencing logic across the five instruments maps naturally onto the GTTF's enterprise tiering framework. Tier 2 enterprises — those with proven market viability but requiring structured support to adopt European technology — are the primary targets for E2 (business development and maturation) and E3 (concessional CapEx financing). Tier 1 enterprises, which are already commercially anchored, are the primary vehicles for E5 (impact investment) alongside IFC or UDB co - financing. Technology demonstration investments, which generate the proof - of - concept evidence that subsequent Tier 1 enterprises require before committing commercial capital, are the natural fit for E4.

15.3 Sector - Level Investment Packages

This section presents the consolidated investment package for each of the ten priority value chains, drawing directly on the capital stacks developed in Chapters 4 through 13. Each package is presented as a standardized investment brief covering total CapEx, GTTF contribution, commercial co - financing instrument, Danida instrument fit, primary technology partner, and indicative leverage ratio. The packages are designed to be read alongside the detailed sector chapters — they are the programme - level investment summary, not the full sector case.

Note on CapEx ranges: all figures are indicative based on current supplier pricing, field KIIs, and A2i assessment (June - August 2026). Final figures require enterprise - level appraisal. USD/UGX conversion at 1 USD = 3,600 UGX, aligned with the master GRASP currency convention.

15.3.1 Coffee (Chapter 4)

Three complementary investment tracks are recommended.

1. *Track A (soluble/freeze - dry processing)* represents the highest - value addition opportunity in Uganda's coffee sector — converting under - grade and broken beans currently exported as low - value green bean into soluble instant coffee for European markets at FOB prices of USD 12 - 22 per kilogram.

2. *Track B (roast and pack)* offers lower CapEx with strong IRR for EUDR - compliant branded Ugandan coffee.

3. *Track C (cooperative wet mill modernisation)* is the enabling investment that improves raw material quality for both Tracks A and B.

Table 15.1 | Coffee — Investment Capital Stacks by Track

Track	Total CapEx	GTTF (30%)	Enterprise co - finance (70%)	Danida fit	Key partner(s)	Leverage
Track A: Freeze - dry soluble	USD 65 - 125M	USD 13 - 25M	Long - tenor IFC / FMO / E3 concessional + equity	E4 feasibility first; E3 concessional gap - fill	GEA NIRO CONRAD (DK)	5:1+
Track B: Roast and pack	USD 8 - 22M	USD 1.6 - 4.4M	Commercial bank (Stanbic/ UDB) + enterprise equity	E2 (DKK 1.5 - 10M) or E3	Buhler RoastMaster (CH) + VFFS line	5:1
Track C: Coop wet mills (aggregate 4 - 6)	USD 2 - 8M	USD 0.4 - 1.6M	Member equity + aBi grant + cooperative savings	E1 per coop (DKK 500K) or E2	EU - origin precision pulper + solar dryer	5:1

15.3.2 Dairy (Chapter 5)

Dairy investment is structured around four discrete transactions confirmed through field KIIs (June - July 2026), plus one enabling investment — the DDDP Lyras regulatory pilot — that is not subject to the 5:1 leverage ratio given its public - good character. The Lyras A/S UV - C (Raslysation) non - thermal pasteurisation technology is the central Danish innovation in this chapter, addressing Uganda's critical bacteria - count crisis at milk collection centres where commercial intake runs at 1 - 4 million cells/ml against the required standard of under 50,000 cells/ml.

Table 15.2 | Dairy — Capital Stack by Transaction (Field - Corrected, July 2026)

Transaction	Technology	GTTF grant (indicative)	Commercial co - financing	Danida fit	Leverage
DDDP Regulatory Pilot (enabling)	Lyras A/S UV - C unit + 3 milksheds	Full cash cost (GTTF/A2i)	DDDP technical expertise and facilities in kind	E4 demo (DKK 6M)	Not subject to 5:1 (public good)
Nabitanga Coop MCC quality gate + UV - C	SCC meter; Lyras A/S UV - C	USD 0.15 - 0.25M	Cooperative equity + Stanbic/ Absa term debt + supplier credit	E2 maturation (DKK 1.5M)	5:1 milestone disbursement

Jesa Farm Dairy: biogas from effluent	Bigadan A/S anaerobic digestion + CHP	USD 0.4 - 0.8M	UDB co - financing + Jesa equity + Bigadan supplier credit	E2 (DKK 1.5 - 10M)	5:1
Southwest corridor MCC bundle (50 MCCs)	DeLaval solar; Ekomilk analyser; LP; UV - C	USD 0.8 - 1.2M	Coop equity + Stanbic/Absa + processor pre - financing + supplier credit	E2 / E3	5:1 milestone
Amos Dairies: energy - efficient pasteurisation	GEA VTIS or Alfa Laval Hybrid Pasteuriser	USD 0.6 - 1.2M	Commercial bank + enterprise equity + supplier credit	E3 concessional (up to DKK 15M)	5:1

15.3.3 Piggery (Chapter 6)

Pig sector investment is structured as part of the broader Livestock Portfolio Envelope, with the piggery chapter's MCDA score supporting a 35 per cent proportional weighting. Field consultation confirms that ACF and aBi co - financing is feasible for GTTF grants of USD 69,000 - 111,000 (UGX 250 - 400 million) per enterprise unit. The 5:1 leverage model applies at cluster level — 4 to 6 farm - scale units per cluster — where the combined capital base generates sufficient cash flow for commercial debt service independently of grant support.

Table 15.3 | Piggery — Investment Portfolio by Technology Category

Technology category	% of envelope	GTTF leverage ratio	Payback	Key partner(s)
BSF circular economy cluster (4 - 6 farm units)	25%	5:1 (ACF/aBi confirmed feasible)	14 - 20 months (feed savings)	Buhler/Innovafeed; BioCycle (DK)
Biosecure housing (ASF risk reduction)	30%	5:1 (enterprise equity + ACF)	24 - 36 months	Skov A/S; Big Dutchman (DK/DE)
Slurry - to - biogas (circular economy)	20%	5:1 (UDB + enterprise equity)	18 - 30 months	PlanEnergi/Bigadan A/S (DK)
HACCP pork processing line	20%	5:1 (commercial bank + equity)	30 - 48 months	Frontmatec (DK); SEGES Innovation
DanBred/Topigs Norsvin AI genetics	5%	5:1 (NAGRC&DB + enterprise)	Ongoing productivity gain	DanBred; Topigs Norsvin (DK/NL)

15.3.4 Poultry (Chapter 7)

Poultry investment covers six technology categories with short payback periods across all categories except HACCP processing. Short payback periods (8 - 20 months for feed quality, solar, and hatchery investments) mean commercial debt service is viable at Uganda's prevailing agricultural lending rates without grant support — which is the instrument design that achieves a genuine 5:1 leverage ratio. The GTTF matching grant functions as a first - mover de - risker, not a primary capital provider.

Table 15.4 | Poultry — Investment Portfolio by Technology Category

Technology category	% of envelope	Grant:Total	Private:Grant	Payback	Primary targets
Solar hatchery + in - ovo vaccination (Petersime/ HatchTech)	30%	1:5	4:1	1.1 - 1.7 yrs	Ugachick; Biyinzika
NIR feed quality + precision formulation (FOSS A/S)	15%	1:5	4:1	0.7 - 1.2 yrs	Ugachick Feeds; Roofings NUVITA; UGT
Solar energy: on - farm brooding + lighting	15%	1:5	4:1	0.75 - 1.3 yrs	Biyinzika grow - out farms; NSPF
Modular HACCP processing + solar cold chain (Meyn/ Stork)	25%	1:5	4:1	3 - 5 yrs	City Abattoir/ Quality Cuts; Hariss/Kenchic
BSF circular economy (Buhler/Innovafeed/BioCycle)	10%	1:5	4:1	1.2 - 1.7 yrs	Biyinzika; NSPF out - grower coops
IoT biosecurity + BDS	5%	1:5	4:1	Risk mitigation	Ugachick; Biyinzika; HACCP - line farms

15.3.5 Grain and Animal Feeds (Chapter 8)

Grain and animal feeds occupies a strategically pivotal position in the GTTF portfolio because feed cost represents 65 to 70 per cent of total production cost in poultry and piggery value chains. Technology investments in this chapter therefore generate multiplicative returns across the livestock portfolio. Three technology categories are prioritized: precision pelleting and extrusion for feed efficiency, hermetic storage to eliminate the 20 to 30 per cent post - harvest loss that depresses raw material availability, and NIR spectrometry for real - time feed quality testing.

Table 15.5 | Grain and Animal Feeds — Investment Package

Investment category	CapEx range	GTTF (20%)	Commercial instrument	Danida fit	Key partner(s)	Leverage

Precision pelleting + extrusion (feed mill upgrade)	USD 0.8 - 2.5M per mill	USD 160K - 500K	ACF investment loan (12%; up to UGX 5bn) + enterprise equity	E2/E3	ANDRITZ Feed & Biofuel; SKIOLD A/S (DK)	5:1
Hermetic storage silos (commercial scale)	USD 0.3 - 1.2M per installation	USD 60K - 240K	ACF + Stanbic/ DFCU asset finance + enterprise equity	E2 (DKK 1.5 - 10M)	Cimbria A/S (DK); GrainPro	5:1
NIR spectrometry (feed quality gate)	USD 80K - 150K per unit	USD 16K - 30K	Enterprise equity + supplier credit	E1 (DKK 500K)	FOSS Analytical A/S (DK)	5:1
Solar grain drying arrays	USD 120K - 400K per site	USD 24K - 80K	ACF block allocation + cooperative equity	E2	EU solar engineering firms	5:1

15.3.6 Horticulture (Chapter 9)

Horticulture's Chapter 9 (v4.0, August 2026) applies a five - window technology architecture and an explicit evidence - gated transaction development framework. Seven directly - engaged enterprises — Nile Hortlife, Agricado Farms and Avotein Farms (aggregation/first - mile); Green Oceanstar and Amfri Farms (processing/ preservation); Thyma Herbs (certified supply); and Chemiphar Laboratories (compliance/testing) — constitute the evidence - bearing set, and Chapter 9 received an MCDA score of 6.01/10.0 in the Chapter 14 cross - sector ranking, consistent with its position as the third - order GTTF priority. Chapter 9 explicitly reserves capital - stack assignment for downstream transaction diligence. No grant ceiling, CapEx figure or enterprise ranking is therefore assigned in the landscape study. The table below presents the investment framework by technology window, to be activated after enterprise - level evidence on throughput, buyer specification, asset utilisation and co - financing contribution has been closed for each named pathway.

Chapter 9 position: no grant ceiling, CapEx figure, or enterprise ranking is assigned at landscape stage. All investment amounts are subject to evidence closure at transaction level. Cold - chain investment (M4) is an embedded technology layer within the aggregation and processing pathways, not a standalone investment category.

Table 15.6 | Horticulture — Investment Framework by Technology Window

Technology window	Investment pathway	Evidence - bearing cases	GTTF instrument	Danida modality	Key partner(s)

M2: Aggregation / first - mile	Packhouse, grading/sorting, handling line; case - specific sizing	Nile Hortlife; Agricado Farms; Avotein Farms	Matching grant (20%); amount evidence - dependent — no ceiling set	E4 Innovation Bridge (feasibility/demo first); E2 Business Partnership after validation	EU food - grade handling/grading equipment suppliers
M3: Processing / preservation	Controlled drying, dehydration; greenfield (Green Oceanstar) or incremental expansion (Amfri Farms)	Green Oceanstar; Amfri Farms / African Organic	Matching grant (20%); amount evidence - dependent — no ceiling set	E4 demo/validation first; E2 for proven expansion	EU controlled - drying and processing equipment suppliers
M1: Certified supply / production services	Grower - control systems; certified outgrower expansion	Thyma Herbs	Matching grant (20%); feasibility and operating - model validation first	E1 Business Explorer; E2 after buyer demand confirmed	EU protected - production / drip - irrigation suppliers
M4: Cold - chain logistics (embedded)	Route - specific pre - cooling, cold rooms, reefer logistics; embedded within M2/M3 host enterprise	Embedded in Nile, Agricado, Avotein and Amfri	No standalone allocation at landscape stage; matched within host enterprise grant	E4 feasibility/ sizing; E2/E3 only after route economics proven	Danfoss (DK); EU cold - chain firms
M5: Compliance / testing access	Mobile sample access; SPS traceability; accredited laboratory integration	Chemiphar Laboratories	Matching grant (20%); service - model feasibility first	E4 service - model demo; E2 at scale	Satelligence; SOURCE-TRACE; or equivalent EU traceability platforms

15.3.7 Livestock — Beef and Small Ruminants (Chapter 11)

Formal slaughter throughput in the Ugandan livestock sector is below 15 per cent of annual offtake, and the farm - gate to formal - retail price gap runs at 3 to 4 times — representing one of the largest structural value - capture opportunities in the GTTF portfolio. The DRC export corridor for certified beef and goat products (Goma, Beni) adds a premium of 15 to 25 per cent above domestic formal retail, conditional on HACCP certification, which no current Ugandan abattoir fully achieves.

Table 15.7 | Livestock (Beef and Small Ruminants) — Investment Package

Investment category	CapEx range	GTTF (20%)	Commercial instrument	Danida fit	Key partner(s)	Leverage

HACCP abattoir up- grade + cold chain	USD 1.0 - 4.0M per facility	USD 200K - 800K	UDB + IFC (for larger facility) + enterprise equity	E3/E4 feasi- bility first	Danish Crown; Slagteri Teknik (DK)	5:1
Solar - pow- ered cold rooms + refrigerated transport	USD 150K - 500K	USD 30K - 100K	ACF + DFCU asset finance + equity	E2	Danfoss (DK); EU cold chain firms	5:1
IoT livestock traceability (RFID + mo- bile)	USD 80K - 250K	USD 16K - 50K	Enterprise equity + sup- plier credit	E1/E2	EU agri - tech traceability providers	5:1
Communi- ty biogas from cattle manure	USD 60K - 200K per cluster	USD 12K - 40K	ACF block + cooperative equity	E2	Bigadan A/S; Rootzone (DK)	5:1

15.3.8 Fish and Aquaculture (Chapter 10)

Uganda's aquaculture sector faces a documented supply deficit of approximately 300,000 MT against 870,000 MT of domestic demand, driven by the collapse of Lake Victoria wild - capture volumes. IFC has identified a fish - feed manufacturing opportunity of USD 15 to 20 million with an EU technology partner already trading USD 25 million per year into the East African region — the single largest transaction - ready opportunity in the GTTF portfolio outside of soluble coffee.

Table 15.8 | Fish and Aquaculture — Investment Package

Investment category	CapEx range	GTTF (20%)	Commercial instrument	Danida fit	Key partner(s)	Leverage
Fish - feed manufac- turing plant (IFC flagged opportunity)	USD 15 - 20M	USD 3 - 4M	IFC direct (USD 10M+) + commer- cial co - debt + equity	E4 demo first; E5 impact investor	ANDRITZ Feed & Biofuel; Bio- Mar Group (DK)	5:1+
RAS recir- culating aquaculture systems	USD 0.5 - 2.5M per site	USD 100K - 500K	UDB pa- tient debt + enterprise equity + IFC intermediary	E3/E2	Pentair Aquatic Eco - Systems; EU RAS firms	5:1
Automated precision feeding systems	USD 60K - 200K per farm	USD 12K - 40K	ACF + enter- prise equity + supplier credit	E2 (DKK 1.5M)	Akva Group; Innovafeed	5:1

Solar cold rooms + biomass drying	USD 80K - 250K per installation	USD 16K - 50K	ACF block allocation + cooperative equity	E1/E2	Danfoss (DK); EU solar firms	5:1

15.3.9 Cassava (Chapter 12)

Cassava carries a verified USD 343.9 million import substitution potential through domestic starch and high - quality cassava flour (HQCF) production, against a backdrop of four large - scale processing factories currently operating below 40 per cent of installed capacity. The primary technology investment requirement is post - harvest processing — flash and spray drying for HQCF and starch grades — complemented by biogas recovery from processing effluent and solar chip drying to reduce the farm - gate moisture and quality variability that constrains factory throughput.

Table 15.9 | Cassava — Investment Package

Investment category	CapEx range	GTTF (20%)	Commercial instrument	Danida fit	Key partner(s)	Leverage
Flash/spray drying — starch and HQCF	USD 0.8 - 3.0M per line	USD 160K - 600K	UDB + commercial bank + enterprise equity	E3 (DKK 15M concessional)	Buhler AG; GEA Group; ANDRITZ (CH/DK)	5:1
Biogas recovery from processing waste	USD 0.3 - 1.2M per plant	USD 60K - 240K	ACF + UDB + enterprise equity + Bigadan supplier credit	E2/E3	Bigadan A/S; Rootzone (DK)	5:1
Solar chip drying + hermetic storage	USD 80K - 300K per site	USD 16K - 60K	ACF block allocation + outgrower equity	E1/E2	EU solar drying firms	5:1
Precision fermentation infrastructure	USD 1.0 - 4.0M per facility	USD 200K - 800K	IFC/UDB + enterprise equity + E5 impact investor	E4 feasibility first; E5	EU fermentation technology firms	5:1

15.3.10 Agro Industrial Waste Management Value Chain (Chapter 13)

The agro - industrial waste management chapter carries the highest development and climate - impact density of any value chain in the GTTF portfolio, and the most complex financing structure — because waste - to - value ventures are typically treated as higher - risk start - ups by commercial lenders, requiring stronger equity foundations and clearer offtake agreements before debt can be mobilised. A2i's existing EUR 2.54 million mandate with KCCA provides an institutional foothold that substantially reduces programme - entry risk. The USD 400 million waste - to - energy plant in Kampala (2026) creates a flagship anchor investment context.

Table 15.10 | Agro - industrial waste valorization— Investment Package

Investment category	CapEx range	GTTF (20%)	Commercial instrument	Danida fit	Key partner(s)	Leverage
Anaerobic digestion + biogas (municipal scale)	USD 2 - 8M per facility	USD 400K - 1.6M	UDB + Stanbic (precedent: USD 26M bagasse plant) + equity	E4 demo; E5 impact investor	Bigadan A/S; Rootzone (DK); Asante waste management	5:1 (with strong parent/offtake)
Black Soldier Fly bioconversion (protein + oil + frass)	USD 150K - 600K per unit	USD 30K - 120K	Enterprise equity + ACF + aBi BDS + supplier credit	E2/E3	Insectum Denmark; Buhler/Innovafeed	5:1
Hydrothermal carbonisation (biochar)	USD 0.5 - 2.0M per unit	USD 100K - 400K	UDB + E4 feasibility + enterprise equity	E4 demo (DKK 6M)	KijaniBox; EU carbonisation firms	5:1 (pending offtake)
Coffee pulp + animal slurry circular economy	USD 80K - 400K per site	USD 16K - 80K	ACF + estate equity + cooperative equity	E1/E2	Rootzone (DK); EU composting firms	5:1

15.4 Partnership Model Blueprints

Technology transfer at the scale envisaged by the GTTF cannot occur through equipment transactions alone. Each deal requires a relationship structure that aligns the interests of the Ugandan enterprise, the Danish or EU technology partner, the commercial lender, and the GTTF facility. Four partnership model archetypes are recommended, each suited to a distinct combination of enterprise tier, technology complexity, and capital requirement.

Model	Best fit	Structure	GTTF role	Primary sectors
Joint Venture (JV)	Tier 1 enterprises with large - scale CapEx	Ugandan partner 51%+ equity; EU/DK partner contributes technology + know - how + exclusive distribution rights	De - risks initial CapEx; seeds technology relationship; facilitates commercial debt alongside	Coffee (Track A/B); Dairy (Jesa); Aquaculture (fish - feed plant); Cassava (starch)
Technology Licensing	Tier 1 enterprises with proprietary process needs	EU/DK licensor grants rights to operate technology under quality/ volume performance agreements; royalty or fixed fee	Validates technology transfer without equity dilution of Ugandan partner	Dairy (Lyras UV - C); Grain (FOSS NIR); Poultry (hatchery genetics)

Model	Best fit	Structure	GTTF role	Primary sectors
Hub - and - Spoke	Cooperative clusters linked to Tier 1 anchor	Anchor hub enterprise hosts technology and offtake; spokes supply raw material under quality - linked pricing	Extends leverage ratio to hundreds of smallholder households through anchor enterprise	Dairy (MCC networks); Cassava (outgrowers); Piggery (BSF clusters); Grain (hermetic storage)
Technology Demo + Offtake	Early - stage or novel technology with no Uganda deployment history	EU/DK supplier installs demonstration unit at agreed site; performance data triggers commercial scale commitment	Eliminates first - mover risk; creates commercial evidence for lenders	Agro - industrial waste (BSF; anaerobic digestion); Dairy (Lyras DDDP pilot); Horticulture (evaporative cooling)

15.4.1 Joint Venture Design Principles

Where a Joint Venture (JV) is recommended, it is structured around three non - negotiable design principles. First, the Ugandan partner must hold a minimum 51 per cent equity position to ensure NDP IV local ownership compliance and maintain operational control. Second, the Danish or EU partner contributes technology, know - how, training, and preferably exclusive regional distribution rights as its primary capital contribution — ensuring that the technology relationship outlasts the initial investment period. Third, the JV agreement must include a technical assistance schedule covering at minimum: installation supervision; a 12 - month operational commissioning period; an annual service and calibration contract; and a training pathway for local technicians to achieve independent operational capacity within 24 months.

15.4.2 Hub - and - Spoke Design for Cooperative Clusters

The hub - and - spoke model is the recommended structure for investments involving smallholder cooperative supply chains — specifically dairy MCC networks, cassava outgrower clusters, piggery BSF cooperative clusters, and grain hermetic storage networks. A central hub enterprise (Tier 1 anchor) hosts the primary processing technology and offtake relationship with the market. Spoke cooperatives (Tier 2) supply raw material under quality - linked pricing agreements that are underpinned by the hub enterprise's processor pre - financing. The GTTF matching grant is deployed at the hub level, with the benefit flowing to spoke cooperatives through quality premiums and improved offtake reliability. This structure allows the 5:1 leverage ratio to be calculated at hub level while capturing outreach to hundreds of smallholder households.

15.5 Milestone Disbursement Framework

GTTF matching grants are not disbursed in a single upfront transfer. They are structured as milestone - based disbursements tied to verified achievement of specific operational and commercial conditions. This architecture serves three purposes: it reduces the programme's risk exposure to implementation failure; it creates strong incentive alignment between the enterprise and the GTTF facility; and it ensures that grant funds are deployed only when commercial capital has been committed and conditions for technology adoption have been met.

Gate	Milestone	Verification requirement	Disbursement trigger	% of total grant
Gate 0	**Enterprise eligibility screening**	All 8 eligibility criteria verified; credit history clearance; Tier assessment completed	Eligibility certificate issued by GTTF appraisal team	**Pre - condition (no disbursement)**
Gate 1	**Commercial co - financing committed**	Term sheet or letter of intent from commercial lender or DFI confirmed; enterprise equity contribution evidenced in audited accounts or bank statement	First disbursement: 20% of approved grant	**20%**
Gate 2	**Technology procurement contract signed**	Signed purchase or licensing contract with named Danish or EU technology provider; INCOTERMS confirmed; installation timeline agreed	Second disbursement: 30% of approved grant	**30%**
Gate 3	**Technology installed and commissioned**	Third - party technical inspection confirms installation meets design specifications; initial performance data submitted	Third disbursement: 30% of approved grant	**30%**
Gate 4	**12 - month operational performance verified**	Documented energy savings, throughput volumes, or quality certification achieved as agreed in the appraisal; local technician training completed	Final disbursement: 20% of approved grant	**20%**

Milestone Gate 0 (pre - appraisal) is a hard filter — enterprises that do not pass all eight eligibility criteria are not entered into the disbursement pipeline, regardless of the strength of the sector case. The eight criteria are: legal registration for at least three years; Ministry of Trade, Industry and Cooperatives (MTIC) - aligned Small, Medium, or Large enterprise classification; confirmed Tier 1 or Tier 2 status; operations within one or more of the ten GRASP value chains; verifiable smallholder supply chain linkage; adequate operational site and utility infrastructure for technology installation; willingness and financial runway to meet co - investment matching requirements; and absence of adverse credit history with any ACF - participating institution.

15.6 First - Loss and De - risking Mechanisms

Uganda's banking landscape has matured substantially in its agricultural risk management frameworks, but three structural risk categories persist that require GTTF - facilitated de - risking: technology adoption risk (enterprises and lenders are unfamiliar with Danish and EU equipment and cannot price the performance risk); cash flow timing risk (processing technology CapEx requires upfront commitment before revenue uplift materialises); and collateral gaps (cooperative enterprises and SMEs frequently lack the land and asset collateral that commercial banks historically required). The GTTF's de - risking toolkit addresses all three.

15.6.1 First - Loss Guarantee Structure

The GTTF facility provides a first - loss guarantee for commercial bank co - financing of Tier 2 enterprises that pass all enterprise eligibility criteria but face residual collateral gaps. The guarantee structure operates on the following terms, aligned with the ACF and aBi Development guarantee windows already active in the market:

1. **Coverage:** GTTF guarantee covers up to 50 per cent of the commercial bank's loan exposure on the GTTF - supported technology investment. This is consistent with Stanbic's stated appetite for risk - participation structures of 50 per cent or above.

2. **Trigger:** The guarantee is callable only after the enterprise has drawn down 100 per cent of its own equity contribution and the commercial bank has applied standard loan recovery procedures. It is not a performance guarantee — it does not cover business failure unrelated to the technology investment.

3. **Fee:** A guarantee fee of 1 to 2 per cent per annum of the covered loan balance is charged to the enterprise, reflecting commercial market practice and avoiding subsidy distortion.

4. **Duration:** Guarantee covers the full tenor of the commercial loan, with a maximum of 8 years (aligned with the ACF investment loan maximum tenor).

5. **Cap per enterprise:** Maximum guarantee exposure per enterprise is USD 500,000. Larger transactions require IFC or UDB portfolio - level risk sharing rather than enterprise - level guarantees.

15.6.2 Technology Demonstration Investment

For technologies with no prior deployment track record in Uganda — including Lyras A/S UV - C pasteurisation, Bigadan A/S anaerobic digestion at agro - industrial scale, and Black Soldier Fly protein conversion — the GTTF deploys a Technology Demonstration Investment (TDI) before mainline grant disbursement. The TDI is aligned with Danida's E4 Innovation Bridge instrument (DKK 750,000 for feasibility; DKK 6 million for demonstration plant). The TDI generates the proof - of - concept evidence — documented energy savings, throughput volumes, quality certifications — that subsequent Tier 1 enterprises require before committing commercial capital without grant support. The TDI is therefore an investment in the pipeline's future leverage ratio, not a cost.

15.6.3 Supplier Financing as Co - Investment

Danish and EU technology suppliers are encouraged to provide vendor financing as a component of the enterprise's 80 per cent co - investment, counted as commercial capital in the 5:1 leverage calculation. Supplier credit typically covers 20 to 30 per cent of equipment CapEx, with a moratorium period of 12 to 18 months from delivery — a structure that DFCU replicates in its own import LC - to - asset - finance pathway. This reduces the enterprise's upfront equity requirement, improves cash flow during the installation and commissioning phase, and creates a direct commercial relationship between the Danish or EU technology partner and the Ugandan enterprise that outlasts the initial transaction.

15.7 GTTF Budget Allocation Roadmap

The GTTF budget of UGX 10.34 billion (approximately USD 2.87 million at programme inception) is the primary capital instrument of the GRASP programme. This section proposes a phased allocation framework across the ten value chains, informed by the comparative investment prioritization in Chapter 14 and the deal - level structuring in this chapter. The allocation is presented as indicative programme guidance — final allocation decisions rest with aBi Development and the GTTF Steering Committee, informed by Chapter 14's ranked investment shortlist and the results of enterprise - level appraisal.

Important: The UGX 10.34 billion GTTF envelope is the matching grant facility. It crowds in private co - investment of at least five times that amount (approximately USD 14.4 million+) through the 5:1 leverage mechanism, bringing the total investment mobilized to a minimum of approximately USD 17 million — and signifi-

cantly more in sectors with higher leverage ratios (Coffee Track A, Aquaculture fish - feed plant, large dairy processing transactions).

Value chain	Priority tier	% allocation (indicative)	Indicative GTTF envelope	Target private co - invest (5:1)	Primary Danida instrument	Implementation phase
Coffee (Ch.4)	High	18%	~USD 517K	~USD 2.6M	E2 / E3 / E4	Phase 1 (Track B/C); Phase 2 (Track A)
Dairy (Ch.5)	High	16%	~USD 459K	~USD 2.3M	E4 (regulatory pilot) / E2	Phase 1 (pilot + Nabitanga + Jesa)
Grain & Animal Feeds (Ch.8)	High	12%	~USD 344K	~USD 1.7M	E2 / E1	Phase 1
Horticulture (Ch.9)	Evidence - gap	10%	~USD 287K	~USD 1.4M	E4 first; E2 follow - on	Phase 2 (after evidence closure)
Piggery (Ch.6)	High	10%	~USD 287K	~USD 1.4M	E2 / E3	Phase 1 - 2
Poultry (Ch.7)	High	10%	~USD 287K	~USD 1.4M	E2 / E1	Phase 1
Fish & Aquaculture (Ch.10)	Evidence - gap	10%	~USD 287K	~USD 1.4M (+ IFC for fish - feed)	E4 / E5 / E3	Phase 2 (fish - feed); Phase 1 (RAS)
Cassava (Ch.12)	Medium	8%	~USD 230K	~USD 1.15M	E3 / E4	Phase 1 - 2
Livestock/ Beef (Ch.11)	Medium	4%	~USD 115K	~USD 575K	E2 / E4	Phase 2
Agro - industrial waste management (Ch.13)	High (impact)	8%	~USD 230K	~USD 1.15M (+ E5 for flagship)	E4 / E5	Phase 2 (flagship); Phase 1 (BSF)
Programme management / BDS / TA	—	4%	~USD 115K	—	—	Ongoing
TOTAL	—	**100%**	~USD 2.87M (UGX 10.34bn)	~USD 14.4M+ (5:1 minimum)	—	48 - month horizon

Editorial note (September 2026): the Priority tier column above has been realigned to Chapter 14's centrally - computed cross - sector MCDA ranking and to Chapter 17's First - Wave Priority Group and Evidence - Gap Group framing (Sections 17.2.1–17.2.2). Poultry and Piggery move from Medium to High priority, consistent with their 3rd - and 4th - place overall ranking (MCDA 8.35 and 8.1) and their place in the four - sector first - wave group. Fish and Aquaculture and Horticulture move to an Evidence - gap priority label, consistent with Chapter 17.2.2's recommendation that both receive Danida E4 feasibility funding in parallel with first - wave deployment rather than first - wave matching grant capital, until transaction - level evidence closes. Indicative percentage allocations are retained pending the GTTF Steering Committee's own budget decision; this realign-

ment corrects the priority label only.

The phase structure reflects both investment readiness and strategic sequencing. Phase 1 (Months 1 - 18) focuses on enterprise - ready Tier 1 transactions and technology demonstration investments in dairy, coffee, grain, and horticulture — sectors where enterprise profiles have been validated through field KIIs and commercial lender appetite has been confirmed. Phase 2 (Months 12 - 36) brings in the larger, more capital - intensive transactions in aquaculture, coffee Track A, and Agro - industrial waste valorization, where Danida E4 feasibility work in Phase 1 creates the evidence base. Phase 3 (Months 24 - 48) extends the portfolio to post - grant sustainability and cluster - level scale across all ten sectors.

15.8 Implementation Sequencing and First 18 Months

The first 18 months of GTTF implementation are the critical window. They establish the programme's credibility with commercial lenders, generate the first verified technology deployment data that subsequent enterprises will rely on, and create the early leverage ratio evidence that informs aBi Development's budget reallocation decisions. The following sequencing is recommended:

Month	Action	Investment vehicle	Expected output
M1 - 3	Appraise and approve 3 - 5 Phase 1 Tier 1 enterprises across dairy, coffee, grain, horticulture	GTTF matching grant (Gate 0 - 1 appraisal); ACF/UDB co - financing engaged	First commercial commitments; leverage ratio evidence established
M2 - 4	Launch Lyras A/S DDDP regulatory pilot (dairy)	Danida E4 demo (DKK 6M); GTTF enabling investment; DDDP partnership	DDA regulatory decision on Raslysation as alternative pasteurisation standard
M3 - 6	Deploy first hermetic storage units (grain) and NIR spectrometers (poultry feed mills)	GTTF matching grant + ACF investment loans + enterprise equity	First performance data; feed quality improvement documented
M4 - 8	Launch E4 feasibility for Bigadan biogas (dairy Jesa; cassava; Agro - industrial waste)	Danida E4 (DKK 750K per feasibility); GTTF technical assistance	Feasibility reports; bankable project structures prepared
M6 - 12	Appraise and approve Phase 1 cooperative cluster investments (dairy MCCs; cassava outgrowers; piggery BSF)	GTTF + ACF block allocation + aBi guarantee + Stanbic cooperative lending	Hub - and - spoke structures activated; outgrower supply quality improvements documented
M9 - 18	Initiate E4 demo plant for fish - feed (aquaculture); E5 process for soluble coffee (Track A)	Danida E4/E5; IFC exploratory engagement; EU technology partner LOI	Demo data generated; flagship investment pipeline confirmed for Phase 2
M12 - 18	First portfolio leverage ratio audit; budget reallocation decision	GTTF Steering Committee; aBi Development	Verified leverage ratio; refined sector allocations for Phase 2 deployment

The Lyras A/S DDDP regulatory pilot is the programme's most important first - year investment. It is not the largest by capital value, but it is the most strategically leveraged: DDA approval of Raslysation as an alternative pasteurisation standard unlocks the entire dairy cold - chain investment pipeline. Without regulatory clearance, no commercial lender will finance UV - C installations at MCCs, regardless of the technology's documented performance. The regulatory pilot is therefore an investment in the pipeline's future leverage capacity, not a stand - alone project.

15.9 Cross - Cutting Conditions for Investment Success

Several conditions apply across all ten value chains and all investment structures. They are not sector - specific risks; they are programme - level requirements that must be addressed at the GTTF facility design and management level.

Condition	Current status	Required GTTF action
Financial literacy and records	Most SMEs and cooperatives lack audited accounts and formal bookkeeping — cited by UDB and ACF as a frequent appraisal showstopper	GTTF BDS component must include financial records development as a mandatory pre - appraisal service; partner with aBi's existing BDS network
Product quality and certification	Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) certification, HACCP compliance, and SPS standards are entry gates for formal markets and commercial bank lending — non - negotiable for export sectors	Include certification pathway support in GTTF technical assistance budget; partner Uganda National Bureau of Standard-sUganda National Bureau of Standards (UNBS) on fast - track certification routes for GTTF enterprises
Climate and biosecurity risk	Named by all five banking institutions as live risks: African Swine Fever, avian influenza, drought, rainfall variability	Embed agricultural insurance requirements in GTTF appraisal; partner with aBi on index - based insurance products; prioritize climate - resilient technology selection
Outgrower and supply chain development	Installed capacity running at 30 - 40% utilisation is the market's dominant underperformance pattern — supply - side volume and quality must keep pace with processing investment	GTTF appraisal must verify outgrower development plan; milestone disbursement Gate 4 to include supply throughput target as a performance condition
Governance and succession	IFC and UDB both cite thin governance, family ownership without succession plans, and over - trading as recurring credit - loss patterns	GTTF eligibility Gate 0 to include governance assessment; BDS to include board and management development for Tier 2 enterprises

The most important of these is production volume and quality at farm level. Every commercial lender engaged in the banking landscape assessment cited installed agro - processing capacity running at 30 to 40 per cent of design throughput, because farm - gate supply quality and volume are insufficient. Capital investment in processing equipment without parallel investment in outgrower development, quality - linked pricing, and agricultural extension creates expensive idle capacity. The GTTF's matching grant structure, which requires enterprises to demonstrate a verifiable smallholder supply base as an eligibility condition, is the correct design response — but programme management must verify that outgrower development is genuinely happening and not just documented on paper.

This chapter has established the comprehensive investment architecture through which the GTTF will deploy its UGX 10.34 billion envelope to crowd in a minimum of five times that amount in private co - investment across ten priority value chains. The architecture rests on five governing principles, an 70:30 GTTF/enterprise capital split, a verified Uganda banking ecosystem that is willing and able to co - finance, alignment with the evolving Danida Business Instruments suite, and a milestone disbursement framework that maintains programme integrity throughout implementation.

Chapter 16 addresses the policy conditions that must be in place — regulatory reform, fiscal incentives, standards development — for GTTF - supported investments to achieve their projected outcomes and sustain themselves beyond the grant period.

Chapter 16 : Policy Recommendations

The investment case for green technology transfer in Uganda's agricultural sector does not stand on commercial analysis alone. Chapters 4 through 13 each identified structural policy conditions that must improve for GTTF - supported investments to achieve their projected outcomes and sustain themselves beyond the grant period. This chapter addresses the policy audience directly: Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) coffee department, UCDA, the DDDP, the National Planning Authority, and the Ministry of Finance, Planning and Economic Development, rather than restating the investment case already made elsewhere in this report.

The recommendations below are drawn from evidence already presented in this report, not asserted independently of it. Each cross - cutting priority and each sector - specific action traces back to a finding in the relevant chapter, cited in place. Where the European Union's own commercial and development - cooperation posture toward Uganda bears directly on a recommendation, this chapter draws on the companion Uganda - EU Trade and Investment Landscape report prepared for A2i and GRASP in July 2026.

16.1 National Policy Priorities

Four cross - cutting priorities recur across multiple value chain chapters with the highest multiplier effect: they do not belong to any single sector, and progress on any one improves the investment case in several chapters simultaneously.

16.1.1 Stable grain and commodity trade policy

Chapter 8 identifies unpredictable Government intervention in grain markets, including ad hoc export restrictions, as a standing risk to commercial investment in storage and processing infrastructure. An enterprise that has financed hermetic storage or milling capacity on the expectation of open regional trade cannot manage a sudden export ban through operational means; the risk sits entirely with policy predictability. The Ministry of Trade, Industry and Cooperatives and the Ministry of Agriculture, Animal Industry and Fisheries should establish a published, rules - based framework for any future trade restriction, with advance notice periods and a defined trigger threshold, so that GTTF - financed enterprises can price this risk rather than absorb it without warning.

16.1.2 A national cold chain development strategy

The cold chain gap appears independently in the Dairy, Livestock, Poultry, Fish and Aquaculture, and Horticulture chapters as a binding constraint on formalisation and export value capture. Horticulture's own evidence describes this need as route - specific and embedded within its enterprise pathways rather than a standalone investment, which strengthens rather than weakens the case for coordination: four separate Horticulture enterprises, plus enterprises across four other chapters, are each independently solving a version of the same cold - chain problem. A single strategy, led by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) in coordination with the Uganda Investment Authority and the Ministry of Energy and Mineral Development, would allow shared infrastructure, such as regional cold storage hubs and standardised refrigerated transport corridors, to serve multiple value chains rather than requiring each sector to solve the same problem independently.

16.1.3 Fiscal incentives for green agricultural technology adoption

Chapter 4 notes that Track A and Track B coffee investments should qualify for the ten - year tax holiday available to qualifying agro - processing investments under the Investment Code Act 2019, subject to confirmation with the Uganda Revenue Authority. The same question applies across every value chain chapter in this report wherever Danish or EU green technology is recommended: whether the specific technology category (solar drying, biogas digestion, energy - efficient processing, water treatment) qualifies for existing investment incentives, and whether those incentives are calibrated to the capital intensity of the equipment involved. The Ministry of Finance, Planning and Economic Development should confirm and, where necessary, extend the qualifying technology categories under the Investment Code Act to explicitly include the Danish and EU green technology categories named throughout this report, removing the current requirement for each investor to seek individual confirmation.

16.1.4 Coherent digital traceability infrastructure for EU market access compliance

The EU Deforestation Regulation, discussed in Chapter 2 and applied directly in the Coffee and Cassava chapters, requires geolocated, deforestation - free traceability to farm plot level from 30 December 2026 for large and medium operators. Horticulture's own compliance evidence, now the most granular in this report, shows the same underlying need from a different regulatory angle: EU General Food Law traceability requirements, buyer due diligence standards, and destination - market documentation rules are creating the same digital - lot - identity and export - document - workflow requirement that EUDR creates for Coffee and Cassava. A single national digital traceability platform, coordinated by Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) in partnership with the Uganda Coffee Development Authority's successor functions and open to use by cassava, horticulture, and other compliance - exposed value chains, would avoid each sector building a parallel system for the same underlying documentation requirement, and would materially lower the per - enterprise cost of compliance that Chapters 4, 9 and 12 all now flag as a capital stack line item.

16.2 Sector - Specific Regulatory Actions

The matrix below sets out the specific policy or regulatory action required in each value chain, drawn directly from the finding in that chapter that identifies it as a binding constraint. This is an action list for the relevant regulatory body, not a restatement of the investment case.

Value chain	Policy gap identified in this report	Regulatory action required	Responsible body
Coffee (Ch. 4)	UCDA's dissolution in December 2024 and transition to The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department has created a 6 to 18 month institutional gap in export certification and quality assurance, documented in Section 4.3.1.	Complete The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department's absorption of certification and licensing functions on a published timeline, with interim certification continuity guaranteed during the transition.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Coffee Development Department

Value chain	Policy gap identified in this report	Regulatory action required	Responsible body
Dairy (Ch. 5)	The DDDP's statutory target of 80 percent formal pasteurisation coverage stands against a current rate of approximately 30 percent, a compliance gap that GTTF - financed pasteurisation investment is designed to close.	The DDDP should confirm a phased enforcement timeline for informal milk trade, calibrated to the pace at which GTTF - financed pasteurisation capacity comes online, so enforcement and capacity expand together rather than enforcement outrunning capacity.	DDDP - Department of Dairy Development and Production
Piggery (Ch. 6)	ASF biosecurity infrastructure is the foundation on which every other piggery investment stands or falls, and inconsistent enforcement of biosecurity and hygiene standards sustains the cost advantage of informal, unregulated slaughter.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) should resource consistent ASF biosecurity inspection and enforcement at district level, closing the enforcement gap that currently allows informal slaughter to undercut certified operators on cost.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Directorate of Animal Resources
Poultry (Ch. 7)	A Ugandan poultry processor without independently verified HACCP or ISO 22000 status cannot access the institutional and export buyers that would justify GTTF - financed processing investment, per Section 7.4.	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) should expand certified auditor capacity for HACCP and ISO 22000 in the poultry processing sector specifically, reducing the current wait times that make certification a multi - year, not multi - month, undertaking for a newly capitalised enterprise.	Uganda National Bureau of Standards (Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS))
Grain and Animal Feed (Ch. 8)	Ad hoc export restrictions on maize and other grains create unpriced policy risk for enterprises that have financed storage and processing capacity on the expectation of open regional trade.	Establish a published, rules - based framework for grain export policy with advance notice periods, as set out in Section 16.1 above.	Ministry of Trade, Industry and Cooperatives; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))

Value chain	Policy gap identified in this report	Regulatory action required	Responsible body
Horticulture (Ch. 9)	This chapter's August 2026 evidence shows compliance exposure across five distinct requirement categories: MRL limits under EU Regulation 396/2005 (concentrated in chilli, capsicum and hot pepper); Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))/DCIC phytosanitary certification (persistent pest and harmful - organism findings); GlobalG.A.P. or equivalent buyer assurance (uneven outgrower certification coverage); EU General Food Law traceability; and accredited testing access, where existing laboratory capability does not yet match demand.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))'s Department of Crop Inspection and Certification (DCIC) should resource consistent phytosanitary inspection capacity, and Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) or an equivalent body should support accredited testing - laboratory capacity expansion (building on existing capability at enterprises such as Chemiphar Laboratories) so decentralised testing access does not remain the binding constraint on export compliance.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Department of Crop Inspection and Certification (DCIC); Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS)
Fish and Aquaculture (Ch. 10)	Technology adoption, not primarily access to finance, is the binding constraint on commercial aquaculture expansion; licensing and cage density regulation add a further layer of uncertainty to commercial - scale investment.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) should streamline aquaculture licensing and publish clear, stable cage density regulation ahead of GTTF - financed commercial expansion, so investors can plan production scale with regulatory certainty.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Directorate of Fisheries Resources
Livestock, Beef and Small Ruminants (Ch. 11)	The gap between what the sector produces and what it captures in value is a certification gap, a cold chain gap, and a finishing technology gap, not a production gap; inconsistent Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) enforcement of abattoir hygiene and HACCP standards sustains the cost advantage of informal slaughter.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) should resource consistent HACCP and hygiene standard enforcement at district abattoir level, mirroring the poultry and piggery recommendations above, so certified processors are not structurally undercut by unregulated competitors.	Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) Directorate of Animal Resources

Value chain	Policy gap identified in this report	Regulatory action required	Responsible body
Cassava (Ch. 12)	The Biofuels Act 2018's statutory E - 5 to E - 20 bioethanol blending mandate is currently implemented below E - 5; without enforcement, the ethanol pathway that this chapter's strongest single investment case (Bukona) depends on has no assured domestic market.	The Ministry of Energy and Mineral Development should publish and enforce a phased timeline to reach the statutory blending mandate, and URA should confirm VAT and COMESA - origin tariff treatment for cassava starch and HQCF as requested in Section 12.3.3.	Ministry of Energy and Mineral Development; Uganda Revenue Authority
Agro - Industrial Waste (Ch. 13)	Commercial waste valorisation is constrained by inconsistent segregation and quality of organic feedstocks, limited product standards and certification pathways for emerging waste - derived products, and weak commercial linkages between waste generators and processors. These constraints increase operating risk for BSF, organic fertiliser, biogas and other waste - to - value investments	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) should strengthen standards and certification pathways for waste - derived feed and fertiliser products, while National Environment Management Authority and relevant sector agencies should strengthen source segregation and compliant recovery of agro - industrial organic waste. Government should also clarify applicable incentives and regulatory requirements for biogas and other eligible waste - to - energy investments, as stated in Section 16.1	Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS); National Environment Management Authority; Ministry of Energy and Mineral Development; Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF))

Each policy gap cited above is drawn directly from the section referenced in the value chain chapter, current as of August 2026; this table does not introduce new findings beyond what Chapters 4 through 13 already establish.

16.3 Programme Design Implications for GTTF

Beyond the GTTF grant mechanism itself, three programme design questions follow directly from the systemic constraints identified across this report.

16.3.1 Business development services to bridge the readiness gap

The technical assistance findings threaded through Chapters 4 to 13 of this report establish a consistent pattern: in seven of the ten value chains, no technical assistance component existed in the capital stack at all prior to this report's compilation, despite clear evidence in each of those chapters that certification, operator readiness,

or regulatory compliance, not capital access, was the binding constraint on investment success. This is a programme design gap, not only a chapter - drafting gap. GRASP's business development services delivery should be explicitly resourced to close this gap for Tier 2 and Tier 3 enterprises across all ten value chains, calibrated to the specific readiness gap identified in each sector chapter (certification support in Poultry, Livestock, and Piggery; feasibility and operator training in Coffee's Track A; biosecurity protocol training in Piggery; compliance and testing - access systems in Horticulture) rather than delivered as a generic training curriculum applied uniformly across sectors.

16.3.2 Horticulture's evidence - gated transaction framework as a template for readiness - limited sectors

Horticulture applies a four - stage evidence - gated transaction framework (landscape screen, technical and economic validation, supplier and finance structuring, investment approval) that explicitly withholds capital - stack assignment until each stage closes. This is a more disciplined sequencing model than several other chapters currently apply, and GRASP's programme design should consider extending the same staged - gate discipline to Fish and Aquaculture, where enterprise - level evidence is similarly incomplete, rather than treating Horticulture's approach as sector - specific rather than a transferable programme practice.

16.3.4 Market linkage facilitation between EU buyers and Ugandan exporters

The companion Uganda - EU Trade and Investment Landscape report finds that European Union suppliers and buyers are strongest where performance, food safety, energy efficiency, and compliance considerations dominate the commercial decision, and weakest where upfront price and rapid local delivery dominate. It recommends that the most effective route for expanding EU commercial engagement combines technology supply with local representation, operator training, after - sales support, and demonstration investments, and that Ugandan enterprises should only be matched with EU suppliers once investment readiness, financing, and service requirements are defined. GRASP's market linkage function should apply this same discipline in the opposite direction: facilitating access for GTTF - financed Ugandan exporters (coffee, cassava - derived products, processed horticulture, aquaculture output) into EU buyer networks only once EUDR and SPS compliance infrastructure, established under Section 16.1 above, is in place, rather than creating buyer interest ahead of the compliance capacity to fulfil it.

16.3.5 Monitoring and evaluation design for the 5:1 leverage ratio

Every sector chapter in this report frames the 5:1 leverage ratio as a programme - level design ambition rather than a per - deal floor, and several chapters (Coffee, Cassava, Livestock) note explicitly that individual transactions will land above or below that ratio depending on enterprise tier and risk profile. GRASP's monitoring and evaluation framework should track leverage at the portfolio level, not reject or flag individual transactions that fall below 5:1, and should report the achieved ratio transparently against the ambition rather than only against individual deal targets. This is what allows the programme to credibly demonstrate the 5:1 outcome at completion without having quietly redefined it as a per - deal requirement partway through implementation.

Chapter 17 : Conclusions and Strategic Recommendations

The Landscape study set out to answer three questions on behalf of aBi Development and the Green Technology Transfer Fund.

1) Where is Uganda's agro - industrial investment opportunity largest and most credibly evidenced?

2) Where does the Danish and EU technology advantage translate into commercially defensible technology transfer, rather than expensive equipment that sits underused?

3) what does a realistic path to mobilising five units of private capital against every unit of GTTF grant capital actually look like across ten value chains and a programme horizon of four years?

The answers, taken together across seventeen chapters and seven analytical pillars, are more differentiated than any single - sector reading would suggest. Some sectors that look high - priority from a market - size perspective carry lower investment - readiness scores when enterprise evidence is applied rigorously. Some sectors with lower MCDA rankings score lower substantially because their evidence base is incomplete at landscape stage, not because their commercial fundamentals are weak. And the most consequential finding of the entire study emerged not from any single sector chapter but from comparing all ten: seven of the ten value chain chapters arrived at the same omission independently, carrying no technical assistance line in their capital stacks despite each documenting, in precise detail, the non - capital constraints that were preventing enterprises from converting investment into performance. That discovery changes how the GTTF should be designed.

This conclusions chapter synthesises those findings into a set of strategic recommendations for aBi Development. It does not restate what individual chapters found — readers seeking the full sector evidence base should consult Chapters 4 through 13 directly. It addresses, instead, what the evidence says when all ten sectors are read together: where to go first, what technology relationships to prioritise, how the leverage ratio will actually be achieved, what remains unresolved and why that matters, and what a successful GTTF programme contributes to Uganda's broader agro - industrialisation agenda under NDP IV.

17.1 What the Evidence Shows: A Synthesis of Seventeen Chapters

Uganda's agricultural sector entered this study with a profile that combines substantial productive capacity, a well - documented technology deficit, and a financing ecosystem that has matured faster than most practitioners appreciate. The country produces across ten commercially significant value chains, maintains the largest livestock asset base in East Africa, exports horticultural produce across regional and international markets, and is home to a growing class of agro - processing enterprises with demonstrable commercial track records. The constraint is not the absence of productive activity. The constraint is the gap between what Uganda's agro - processing enterprises are currently doing and what they could be doing with correctly specified technology, technical assistance, and structured co - financing.

The multi - criteria assessment across all ten value chains produced a weighted ranking that provides a defensible first - order guide to capital allocation. Grain and Animal Feed ranks highest (8.98 out of 10), driven by a foundational cross - sector role that no other chapter shares: underinvestment in grain storage, milling, and feed quality directly caps the achievable return in Poultry, Piggery, Aquaculture, and Livestock simultaneously. Coffee ranks second (8.54), anchored by a confirmed off - take relationship with Sucafina Instant at a 40 to 75 times FOB value uplift potential over green bean exports. Poultry (8.35) and Piggery (8.1) follow, both with strong

enterprise pipelines and commercially bankable return profiles. Dairy (7.97) brings the most field - validated enterprise evidence base of any chapter in the study — seven of nine KII - confirmed enterprises — alongside a specific regulatory gap (DDDP pasteurisation compliance at 30 per cent against an 80 per cent statutory target) that Lyras A/S's UV - C Raslysation technology directly addresses.

The middle tier — Cassava (7.78), Livestock (7.5), and Agro - industrial waste valorization (6.4) — each carries a credible investment case with a distinctly different constraint profile. Cassava's USD 343.9 million import - substitution potential in starch and high - quality cassava flour is real but contingent on resolving the E - 20 blending mandate enforcement gap and the chronic factory underutilisation that suppresses raw material throughput. Livestock's 14.5 million cattle head asset base is matched by a HACCP abattoir gap so complete that formal slaughter throughput sits below 15 per cent of annual offtake. Agro - industrial waste valorisation ranks lowest in the cross - sector MCDA, reflecting uneven enterprise readiness and constraints around feedstock aggregation, segregation and off - take. This should not be interpreted as low strategic relevance: the sector offers strong climate and circular - economy potential through waste recovery, alternative feed proteins, organic fertilisers and renewable energy, with several field - validated enterprise opportunities already identified. A2i's existing engagement with KCCA provides an institutional foothold in Uganda's waste - management ecosystem that can support demonstration and scaling. The sector is therefore best positioned as a cross - cutting GTTF investment and demonstration platform alongside targeted enterprise investments.

Aquaculture (6.31) and Horticulture (6.01) score lowest — but the reason matters more than the number. Both chapters are explicit that their scores reflect an evidence - completeness position rather than a judgement on commercial potential. The IFC - flagged fish - feed manufacturing opportunity in Aquaculture, at USD 15 to 20 million with an EU technology partner already trading USD 25 million per year into the East African region, is the single largest transaction - ready opportunity in the GTTF portfolio outside of soluble coffee. Horticulture's seven directly - engaged evidence - bearing enterprises collectively present a credible, well - defined pathway, but Chapter 9 is explicit that no capital stack, grant ceiling, or enterprise ranking can be responsibly assigned until transaction - level evidence on throughput, buyer specification, and asset utilisation is closed. Both sectors should remain in the programme pipeline. Neither should receive first - wave GTTF capital before that evidence is in hand.

Rank	Value chain	MCDA score	Investment - readiness position	Strategic recommendation
1	**Grain and Animal Feed**	**MCDA: 8.98**	Strong; confirmed Tier 1 anchors; cross - sector precondition	Deploy first - wave grants; prioritise hermetic storage and precision milling; treat as upstream enabler for Poultry, Piggery, Aquaculture, and Livestock
2	**Coffee**	**MCDA: 8.54**	Strong; Sucafina off - take anchor confirmed; UCDA - Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) transition risk flagged	Deploy Track B/C in first wave; launch E4 for Track A; actively support institutional transition with TA
3	**Poultry**	**MCDA: 8.35**	Strong; Ugachick, Biyinzika anchor enterprises confirmed; short payback across most categories	Deploy first - wave grants; prioritise solar hatchery, NIR feed quality, BSF circular economy; milestone gate at certification

Rank	Value chain	MCDA score	Investment - readiness position	Strategic recommendation
4	**Piggery**	**MCDA: 8.1**	Good; value gap quantified; ASF biosecurity risk requires active management	Deploy first - wave grants with mandatory biosecurity protocol at Gate 0; cluster - level structuring for ACF feasibility
5	**Dairy**	**MCDA: 7.97**	Strongest field - validated enterprise pipeline (7 of 9 KII - confirmed)	Lyras DDDP pilot as enabling investment in first 4 months; then MCC bundle and Jesa biogas; DDA regulatory engagement alongside
6	**Cassava**	**MCDA: 7.78**	Medium; large opportunity, low enterprise readiness; E - 20 mandate enforcement gap	Phase 1 - 2; E3 concessional for starch processing; biogas circular economy alongside; monitor E - 20 enforcement
7	**Livestock**	**MCDA: 7.5**	Medium; largest asset base, lowest formalisation rate	Phase 2; HACCP abattoir E3/E4 feasibility first; DRC export corridor as target market anchor
8	**Agro - industrial waste valorization**	**MCDA: 6.4**	Solid opportunity; highest governance - intensity transactions in the portfolio	E4 for BSF demo and biogas feasibility; E5 for flagship waste - to - energy; KCCA mandate as institutional anchor; Phase 2
9	**Fish and Aquaculture**	**MCDA: 6.31**	Evidence gap, not structural weakness; IFC opportunity is portfolio's largest single transaction	E4 fish - feed feasibility in months 9 - 18; RAS first - wave; Phase 2 matching grant once evidence closes
10	**Horticulture**	**MCDA: 6.01**	Evidence gap; seven directly - engaged enterprises; evidence closure is 30 - 60 days per case	E4 feasibility for M2 and M3 pathways in parallel with Phase 1; matching grant in Phase 2 after evidence closes

Source: Chapter 14 cross - sector MCDA synthesis (August 2026). No underlying chapter score has been altered. Investment - readiness position and strategic recommendation are Chapter 17 synthesis conclusions.

The most consequential finding of this study is not which sector ranks highest. It is that capital is not the binding constraint — bankability is. Every financial institution engaged in the banking landscape assessment reported strong pipeline and a desire to deploy more capital into Uganda's agricultural sector. The binding constraint, named identically by Stanbic, UDB, IFC, DFCU, and the ACF, is the production volume, product quality, and enterprise governance that would put existing capital to work.

17.2 Where GTTF Capital Should Go: The Ranked Investment Case

The ranked investment case rests on three propositions that the sector chapters establish independently and the cross - sector analysis confirms. First, the sectors that combine high MCDA scores with confirmed enterprise evidence and demonstrated banking appetite should receive the earliest and largest capital allocation — not because later sectors are less important, but because first - wave credibility establishes the programme's leverage ratio evidence for aBi Development's reallocation decisions at month 18. Second, the sectors where the score is driven by evidence incompleteness rather than structural weakness should receive Danida E4 feasibility and demonstration funding in parallel with first - wave deployment, so that transaction - level evidence is closing while commercial capital is being mobilised elsewhere. Third, the cross - sector interdependencies

between sectors — particularly Grain and Animal Feed's upstream role across four livestock sectors — should drive sequencing, not just MCDA rank.

17.2.1 The First - Wave Priority Group

Four sectors constitute the GTTF's first - wave priority group: Grain and Animal Feed, Coffee, Poultry, and Piggery. Between them they account for approximately 55 per cent of the indicative GTTF budget allocation and share three characteristics that justify that concentration: each has a confirmed Tier 1 enterprise anchor (or equivalent off - take anchor) capable of catalysing commercial co - financing at or above the 5:1 leverage target; each has identified Danish or EU technology partners with documented Uganda - market appetite; and each has a payback profile short enough (8 to 36 months across most investment categories) that commercial bank debt service is viable at Uganda's prevailing agricultural lending rates without permanent grant support.

Grain and Animal Feed occupies a unique position within the first - wave group. It is not simply Uganda's highest - scoring sector; it is the sector whose underperformance most directly suppresses the GTTF's achievable return in four other chapters simultaneously. Feed cost represents 65 to 70 per cent of total production cost in Poultry and Piggery. Post - harvest losses of 20 to 30 per cent in grain suppress the raw material quality and volume that dairy, aquaculture, and livestock processing require. Investing in Grain and Animal Feed at programme launch — hermetic storage, NIR spectrometry, precision feed milling — is therefore an investment in the leverage ratio of the entire portfolio, not just a single sector.

Coffee's case rests on a single, well - documented commercial anchor: Sucafina Instant's confirmed off - take interest in Uganda - origin soluble coffee, at FOB prices of USD 12 to 22 per kilogram against under USD 1 per kilogram for green bean exports. There is currently no industrial freeze - dry soluble processing capacity in Uganda. GEA Group's NIRO CONRAD technology is the technically validated solution. The financing path (IFC or FMO long - tenor debt, Danida E4 feasibility, E5 impact capital) is available and precedented. The single constraint is the institutional transition from UCDA to Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) as Coffee's primary regulatory body — a gap that GTTF's technical assistance component can actively support. Coffee Track B (roast and pack, USD 8 to 22 million CapEx) and Track C (cooperative wet mill modernisation, USD 2 to 8 million) are deployable in first - wave while Track A (freeze - dry) moves through E4 feasibility.

17.2.2 The Evidence - Gap Group: Parallel Track Approach

Aquaculture and Horticulture should not be deprioritised within the GTTF portfolio — their lower MCDA scores are, as the sector chapters themselves acknowledge, primarily a function of evidence completeness at landscape stage. But they should not receive first - wave matching grant capital before the specific evidence gaps are closed. The correct instrument for both sectors in the programme's first 12 months is Danida's E4 Innovation Bridge (DKK 750,000 for feasibility, DKK 6 million for demonstration) applied to the specific transaction - development questions that each chapter identifies: for Aquaculture, the fish - feed manufacturing plant feasibility and the RAS technology demonstration; for Horticulture, the throughput and buyer - specification evidence for the three aggregation pathway enterprises (Nile Hortlife, Agricado Farms, Avotein Farms) and the processing economics for Green Oceanstar and Amfri Farms.

This parallel - track approach — first - wave grants to evidence - ready sectors, E4 feasibility to evidence - gap sectors — is not a consolation strategy for lower - ranked chapters. It is the correct risk management response when the evidence base and the financing case are both developing simultaneously. The two sectors will be evidence - ready for matching grant deployment at programme months 12 to 18, precisely when the first - wave leverage ratio data is being consolidated and aBi Development is making its Phase 2 budget reallocation deci-

sion.

17.3 The Danish and EU Technology Advantage: Where It is Most Feasible

The GTTF's mandate to favour Danish and European technology is not a procurement preference — it is a strategic bet on lifecycle value, regulatory compatibility, and relationship durability. Where that bet is defensible, it should be made with conviction. Where it needs to be earned rather than assumed, the study is direct about what earning it requires.

The Danish and EU technology advantage is strongest and most immediate in six specific technology categories, each of which combines a documented Uganda - market gap, a named Danish or European supplier with active East Africa commercial presence, and a post - grant sustainability profile that does not depend on continued grant support after Year 3. Non - thermal pasteurisation (Lyras A/S UV - C, for dairy) is the highest - leverage single technology investment in the portfolio: regulatory approval of Raslysation as an alternative pasteurisation standard by Uganda's Dairy Development Authority would unlock the entire dairy cold - chain investment pipeline that cannot currently proceed. Freeze - dry soluble processing (GEA NIRO CONRAD, for coffee) is the highest - value commercial transformation available in any Ugandan value chain. Hermetic grain storage and precision feed milling (Cimbria A/S, SKIOLD A/S for grain; ANDRITZ and Buhler for feed) address Uganda's most damaging structural post - harvest loss category and the upstream constraint on four livestock sectors. Anaerobic digestion and biogas (Bigadan A/S, recurring independently across dairy, cassava, and agro - industrial waste) creates the circular economy infrastructure that Uganda's agro - industrial growth is generating the feedstock for but not yet capturing. Precision livestock housing and biosecure production systems (Skov A/S, Big Dutchman, DanBred) address the certification and biosecurity gaps that keep Poultry and Piggery enterprises below bankable formalisation thresholds.

Three Danish suppliers appear independently in multiple sector chapters — GEA Group (Coffee, Dairy, Cassava), Bigadan A/S (Dairy, Cassava, agro - industrial waste), and Cimbria A/S (Grain, storage across multiple sectors). This cross - sector overlap is a material commercial advantage: a single European technology partner with a demonstrated multi - sector Uganda pipeline is a stronger proposition to that supplier than five separate single - sector engagements, and represents a more durable basis for after - sales support, local technical capacity development, and long - term relationship maintenance. GTTF's programme management should actively exploit these cross - sector supplier relationships rather than treating each sector's technology procurement independently.

The Lyras A/S DDDP regulatory pilot deserves a specific strategic recommendation. It is the most strategically leveraged early investment in the entire GTTF portfolio — not because of its capital value, which is modest, but because DDA approval of UV - C Raslysation as an alternative pasteurisation standard is the regulatory precondition for every commercial - scale MCC cold - chain investment in Uganda's dairy sector. Without that approval, no commercial lender will finance UV - C installations regardless of the technology's documented performance in Denmark and elsewhere. The regulatory pilot should be treated as a programme - level enabling investment and funded from the first - wave budget, not deferred to a later phase. It generates the regulatory pipeline that subsequent Tier 1 and Tier 2 dairy investments require.

The Danish and EU technology advantage is also underwritten by a structural market condition that the banking landscape assessment confirmed: DFCU Bank has reduced its client contribution requirement on strategically important agricultural equipment from the market - standard 20 per cent to 10 per cent — the lowest threshold in Uganda's banking market. This is not a generic concession; it applies specifically to the kinds of precision processing and cold - chain equipment that European technology suppliers provide. It means that an enterprise adopting EU or Danish technology through the GTTF's 70:30 matching grant structure, with DFCU as co - financier, can achieve the required 80 per cent enterprise contribution with a lower equity draw - down than an

enterprise selecting non - European alternatives. This is a concrete, measurable structural advantage that GTTF programme management should communicate to enterprises at appraisal.

17.4 The Path to a 5:1 Leverage Ratio

The 5:1 leverage target — five units of private co - investment mobilised against every unit of GTTF matching grant — is achievable across the programme portfolio. It is not guaranteed. The banking landscape engagement identified the precise conditions under which it is achieved and the specific failure modes that would prevent it. This section summarises those conditions as operational requirements for GTTF programme management, not aspirational benchmarks.

17.4.1 The 70:30 Structure Works When the Capital Stack is Correctly Assembled

The GTTF's 70% : 30% enterprise/grant split creates the right architecture for a 5:1 leverage ratio only when the enterprise's 80 per cent contribution is genuinely structured against commercial or development finance at the programme launch, not composed primarily of soft commitments resolved after grant disbursement. The five institutions that together finance the majority of Uganda's agricultural value chains — IFC, Uganda Development Bank, Stanbic Bank, DFCU Bank, and the Agricultural Credit Facility — all reported strong appetite for agricultural co - financing in structured transactions where the technology investment is correctly specified and the enterprise's supply base is verifiable. They are not a financing gap; they are a supply of capital waiting for bankable deals. The GTTF's role is to originate those deals, not to substitute for the commercial financing.

The ACF's recent expansion is the most important enabling development in Uganda's agricultural financing landscape since the programme was designed. The facility has raised its maximum investment loan from UGX 2.1 billion to UGX 5 billion, extended eligibility to raw - produce purchases for processing, and introduced loan top - ups. At 12 per cent fixed rate for up to eight years with a three - year grace period, ACF - linked debt from any of the five participating institutions is the most cost - effective commercial co - financing available to GTTF - supported enterprises at the scale the programme requires.

17.4.2 The Milestone Disbursement Framework Assures the Ratio

The five - gate milestone disbursement framework (Gate 0: eligibility; Gate 1: co - finance committed, 20 per cent; Gate 2: technology procurement signed, 30 per cent; Gate 3: installation commissioned, 30 per cent; Gate 4: 12 - month performance verified, 20 per cent) is the mechanism that converts the 5:1 leverage target from a programme - level aspiration into a transaction - level requirement. Gate 1 is the critical structural gate: no GTTF grant is disbursed until the enterprise has demonstrated committed commercial co - financing. This means that at the moment of first disbursement, the leverage ratio is already established and verified — it is not assumed and verified later. Every enterprise in the programme pipeline should understand, at the appraisal stage, that Gate 1 is a hard filter and that uncommitted co - finance is not sufficient to pass it.

17.4.3 The First 18 Months Are the Critical Window

The programme's first 18 months establish the leverage ratio evidence that drives everything that follows. Chapter 15 identifies seven specific actions for the first 18 months, sequenced to maximise the early credibility signal. The Lyras A/S DDDP regulatory pilot (months 2 to 4, Danida E4) produces the dairy cold - chain unlock. First hermetic storage and NIR spectrometer deployments (months 3 to 6) produce the first documented performance data on EU technology in the Uganda grain sector. First - wave Tier 1 enterprise appraisals across dairy, coffee, grain, and Poultry (months 1 to 3) produce the first commercial co - financing commitments. The month 12 to 18

portfolio leverage ratio audit produces the verified leverage data that justifies Phase 2 budget reallocation. This sequencing is not arbitrary; each action builds the evidence base that the next action requires.

17.5 What Remains Unresolved: An Honest Assessment

The GRASP landscape study has been designed to be honest about the boundaries of its own evidence. Several sector findings carry a lower confidence level than others, and several programme risks require explicit acknowledgement before capital is committed. This section sets out the material uncertainties, distinguishing between those that are closable within the programme timeline and those that require aBi Development's active management throughout.

17.5.1 Evidence Gaps That Are Closeable

Horticulture's seven evidence - bearing enterprises present a credible, field - engaged opportunity set. The evidence gaps — throughput, buyer specification, asset utilisation, and enterprise co - financing contribution — are standard transaction development questions that a short evidence - closure exercise (estimated 30 to 60 days per enterprise) can resolve. They are not structural weaknesses in the sector's commercial case. The same applies to Aquaculture's enterprise pipeline, where the IFC - flagged fish - feed opportunity is substantive and independently verified but requires feasibility - stage engagement before the capital stack can be responsibly assigned. Both sectors should have dedicated E4 feasibility funding allocated in the first - wave budget so that evidence closure proceeds in parallel with Phase 1 deployment.

17.5.2 Structural Risks That Require Active Management

Three structural risks require aBi Development's active management throughout the programme, rather than resolution before programme launch. Coffee's institutional transition from UCDA to Ministry of Agriculture, Animal Industry and Fisheries (Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) is the most significant regulatory risk in the portfolio: the transition is ongoing, the governance arrangements are not yet fully settled, and the regulatory score in Coffee's MCDA was deliberately capped at 6 to reflect this honestly. GTTF programme management should engage both institutions during the transition and ensure that Coffee's enterprise pipeline is not disadvantaged by certification and compliance uncertainty during the handover period.

African Swine Fever remains an active biosecurity risk in Uganda's pig sector. The piggery chapter's recommended investment in biosecure housing (Skov A/S, Big Dutchman) is partly a commercial technology investment and partly an ASF risk - reduction measure. The GTTF's eligibility criteria should require enterprises to demonstrate active biosecurity protocols — not merely aspire to them — before accessing the Piggery matching grant envelope. An ASF outbreak in a GTTF - supported piggery cluster would damage the programme's leverage ratio and its credibility with commercial co - financiers simultaneously.

Agro - industrial waste records the lowest enterprise - readiness score in the cross - sector assessment, reflecting uneven operating readiness and constraints around feedstock quality, aggregation, off - take and commercial scale rather than a weak underlying opportunity. Uganda's estimated 1.71 million tonnes of annual priority agro - industrial waste, several field - validated enterprise opportunities, and A2i's existing engagement with KCCA provide a strong platform for investment and demonstration. However, BSF bioconversion, anaerobic digestion and related waste - to - value investments will require stronger transaction - level controls, particularly verified feedstock supply, credible off - take, management capacity and enterprise co - investment. GTTF should therefore apply enhanced Gate 0 due diligence to agro - industrial waste investments while positioning the sector as a cross - cutting circular - economy investment and demonstration platform.

17.5.3 Data Limitations That Should Be Declared

Several data limitations were declared during the study and are repeated here so that they are visible at the programme's decision - making level. Horticulture's HS - level UBOS product - form disaggregation was not available at chapter finalisation, meaning the import - substitution finding is stated at SITC 05 level rather than product - specific level. The gender and youth workforce data in several chapters (Horticulture, Aquaculture, Livestock) are stated as targets to be verified at transaction stage rather than confirmed baselines, because management claims on workforce composition were treated as provisional unless independently corroborated. These limitations should inform the design of the programme's monitoring and evaluation framework: the indicators that are weakest at landscape stage are precisely the indicators that require the strongest transaction - level data collection protocol.

17.6 Uganda's Agro - Industrialisation Trajectory and What This Study Means for It

Uganda's Fourth National Development Plan (NDP IV) identifies agro - industrialisation as a central mechanism for structural economic transformation — moving from primary commodity export dependency toward processed and value - added product categories that retain a larger share of agricultural value within the domestic economy. The GRASP programme, and the GTTF within it, sits at a precise juncture in that trajectory. It is not a development project operating in a policy vacuum; it is a technology transfer and investment facility designed to accelerate a transformation that Uganda's own policy framework has already committed to.

The ten value chains assessed in this study, together, account for the majority of Uganda's formal agro - industrial activity and the overwhelming majority of its agro - industrial export potential. The finding that capital is not the binding constraint — that Uganda has a functioning agricultural lending market, with five active institutions and a concessional price floor near 12 per cent, capable of meeting the co - financing requirements the GTTF programme generates — is itself a significant development in the context of Uganda's agricultural finance trajectory. A decade ago, the ACF ceiling was UGX 2.1 billion and agro - processing was treated as high - risk by most commercial lenders. The banking landscape the GRASP team found in June and July 2026 is substantially more capable than that. The GTTF is entering a market that is ready for it.

Uganda has the productive capacity, the enterprise base, the banking infrastructure, and the policy framework for agro - industrialisation at scale. What it has not yet had is a structured, evidence - based technology transfer mechanism that connects the enterprise's investment appetite, the commercial lender's financing capacity, and the Danish and EU technology supplier's market development interest into a single, verified transaction. That is precisely what the GTTF, as this study has designed it, provides.

The GTTF's 5:1 leverage mechanism, applied across a UGX 10.34 billion grant envelope, generates a minimum of USD 14.4 million in verified private co - investment — and substantially more in sectors where the leverage ratio exceeds 5:1 (Coffee Track A, Aquaculture fish - feed plant, large dairy processing transactions with IFC co - financing). At programme completion, the most important metric will not be the number of technology installations or the number of enterprises supported. It will be the enterprises that are still operating, still servicing their commercial debt, still maintaining their technology, and still connected to their Danish or EU technology partners four years after the grant disbursement ended. Post - grant sustainability — assessed at appraisal, tracked through the milestone framework, and verified at Gate 4 — is the test that distinguishes a transformative technology transfer programme from a grant distribution exercise.

The enabling conditions required for GTTF investments to achieve their projected outcomes and sustain themselves beyond the grant period are addressed in Chapter 16. They include regulatory reform in Coffee's insti-

tutional transition, enforcement of the E - 20 cassava blending mandate, DDA approval of alternative pasteurisation standards for dairy, and Uganda National Bureau of StandardsUganda National Bureau of Standards (UNBS) capacity development for HACCP certification across Poultry and Piggery. These are not conditions that aBi Development or the GTTF facility can deliver unilaterally — but they are conditions that a well - structured programme, investing in enterprise - level compliance alongside technology, can actively support. The GTTF's technical assistance component is as much a regulatory development instrument as it is a business development one.

17.7 Ten Strategic Recommendations for aBi Development and GTTF Implementation

The following ten recommendations summarise the study's principal strategic conclusions. They are addressed directly to aBi Development and the GTTF Steering Committee as the primary decision - makers responsible for programme implementation.

No.	Recommendation	Rationale and Implementation Note
R1	**Treat technical assistance as a first - order capital stack component in every sector**	Seven of ten chapters independently omitted TA from their capital stacks while documenting the exact non - capital constraints that TA exists to close. Every GTTF transaction must include an explicit, evidence - linked TA line covering at minimum: operator training, certification pathway support, compliance documentation, and supplier relationship management. TA is not a residual; it is a prerequisite for post - grant sustainability.
R2	**Invest in Grain and Animal Feed as the programme's first action, not one action among many**	Underperformance in grain storage, milling, and feed quality directly suppresses the achievable return in Poultry, Piggery, Aquaculture, and Livestock. GTTF's first commercial transactions should include hermetic storage, NIR spectrometry, and precision milling investments in grain, so that the downstream livestock sectors are receiving improved raw material quality from programme month six onwards.
R3	**Fund the Lyras A/S DDDP dairy regulatory pilot as a programme - level enabling investment in months 2 to 4**	DDA approval of UV - C Raslysation as an alternative pasteurisation standard is the regulatory precondition for every commercial - scale MCC cold - chain investment in Uganda's dairy sector. The pilot is modestly priced (Danida E4 DKK 6M), strategically positioned, and directly leverages an active DDDP institutional partnership. It should be treated as an enabling investment of equivalent priority to first - wave Tier 1 enterprise appraisals.
R4	**Design a national cold chain development strategy alongside, not after, the GTTF investment programme**	Five chapters — Dairy, Livestock, Poultry, Aquaculture, and Horticulture — independently identify the cold chain deficit as a binding constraint. At present, each chapter proposes enterprise - level cold - chain investment because no coordinating national strategy exists. A programme - level cold chain strategy, developed in the first 6 months of GTTF implementation, would allow individual enterprise investments to be sized against shared infrastructure commitments rather than planned in isolation.

R5	**Exploit cross - sector supplier relationships rather than treating each sector's technology procurement independently**	GEA Group, Bigadan A/S, and Cimbria A/S each appear in multiple sector chapters. A single European technology partner with a multi - sector Uganda pipeline is a stronger commercial proposition than five separate single - sector engagements. GTTF programme management should approach Danish and EU technology suppliers at programme level, presenting the full portfolio pipeline, before individual sector transactions are tendered.
R6	**Apply stronger governance requirements at Gate 0 for Agro - industrial waste transactions than for any other sector**	For agro - industrial waste enterprises, technology and capital alone will not ensure commercial success; performance depends critically on operating discipline, reliable feedstock supply and secured off - take. The IFC and UDB both identified governance quality, succession planning, and over - trading as recurring credit - loss patterns. Gate 0 eligibility criteria for agro - industrial waste transactions should include a governance assessment, a board and management development plan, and a documented offtake agreement — not as aspirations but as verified conditions for programme entry.
R7	**Allocate Danida E4 feasibility funding to Horticulture and Aquaculture in parallel with first - wave Phase 1 deployment**	Evidence - gap sectors should not wait for Phase 2 to begin evidence closure. Allocating E4 feasibility funding to the seven Horticulture enterprises (M2 and M3 pathways) and the Aquaculture fish - feed plant in programme months 3 to 9 means that transaction - level evidence is closing while first - wave commercial capital is being mobilised. By month 18, both sectors can be evidence - ready for matching grant deployment.
R8	**Engage aBi Development's existing guarantee and BDS infrastructure as a first - loss and enterprise development platform**	The GTTF is not the only aBi instrument in the market. aBi's existing BDS network, guarantee windows, and co - financing relationships reduce the programme - entry cost for Tier 2 enterprises that would otherwise fail Gate 0 eligibility criteria on financial records and governance alone. GTTF programme management should treat aBi's existing instruments as the enterprise development pipeline that feeds the GTTF appraisal process, not as separate programmes.
R9	**Conduct a portfolio leverage ratio audit at month 12 to 18 and use the findings to rebalance Phase 2 budget allocation**	The indicative GTTF budget allocation in Chapter 15 is a first - order guide, not a fixed sectoral commitment. The month 12 to 18 audit will produce verified leverage ratio data — actual commercial capital committed against GTTF disbursements — that will show which sectors are generating the strongest leverage and which are encountering structural barriers. Phase 2 reallocation should follow the evidence, not the initial plan.
R10	**Declare, monitor, and report the study's stated data limitations through the programme's M&E framework**	Gender and youth workforce data, product - specific import - substitution figures, and enterprise - level economic baselines are stated as targets to be verified at transaction stage in several chapters. The programme's monitoring and evaluation framework should treat these gaps as priority data - collection obligations, not as permanent exclusions from the evidence base. Improving the evidence base during programme implementation is a programme output in its own right.

This landscape study has done what a landscape study should do: it has mapped where the commercial opportunity is largest, where the evidence base is strongest, where the technology fit is most defensible, and where the financing pathway is most clearly established. It has been honest about where those conditions do not yet fully hold, and it has specified, with precision, what must be resolved before capital is committed in those cases.

What it cannot do — and does not attempt to do — is substitute for the transaction - level due diligence, enterprise appraisal, and relationship - building that must follow. The GTTF's effectiveness will ultimately depend not on the quality of this landscape assessment, but on the quality of the programme management, appraisal discipline, and technical assistance delivery that translates the investment case identified here into verified technology adoption, documented leverage ratios, and enterprises that are stronger, more competitive, and more sustainably financed than they were before the programme began.

Uganda's agro - industrial transformation is underway. The GTTF, as this study has structured it, is designed to accelerate that transformation and to demonstrate, in verified and replicable commercial terms, that Danish and European green technology creates durable value in Uganda's agricultural economy. The evidence base assembled across seventeen chapters, ten value chains, and four months of field engagement supports that ambition. The implementation work now begins.

ANNEXES

The following annexes are submitted as supplementary volumes to this report. They contain technical data, scoring matrices, enterprise profiles, and reference material that informed the analysis presented in the main body of this report.

Annex A: *Value Chain Scoring Matrices*

Annex B: *Enterprise Profiles*

Annex C: *Technology Provider Longlist and Assessment*

Annex D: *Donor Program Matrix by Sector*

Annex E: *Data Sources and Bibliography*

Annex F: *Stakeholder Consultation Log*

The Uganda - European Union Trade and Investment Landscape and The Agricultural Financing Landscape in Uganda, previously circulated as standalone Annexes G and H, are now integrated into the main body of this report as Chapter 2 and Chapter 3 respectively, and are not repeated here.

ANNEX A

Value Chain Scoring Matrices

Submitted to: aBi Development Limited | The GRASP Program

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Annex A: Value Chain Scoring Matrices

A.1 Purpose and Scope

This annex consolidates the Multi-Criteria Decision Analysis (MCDA) that each value chain chapter in the Final Landscape Assessment Report (Chapters 4 through 13) applies to score its own sector, together with the criterion weights and evidence-based rationale behind each score. It is organised in the same chapter order as the main report, and closes with the cross-sector ranking that Chapter 14 builds once all ten scores sit side by side.

Nine of the ten chapters score their sector on a like-for-like 1-10 MCDA scale, weighted by criterion, and each chapter's table is reproduced here as published — no score, weight, or rationale has been altered for this annex. Horticulture (Chapter 9) is the exception: rather than a standalone MCDA table, it applies a nine-gate Opportunity Evaluation Tool to individual investment pathways, and its 6.01/10.0 figure in the Chapter 14 ranking is a value assigned at that cross-sector stage rather than computed inside its own chapter. Section A.7 below reproduces the Opportunity Evaluation Tool in place of an MCDA table, consistent with how the report itself treats this chapter.

One further note on internal consistency, in the interest of transparency rather than correction: the Livestock chapter's own detailed MCDA table (Section 11.8.1, reproduced in A.9 below) sums to 7.35/10.0, and this is the figure Chapter 14 carries into its cross-sector ranking. An earlier snapshot line elsewhere in Chapter 11, and Chapter 17's own recap table, both still cite 7.5 for Livestock — an older, uncorrected figure that was not updated everywhere the score is quoted. This annex uses 7.35 throughout, as the figure that is both the chapter's own calculated total and the one Chapter 14 relies on, and flags the discrepancy here rather than silently picking a side.

A.2 Coffee

Coffee scores 8.54 out of 10.0, Priority 1, on a nine-criterion table where market size and growth trajectory, EU/Danish technology fit, and strategic anchors and market-making potential each score at or near the ceiling. The regulatory and policy alignment score of 6 is a deliberate, explained deduction rather than an oversight: it reflects the institutional gap opened by UCDA's dissolution and the still-unsettled transition to MAAIF oversight, not a weaker underlying policy environment.

MCDA Criterion	Weight	Score (1-10)	Weighted	Evidence / Rationale
Market size and growth trajectory	15%	10	1.50	Uganda is Africa's largest Robusta exporter (8.7M bags, USD 2.5B CY2025); 40-75x FOB price uplift available through freeze-dry processing.
EU and Danish technology fit	15%	8	1.20	GEA (NIRO CONRAD) and Buhler (RoastMaster) are the definitive Track A/B technologies; formal Uganda commitment still pending at desktop-engagement stage.
Enterprise investment-readiness (KII base)	5%	8	0.40	Four KII-verified consultations, including a confirmed global off-take anchor (Sucafina Instant); Track A operating entity not yet identified.

MCDA Criterion	Weight	Score (1-10)	Weighted	Evidence / Rationale
Additionality and crowding-in (leverage)	12%	8	0.96	20-35% CAPEX differential over Chinese/Asian equipment; 5:1 leverage achievable for Track B, longer-tenor co-debt needed for Track A.
Processing quality and farm-income impact	12%	8	0.96	Wet mill modernisation reduces 25-30% quality loss at farm level; EUDR-compliant traceability unlocks EU premium pricing.
Rio Marker alignment	10%	10	1.00	100% of GTTF facility contribution ties to a named climate-relevant technology; Climate Adaptation is the lead rationale.
Regulatory and policy alignment	8%	6	0.48	NDP IV and export-target alignment strong, but UCDA dissolution creates a 6-18 month institutional gap in quality assurance and licensing.
Financial co-financing readiness	8%	8	0.64	aBi Development, Stanbic and Centenary confirmed for Track B; Track A requires long-tenor debt not yet confirmed.
Gender and social inclusion	5%	8	0.40	Cooperative wet mill track directly benefits 65%+ women smallholder members.
Strategic anchors and market-making potential	10%	10	1.00	Sucafina Instant (global off-take anchor) and Kyagalanyi Coffee Ltd (Track B processor) together constitute a complete market-making ecosystem.
TOTAL WEIGHTED SCORE	**100%**	**8.54 / 10.0**		Priority 1 sector. Regulatory score of 6 reflects a correctable institutional-transition risk, not a structural weakness.

A.3 Dairy

Dairy scores 7.97 out of 10.0, Priority 1, and carries the report's most extensively field-validated enterprise pipeline (seven of nine profiled enterprises KII-confirmed). Its lowest score, gender and social inclusion at 5, is presented candidly as a genuine data gap rather than a scored weakness in the sector itself.

MCDA Criterion	Weight	Score (1-10)	Weighted	Evidence / Rationale
Market size and growth trajectory	15%	9	1.35	10.3% CAGR (2015-2023); per-animal yield more than doubled; Uganda is the only EAC member running a structural dairy trade surplus.
EU/Danish technology fit	15%	9	1.35	Seven distinct technology categories (Lyras, GEA, Alfa Laval, DeLaval, Tetra Pak, Bigadan) each matched to a specific, field-validated constraint.
Enterprise investment-readiness	5%	8	0.40	Seven of nine profiled enterprises and cooperatives are field-KII validated, the most complete coverage of any chapter in the report.
Additionality and crowding-in (leverage)	12%	7	0.84	The highest-value transaction is capped pending resolution of a documented governance risk, a real qualification on an otherwise strong leverage case.

MCDA Criterion	Weight	Score (1-10)	Weighted	Evidence / Rationale
Milk quality and bacterial load impact	12%	8	0.96	Bacterial load at collection is quantified against a peer-reviewed benchmark; field validation across seven sites confirmed the desktop diagnosis.
RIO Marker alignment (all 4 markers)	10%	8	0.80	Climate-funding share computed transparently at 66.7% against a 75% threshold, stated plainly rather than rounded up.
Regulatory and policy alignment	8%	6	0.48	DDA's own statutory target of 80% formal pasteurisation coverage stands against a current rate of approximately 30%.
Financial sector co-financing readiness	8%	8	0.64	Established pathways across Stanbic, DFCU and the Bank of Uganda's Agricultural Credit Facility.
Gender and social inclusion	5%	5	0.25	Referenced qualitatively but not quantified with the same rigour as production and financial data; a genuine data gap.
Strategic anchors and market-making potential	10%	9	0.90	Four confirmed anchor enterprises plus four cooperative collection centres, the most extensive field-verified anchor base in the report.
TOTAL WEIGHTED SCORE	**100%**	**7.97 / 10.0**		Priority 1 sector. Dairy's scoring is the reference standard against which other chapters' MCDA scales were calibrated.

A.4 Piggery

Piggery scores 8.1 out of 10.0. Its standout feature is the highest climate-resilience score of any livestock sub-sector, driven by a biogas-plus-BSF circular economy case that simultaneously addresses methane emissions, fishmeal carbon footprint, and manure disposal.

Scoring Criterion	Weight	Score	Rationale
Market Growth Potential	25%	8/10	CAGR ~6% on herd; Uganda per capita consumption (3.2 kg) nearly 2x Kenya and 3x Tanzania - a structural demand advantage unique in the EAC.
Climate Resilience Impact	20%	9/10	Highest circular-economy score of any livestock sub-sector: biogas plus BSF address methane, fishmeal carbon footprint and manure disposal together.
Technology Absorption Readiness	20%	7/10	A2i's own 2024 BSF pilot and a SEGES feasibility review de-risk adoption, but UNBS BSF larval meal certification is still absent.
Private Co-Investment Potential	15%	8/10	aBi ACF confirms 5:1 leverage for GTTF grants of USD 69K-111K; strong commercial returns from BSF (14-20 months) and biogas (18-28 months).
Export & Value-Addition Viability	10%	7/10	DRC export channel viable once HACCP certification achieved; 20-35% price premium documented in Goma/Beni.

Scoring Criterion	Weight	Score	Rationale
Inclusive Development Impact	5%	8/10	1.6 million rural households; 45-55% female-led pig keeping; pig savings function as a primary financial inclusion mechanism.
Danish / EU Technology Match Quality	5%	8/10	Frontmatec, BSF suppliers (Buhler/Innovafeed), PlanEnergi/ Bigadan, DanBred, FOSS and Skov A/S/SEGES form a validated pipeline.
WEIGHTED TOTAL	**100%**	**8.1 / 10**	Chapter-level score, carried without adjustment into the Chapter 14 cross-sector ranking. Highest circular-economy/climate-mitigation score of any value chain in the study.

A.5 Poultry

Poultry scores 8.35 out of 10.0, described in its own chapter as the highest-priority investment corridor in the GRASP landscape on recomputed scoring, on the strength of short payback periods and the broadest rural reach of any livestock sub-sector.

Scoring Criterion	Weight	Score	Rationale
Market Growth Potential	25%	9/10	Highest growth rate of any protein sector; urban demand growing at 5.2% p.a. urbanisation; per capita gap to the SSA average (2.1 kg) is the supply-side opportunity.
Climate Resilience Impact	20%	8/10	Solar energy plus BSF circular economy; NIR feed efficiency reduces GHG per kg output; closed housing eliminates heat-stress vulnerability.
Technology Absorption Readiness	20%	8/10	A2i's 22-unit solar incubator track record reduces first-mover risk; Ugachick and Biyinzika have management capacity and financing precedent.
Private Co-Investment Potential	15%	9/10	Short payback periods (8-20 months for NIR and solar) create commercially bankable returns; Tier 1 integrators have ACF/aBi co-financing track records.
Export & Value-Addition Viability	10%	7/10	DRC/South Sudan export corridor opens once HACCP certification achieved; Kenya's structural deficit exceeds 100,000 MT/year.
Inclusive Development Impact	5%	8/10	Out-grower model and women's cooperatives; 4.2 million rural households with poultry, the broadest rural reach of any livestock sub-sector.
Danish / EU Technology Match Quality	5%	9/10	Petersime, FOSS, Meyn, HatchTech, Danfoss and Gram are world-leading in every identified technology gap.
WEIGHTED TOTAL	**100%**	**8.35 / 10**	Highest-priority investment corridor in the GRASP landscape on recomputed scoring; strongest post-grant sustainability profile of any chapter.

A.6 Grain and Animal Feed

Grain and Animal Feed scores 8.98 out of 10.0, the highest of any sector, recommended as Priority 1 on the strength of near-ceiling scores across market size, technology fit, and post-harvest loss reduction impact.

MCDA Criterion	Weight	Score (1-10)	Weighted	Evidence / Rationale
Market size and growth trajectory	15%	10	1.50	~7.2M MT grain surplus plus per-capita poultry consumption runway (1.3 to 8-9 kg by 2040).
EU/Danish technology fit	15%	10	1.50	KAMP Group already runs Skiold/Cimbria; Buhler active at Mandela and SR Kuku; Denmark has arguably the world's strongest feed-technology cluster.
Enterprise investment-readiness (Tier 1 base)	5%	8	0.40	Six KII-verified Tier 1 enterprises with UNBS certification and balance sheets; a brownfield audit is still needed before equipment specification.
Additionality / crowding-in (leverage)	12%	8	0.96	5:1 leverage achievable at Tier 1 via Stanbic/ Centenary; realistic at Tier 2 via UDB plus Aceli, though not guaranteed without GTTF closing the EU-Asian cost gap.
Post-harvest loss reduction impact	12%	10	1.20	MAAIF documents 20-30% post-harvest losses; Mandela Millers' drying ROI moves intake acceptance from 30% to 70-80%.
RIO Marker alignment (all 4 markers)	10%	10	1.00	Within the 75% climate-marker threshold required by donor design, per Day One Validation consensus.
Regulatory and policy alignment	8%	6	0.48	NDP IV agro-industrialisation support is strong, but ad hoc maize export-ban risk is material and recurrent.
Financial sector co-financing readiness	8%	8	0.64	UDB (Tier 2), Stanbic/Centenary (Tier 1) and Aceli Capital confirmed through KII; a GCU on-lending pilot is still conceptual.
Gender and social inclusion	5%	6	0.30	60-70% women farmers in the WARC/Jeroma Lira cluster, though feed-mill technology investment itself is capital-intensive and male-dominated.
Strategic anchors and market-making potential	10%	10	1.00	De Heus's incoming factory (100-120K MT/yr maize pull), Kenchic and Mandela Millers form a strong anchor ecosystem.
TOTAL WEIGHTED SCORE	**100%**	**8.98 / 10.0**		Priority 1 sector. Two deliberately conservative scores (enterprise readiness, regulatory environment) reflect genuine data gaps, not sector weakness.

A.7 Horticulture

Horticulture does not carry a standalone MCDA table of its own kind, unlike the other nine chapters. In its place, Chapter 9 applies a nine-gate Opportunity Evaluation Tool to individual investment pathways rather than scoring the sector as a whole - the report's own account of why is that "the landscape evidence now supports defined opportunity pathways... [but] does not support assigning final grant sizes, supplier quotations or capital stacks to named enterprises" until each gate closes. The 6.01/10.0 MCDA figure that appears in Chapter 14's

cross-sector ranking (third-order GTTF priority) is assigned at that comparative stage rather than computed inside Chapter 9 itself.

Gate	Decision test	Evidence required before a candidate is called investable
1. Operator identity	Is the operator named, legitimate and accountable?	Registration/identity, management accountability, site/node and operating role.
2. Buyer route and standards	Is there real demand with known specifications?	Buyer/destination, standards, product form, quality specification and route.
3. Throughput and timing	Is current and peak volume sufficient for the asset?	Monthly/peak throughput, seasonality, catchment and existing capacity.
4. Monetisable constraint	Can the problem be priced?	Avoided loss, grade uplift, price spread, cost saving or reduced access risk.
5. Green additionality	Does the investment create measurable green benefit?	Energy, water, waste, loss, resilience or compliance baseline and metric.
6. Technology fit and serviceability	Is the solution technically suitable and maintainable in Uganda?	Capacity, supplier specs, warranty, spares, local service and operator skills.
7. Grant / commercial additionality	Would GTTF support de-risk a deal that would otherwise stall?	Counterfactual, co-finance constraint, grant rationale and leverage path.
8. Capital stack	Is the financing pathway credible?	Enterprise contribution, debt/supplier finance, working capital and grant share.
9. Post-support sustainability	Will the asset or service run after support?	O&M budget, service contract, skills, buyer continuity and governance.

Source: A2i/GTTF Opportunity Evaluation Tool logic, Chapter 9, Table 9.9. Horticulture's evidence-gated framing is applied consistently to its seven directly-engaged enterprises (Nile Hortlife, Agricado Farms, Avotein Farms, Green Oceanstar, Amfri Farms, Thyma Herbs, Chemiphar Laboratories).

A.8 Fish and Aquaculture

Fish and Aquaculture scores 6.31 out of 10.0. The chapter is explicit that its own binding constraint is technology adoption rather than access to finance, and several of its own scores (enterprise investment-readiness, financial co-financing readiness) are presented candidly as data or maturity gaps rather than adverse commercial findings.

MCDA Criterion	Weight	Score (1-10)	Evidence / Rationale
Market size and growth trajectory	15%	8/10	Production grew 87% from ~35,000 MT (2015) to 65,444 MT (2025), against a persistent national fish supply deficit.
EU/Danish technology fit	15%	7/10	RAS water recirculation, precision feeding and IoT water-quality monitoring are matched to specific constraints, with less KII validation than Dairy or Coffee.
Enterprise investment-readiness	5%	5/10	Low technology adoption, not access to finance, is this chapter's own stated binding constraint on commercial expansion.
Additionality and crowding-in (leverage)	12%	6/10	The blended-finance structure is clearly specified, but co-financing commitments are not yet confirmed against named transactions.

MCDA Criterion	Weight	Score (1-10)	Evidence / Rationale
Value-chain constraint relief impact	12%	7/10	Feed costs of 50-70% of production costs, poor-quality fingerlings and weak fish-health systems are well-documented and directly addressed.
RIO Marker alignment (all 4 markers)	10%	6/10	Plausible climate and resource-efficiency co-benefits, though not built into the same marker-by-marker assessment found in Dairy and Cassava.
Regulatory and policy alignment	8%	6/10	Aquaculture licensing and cage-density regulation add uncertainty to commercial-scale investment planning.
Financial sector co-financing readiness	8%	5/10	Limited finance access is one of the sector's own stated constraints, a genuine gap rather than a resolved financing pathway.
Gender and social inclusion	5%	5/10	Not separately quantified with the same rigour as production and cost data; treated as a data gap.
Strategic anchors and market-making potential	10%	6/10	Named commercial anchors exist, but the enterprise pipeline evidence is less complete than Dairy or Coffee's fully field-validated anchor bases.
TOTAL WEIGHTED SCORE	**100%**	**6.31 / 10.0**	A genuine growth sector held back by incomplete enterprise-level field validation, an honest reflection of the current evidence base rather than a judgment on underlying potential.

A.9 Livestock (Beef and Small Ruminants)

Livestock scores 7.35 out of 10.0 on its own detailed criterion table, the figure Chapter 14 carries into the cross-sector ranking. As noted in A.1, an older snapshot figure of 7.5 still appears elsewhere in the chapter and in Chapter 17's recap table; 7.35 is used here as the chapter's own calculated total.

Scoring Criterion	Weight	Score	Rationale
Market Growth Potential	25%	7/10	Kenya, DRC and South Sudan structural deficits create documented export corridors; EU leather market exceeds USD 100 billion.
Climate Resilience Impact	20%	7/10	Solar water supply addresses the cattle-corridor drought-water nexus; feedlot precision feeding reduces rangeland dependency.
Technology Absorption Readiness	20%	7/10	Uganda Meat Industries and Leather Industries of Uganda have operational history and management capacity, but no HACCP precedent exists yet.
Private Co-Investment Potential	15%	8/10	Abattoir and tannery investment generates commercially defensible returns; ACF, IFAD LADEP and IFC provide documented co-financing pathways.
Export & Value-Addition Viability	10%	8/10	3-4x value multiplication to certified chilled beef; 20-40x multiplication from raw hide to finished leather, the highest per-unit value-add in the portfolio.
Inclusive Development Impact	5%	8/10	3.2 million rural households; women-managed small ruminants; digestate fertiliser returns value to pastoral households.

Scoring Criterion	Weight	Score	Rationale
Danish / EU Technology Match Quality	5%	8/10	Danish Crown, Frontmatec, Grundfos, Danfoss, Gram and SEGES Innovation are world-leading in abattoir, water, cold-chain and biogas technology.
WEIGHTED TOTAL	**100%**	**7.35 / 10**	Chapter-level score, carried without adjustment into the Chapter 14 cross-sector ranking. Leather finishing is potentially the highest per-unit value-add investment in the portfolio.

A.10 Cassava

Cassava scores 7.78 out of 10.0, Priority 2, its strongest criterion by far being post-harvest loss reduction impact - scored a full 10/10 against a documented 30-40% loss rate.

MCDA Criterion	Weight	Score (1-10)	Weighted	Evidence / Rationale
Market size and growth trajectory	15%	8	1.20	Large market; 2026 starch-price surge improving economics, though industrial off-take remains nascent.
EU/Danish technology fit	12%	8	0.96	SiccaDania, GEA, Buhler, ANDRITZ and Alfa Laval are all applicable, though no EU technology is yet installed in Uganda's cassava sector.
Enterprise investment-readiness (Tier 1 base)	10%	6	0.60	Eight confirmed Tier 1 plants; capacity utilisation highly variable (from ~100% at one line to ~30% at others); financial data still being validated.
Additionality / crowding-in	12%	8	0.96	Clear EU technology cost gap versus Asian alternatives, with no current donor filling this space; 5:1 leverage achievable.
Post-harvest loss reduction impact	15%	10	1.50	PPD losses are severe (30-40%); impact is direct, measurable and scalable.
RIO Marker alignment	10%	8	0.80	Scores against Climate Adaptation (PPD reduction) and Climate Mitigation (ANDRITZ biogas).
Regulatory and policy alignment	8%	6	0.48	NDP IV priority and Biofuels Act alignment strong, but E-20 blending mandate implementation runs well below target.
Financial sector co-financing readiness	8%	6	0.48	UDB, ACF, Centenary and DFCU available, but cassava is less established in lending portfolios than grain.
Gender and social inclusion	5%	8	0.40	Women and youth dominate primary processing, including a lab-technician model at one Tier 1 plant.
Strategic anchors and market-making potential	5%	8	0.40	A confirmed PPP anchor, a KII-confirmed USD 5M+ operational facility, and a confirmed buyer for high-quality cassava chips/flour.
TOTAL WEIGHTED SCORE	**100%**	**7.78 / 10.0**		Priority 2 sector. Strong on post-harvest-loss impact, market size and additionality; held back by low enterprise readiness and regulatory implementation gaps.

A.11 Municipal and Agro-Industrial Waste

Agro-Industrial Waste scores 6.4 out of 10.0, described as a solid mid-range sector. Its own chapter notes that this table was originally scored on a 1-5 scale and has been rescaled to the 1-10 scale used elsewhere in the report for cross-chapter comparability, with each score and the weighted total simply multiplied by two - relative weighting and judgment are stated as unchanged.

Assessment Criterion	Weight	Score (1-10)	Rationale
Growth potential and market scale	20%	6	76% growth in waste volumes 2015-2025; an emerging rather than established commercial market.
Export viability and trade balance	15%	4	Primarily import substitution (organic fertiliser, BSF protein); export potential limited in the near term.
Climate vulnerability and resilience	15%	8	Strong climate-mitigation case: GHG avoidance from waste diversion, carbon biochar, and renewable energy.
Import substitution opportunity	20%	8	BSF protein replaces imported fishmeal; organic fertiliser replaces mineral imports - a direct trade-balance improvement.
Technology absorptive capacity	15%	6	Several enterprises are technically capable, but certification gaps and feedstock constraints limit commercial readiness.
Inclusiveness (smallholder/gender)	15%	6	Indirect smallholder linkages through feedstock aggregation; a gender dimension present in some enterprises.
WEIGHTED OVERALL SCORE	**100%**	**6.4 / 10**	Solid mid-range sector: a strong circular-economy case and EU policy alignment, with commercial scale-up still needed.

A.12 Cross-Sector Ranking (Chapter 14 Synthesis)

Chapter 14 of the main report brings all ten chapter-level scores together on the single comparative scale re-produced below. Its own methodological note is worth restating here: no individual chapter's underlying score, weighting or evidence was altered to build this ranking - it applies each chapter's own published score exactly as calculated in that chapter.

Rank	Value Chain	MCDA Score (/10)	Chapter's Own Priority Label	Strongest Driver	Principal Constraint
1	Grain and Animal Feed	8.98	Priority 1	Strong performance across all ten criteria; foundational cross-sector role (feeds Livestock, Poultry, Aquaculture)	Two deliberately conservative scores on enterprise readiness, reflecting genuine data gaps rather than sector weakness
2	Coffee	8.54	Priority 1	40-75x FOB value uplift; confirmed global off-take anchor (Sucafina Instant)	UCDA-to-MAAIF institutional transition gap; regulatory score capped at 6 to reflect it honestly

Rank	Value Chain	MCDA Score (/10)	Chapter's Own Priority Label	Strongest Driver	Principal Constraint
3	Poultry	8.35	Highest-priority investment corridor	Strongest post-grant sustainability profile and most commercially bankable return of any chapter	UNBS/HACCP certification capacity constrains how fast processors can convert capital into certified output
4	Piggery	8.1	Not separately labelled	Large, well-quantified value gap between farm-gate and certified formal retail	ASF biosecurity infrastructure and certification status, both technical-assistance gaps as much as capital ones
5	Dairy	7.97	Priority 1	Most field-validated enterprise pipeline of any chapter (7 of 9 enterprises KII-confirmed)	DDDP formal pasteurisation compliance gap (30% actual against an 80% statutory target)
6	Cassava	7.78	Priority 2	Strong post-harvest loss reduction case and market size	Low enterprise readiness and regulatory implementation gaps (E-20 blending mandate under-enforced)
7	Livestock, Beef and Small Ruminants	7.35	Not separately labelled	Uganda's largest livestock asset base (14.5M cattle head) relative to its commercial infrastructure	Certification, cold-chain and finishing technology gaps rather than a production gap
8	Municipal and Agro-Industrial Waste	6.4	Solid mid-range sector	Strong circular economy case and EU policy alignment	Commercial scale-up needed; enterprises fail more often on operating discipline than on capital access
9	Fish and Aquaculture	6.31	Not separately labelled	87% production growth 2015-2025 against a substantial unmet national demand	Technology adoption, not capital access, is this chapter's own stated binding constraint
10	Horticulture	6.01	Third-order GTTF priority	Rigorously quantified packhouse wastage data and a narrowed, seven-enterprise evidence-bearing set, paired with a well-specified Danida instrument mapping	This chapter's own transaction framework confirms financing structuring and investment approval are not yet assessed; capital-stack assignment awaits evidence close-out

Chapter 14 does not recommend applying this ranking as a mechanical budget-proportioning formula. Two of the three lowest-scoring sectors, Aquaculture and Horticulture, score low substantially because their own enterprise-level evidence base is less complete than the top-ranked chapters, not because their underlying commercial case is weak. Chapter 15's investment framework treats the ranking as a first-order signal for capital weighting, adjusted for which gaps are genuinely structural against which are evidence gaps closeable within the current programme cycle.

ANNEX B

Enterprise Profiles

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Annex B: Enterprise Profiles

B.1 Purpose and Scope

This annex consolidates the Tier 1 and Tier 2 enterprise profiling carried out under Pillar 4 of each value chain chapter (Chapters 4 through 13) into one reference volume, organised in the same chapter order as the main report. Each profile draws on the same financial health indicators, processing capacity data, operational-deficit findings and technology-adoption readiness assessment already published in its source chapter - no figure here is new disclosure, and none has been rounded or generalised beyond what the chapter itself states.

Company names are used throughout, since these are businesses already named and profiled in full in the main report, not individuals. Where a chapter's own enterprise table also names an individual contact (a managing director, a technical lead) tied to a specific KII, that person's name has been replaced with their role or title alone, consistent with the anonymisation convention applied to Annex F. Two chapters (Coffee, Grain and Animal Feed) had already applied this convention themselves in the source text; a small number of individual first names appearing in Piggery's and Grain and Animal Feed's source tables have been removed for this annex.

Enterprise tiering conventions are not fully harmonised across the ten chapters - a point the report itself acknowledges. Several chapters use a "Tier 3 " or similar marker for their highest-priority enterprises rather than "Tier 1"; two chapters (Coffee, Dairy) present a single ranked table rather than separate Tier 1/Tier 2 tables; and Horticulture uses no tier labels at all. Each section below states the convention that chapter actually uses rather than forcing a uniform Tier 1/Tier 2/Tier 3 label onto material the source chapter itself does not label that way.

B.2 Coffee

Coffee's enterprise pipeline centres on three ranked cases rather than a large Tier 1/Tier 2 roster: two enterprises the chapter itself ranks as Tier 1, plus one Tier 2 cooperative.

Enterprise	Scale & Positioning	Strategic Strengths	Key Gaps
Kyagalanyi Coffee Ltd (Tier 1)	Vertically integrated exporter with ~15-18% of Uganda's green coffee export volume; wet-mill network processes ~50,000-70,000 MT of cherry per season	Strongest balance sheet and commercial platform among assessed enterprises; established export markets; capacity to co-finance Track B	No commercial soluble/ freeze-dry capacity; roast-and-pack still at pilot stage; EUDR geolocation/ traceability not yet complete across the smallholder supply base
Sucafina Instant (Tier 1)	Global instant-coffee trader with confirmed commercial interest in Ugandan Robusta; no Uganda processing asset of its own	Provides a potentially critical route-to-market for Uganda-origin soluble coffee; clear understanding of commercial requirements	Off-take interest is not yet a binding commitment; needs a credible Uganda-based operating partner and EUDR-compliant certification before a deal can close

Enterprise	Scale & Positioning	Strategic Strengths	Key Gaps
Rubanga Cooperative (Tier 2)	~12,573 registered members, linked to 13 further cooperatives (22,881 members total); 6 hullers and one dry mill processing ~192,000 MT green coffee beans per season	Strong inclusion and rural-income impact; established EU market access; Fairtrade and Organic certifications provide a traceability foundation	Limited borrowing capacity, currently dependent on impact/development finance; drying remains fuel-dependent, not yet electrified or solar; EUDR geolocation incomplete

Kyagalanyi and Sucafina Instant together form what the chapter calls a complete market-making ecosystem - a confirmed global trading anchor paired with a vertically integrated domestic processor - while Rubanga Cooperative represents the report's clearest cooperative-scale GTTF matching-grant case in this sector.

B.3 Dairy

Dairy's own chapter table (Table 5.12) ranks enterprises 1 through 7 rather than sorting them into separate Tier 1/ Tier 2 tables; the chapter describes this ranking as its own field-based reasoning on balance-sheet strength and adoption readiness, still provisional pending a cross-consultant agreement on a single tiering metric.

Rank	Enterprise	Scale & Positioning	Strategic Strengths	Key Gaps
1	Nabitanga Cooperative MCC (Sembabule)	High-readiness milk collection centre; zero rejection rate; grid-tied solar system	Highest-readiness site in the field programme; strong quality-management systems; national quality awards	Bacterial-load reduction and shelf-life extension remain important; UV-C treatment requires regulatory approval
2	Brookside Uganda (Sameer Agriculture)	450,000 L/day installed capacity, only ~100,000 L/day (22%) current throughput; four bulking centres	Confirmed Algeria export market; ISO 22000 certified; extensive bulking network	Very low capacity utilisation from raw-milk constraints; no CIP infrastructure at tanker or bulking-centre level; no solar cooling
3	Jesa Farm Dairy (Wakiso)	400,000 L/day installed, 60-70% utilisation; major national fresh-milk brand	Strong market position; ISO 22000 certified; previous UDB co-financing experience; clearly identified biogas opportunity	Existing pasteurisation line has spare capacity, so a second treatment line is not commercially justified; water recycling is the higher near-term priority
4	Pearl Dairy (Mbarara, Lato Milk)	Uganda's largest dairy processor by market share (~31%); ~1 million L/day installed capacity	Exceptional scale and market reach; IFC capital programme underway; quality-based milk payment system operational	Raw-milk supply and farm productivity, not processing capacity, is the binding constraint on its own assessment

Rank	Enterprise	Scale & Positioning	Strategic Strengths	Key Gaps
5	Benni Foods Ltd (Lyantonde)	Largest reported single-site capacity (~1 million L/day installed); confirmed Algeria exporter	Potentially major Southwest investment platform; very large effluent volume creates significant biogas potential	No direct enterprise engagement; utilisation and financing capacity remain unverified
7	Yoghurt Express Ltd (Bugolobi)	Micro/small processor; ~500 L/day, planned expansion to 2,000-3,000 L/day	Strong direct-sourcing model; premium market positioning; low reported bacterial counts	Current scale too small for major capital-intensive technology; supplier base limited to two farms

Beyond the ranked table, five cooperative-level milk collection centres carry field-validated evidence of their own: Nabitanga (highest-readiness site in the entire field programme, recommended for the first commercial UV-C deployment once the DDDP regulatory pathway clears), Migani and Kalyabulo (both showing strong unprompted UV-C demand signals), Kijjumba (reclassified to pipeline status after a solar technical failure left it with double loan burden and a 15-20% rejection rate), and Dwaniro (a government-donated processing plant standing commercially idle - its constraint is working capital and distribution, not equipment).

B.4 Piggery

Piggery's Pillar 4 (titled "Enterprise Profiling and Green Technology Mapping") assigns each enterprise a Tier 1-3 marker inside a single "Comprehensive Sector Actor Landscape" table, with a "Tier 3 " marker used for its two priority KII targets - reflecting the chapter's own stated intent to reconcile tiering conventions across chapters rather than an error.

Enterprise	Segment	Scale / Capacity	Tier	Key Gaps
Ranchers Finest / Finest Farms	Vertically integrated	Two farms (Weekway genetics/AI and Nakifuma); own slaughter, processing and cold chain; on-site feed mill; ~100 pigs/month scaling to 250-500	Tier 3 ★	Certification status unconfirmed or lapsed pending UNBS re-verification; some certificates found already expired
Prime Pork Uganda Limited	Vertically integrated	500+ sows; own feed mill; formal supermarket and hotel off-take; stated HACCP ambition	Tier 3 ★	Sources genetics from a French nucleus with exclusive East-African rights and its own RFID traceability, independent of NAGRC&DB - described as the clearest Tier 1 anchor for the GTTF piggery portfolio
Nsibirwa Pork Products Ltd	Processing / Distribution	Established Kampala formal pork supply; hotel and restaurant linkages	Tier 2-3	HACCP certified processing upgrade needed; solar cold hub

Enterprise	Segment	Scale / Capacity	Tier	Key Gaps
UPPA Member Enterprises	Processing / Production	Uganda Pork Producers and Processors Association Tier 1 cluster; OPA contractual off-take framework documented as bankable	Tier 2-3	Current scale and activity levels not yet independently verified - treated as provisional
Silverback Feeds Ltd	Feed Manufacture	Commercial pig feed production, Kampala region; key downstream customer of BSF larval meal	Tier 2	NIR feed quality testing and BSF larval meal off-take agreement needed
Multifeeds Ltd	Feed Manufacture	Commercial pig and poultry feed, Wakiso District	Tier 2	NIR spectrometry and BSF larval meal integration needed

Prime Pork Uganda Limited's genetics finding is worth flagging on its own: field engagement corrected an earlier assumption that its breeding stock came via NAGRC&DB, establishing instead that it operates a structured breeding pyramid sourced from a French genetics nucleus. Separately, national import data (URA HS 0103.10, 2015-2025) shows South Africa, not Europe, as the dominant country of origin for live breeding swine entering Uganda by weight and value - reframing genetics as an EU/Southern-Africa technology-transfer question rather than an EU/Danish one exclusively.

B.5 Poultry

Poultry's chapter states its analytical focus plainly: systemic impact is concentrated in a small number of Tier 3 enterprises - principally Ugachick Poultry Breeders and Biyinzika Poultry International - with the fuller actor landscape retained mainly for ecosystem completeness and KII targeting.

Enterprise	Scale / Capacity	Tier	Key Gaps
Ugachick Poultry Breeders Ltd	~2M day-old chicks/yr; ~60% capacity; integrated feeds	Tier 3 ★	Operating at only ~60% hatchery capacity due to climate-control failure - a direct match to the solar hatchery/in-ovo vaccination technology gap
Biyinzika Poultry International	~500,000 day-old chicks/yr; broiler and layer; government distribution	Tier 3 ★	Identified for solar incubation upgrade and HACCP processing line investment at a 25% matching-grant rate
Ugachick Feeds Division	~5,000 MT/yr; integrated with day-old-chick supply chain	Tier 3 ★	Fastest payback of any technology in the portfolio (8-14 months) via NIR spectrometry for aflatoxin control
NSPF Nucleus Scheme	Multi-district; 200+ satellite growers; out-grower model	Tier 2	Collective solar incubation across the nucleus network still needed
Roofings Feeds / NUVITA	~15,000 MT/yr; largest independent feed miller	Tier 2	NIR feed quality and BSF protein integration needed

Enterprise	Scale / Capacity	Tier	Key Gaps
Hariss International (Kenchic Uganda)	Imported frozen product alongside growing domestic processing; Nairobi wholesale linkage	Tier 2-3	Still relies significantly on imported frozen product; HACCP processing upgrade and Kenya export route are the identified opportunities

Two field notes worth carrying forward: SR Kuku confirmed at its July 2026 KII that it already has an active Danish supplier relationship (El Anker) for slaughter/grading automation, expanding throughput from ~5,000 to 10,000 birds/hour; and Kenchic raised in-ovo sex determination technology (In Ovo B.V., Netherlands) as a new candidate not yet assessed for Uganda fit.

B.6 Grain and Animal Feed

Grain and Animal Feed applies the report's clearest statement of tiering logic: Tier 1 enterprises hold three or more UNBS-certified products and the balance-sheet strength for 5:1 or 10:1 leverage; Tier 2 enterprises are commercially active with one to two certifications and need targeted de-risking; Tier 3 covers cooperatives and rural aggregators needing patient capital.

Enterprise	Location	Scale / Capacity	Tier	Key Gaps
SR Kuku / Wind Green (merged)	Luwero / Kampala	7 UNBS SKUs; 20 t/hr mash + 7 t/hr pellet + 10 t/hr pellet (Buhler, installing)	Tier 1 - Priority	Unmonetised lecithin by-product sold at USD 0.0003-0.0006/kg vs. a global value of USD 2,000-4,000/MT
KAMP Group Limited	Anaka, Nwoya	5 UNBS SKUs; Skiold + Cimbria Danish technology already installed	Tier 1 - Priority (most naturally aligned)	Soybean meal quality inconsistency (37% crude protein vs. 44-46% standard); silo capacity limits seasonal procurement
Mukwano Industries Ltd	Industrial Area, Kampala	3 UNBS SKUs; 400-560 t/day oilseed	Tier 1 - Priority	Aflatoxin contamination blocks the Kenya sunflower-meal export market entirely
Mount Meru Millers (U) Ltd	Lira	5 UNBS SKUs; 200 t/day (1,000 t planned); revenue grew from USD 35M to USD 100M over three years	Tier 1 - Priority	Raw-material supply, not capacity or demand, is the primary growth barrier - revenue has plateaued for two years on crop supply
Mandela Millers Ltd	Kampala	2 UNBS SKUs, feed plant launching Q4 2026; ~144 MT/day grain milling	Tier 1 (advancing to full Tier 1)	Currently not buying from cooperatives due to aflatoxin/moisture variability - both a constraint and an opportunity
Ugachick Poultry Breeders Ltd	Kampala (multi-site)	Integrated poultry; 8-9M day-old chicks/yr	Tier 1 - commercial case strong; certification pathway needed	Consumer-market development and cold-chain logistics remain the binding constraint on the B2C side

Enterprise	Location	Scale / Capacity	Tier	Key Gaps
WARC Uganda	Kiryandongo / Kiboga / Anaka	Social enterprise aggregator; 4,500 registered farmers; 3,000 MT aggregated this season	Tier 2 - strongest case	Lacks its own cleaning/drying facility; working capital gap confirmed at a 2:1 minimum ratio
Jeroma Farmers Collection Centre Ltd	Pader / Lira	Cooperative union across 11 districts; 10,000+ farmers; 8,000-13,000 MT/yr maize aggregate	Tier 3 - confirmed	No drying/cleaning facility - sun-drying only on open tarpaulin; no on-site aflatoxin testing

Buhler Group's own East Africa technology partner KII (7 August 2026) is worth noting as a cross-cutting caution: Buhler recommends an independent, neutral process audit before any brownfield equipment investment, separate from its own commercial pre-sale consultation, and states plainly that it will decline a sale where an enterprise's process design falls below minimum standard.

B.7 Horticulture

Horticulture is the one chapter in this report that deliberately does not sort its enterprises into Tier 1/Tier 2 categories at landscape stage. Its own framing is explicit: "the enterprise analysis is deliberately narrower than the original prospecting list... this table is an evidence grouping, not an enterprise ranking." A later cross-chapter synthesis (Chapter 15) does retrospectively describe these as "Horticulture's seven directly-engaged Tier 2 cases," but Chapter 9 itself withholds tier labels until further evidence closes.

Opportunity category	Evidence-bearing enterprises	Investment model indicated	Critical remaining gap
Aggregation, packhouse and first-mile	Nile Hortlife; Agricado Farms; Avotein Farms	Own integrated facility; aggregation into existing assets; distributed hub/logistics model	Throughput, asset utilisation, handling/logistics cost, and first-asset sizing
Processing and preservation	Green Oceanstar; Amfri Farms	Greenfield processing/drying facility; incremental expansion of an established platform	Buyer specs, throughput, conversion yield, energy and price economics
Certified supply / production services	Thyma Herbs	Certified outgrower expansion and protected-production/service system	Buyer demand, target certified volume, certification model/cost
Compliance / testing access	Chemiphar Laboratories	Mobile screening, sample collection/tracking and private inspector network linked to an existing lab	Samples/month, prices, turnaround, spare capacity, willingness to pay

The chapter's own closing caution applies to every one of these seven cases: "management claims are treated as provisional unless independently corroborated... do not assign final grant amounts, asset sizes, supplier matches or enterprise rankings until UBOS product-level data and last-mile enterprise evidence close the gates." One further case, Fresh Handling Ltd, is discussed but explicitly parked rather than counted as evidence-bearing, since its box-integrity loss is not yet quantified.

B.8 Fish and Aquaculture

Fish and Aquaculture groups its enterprises directly into Tier 1 ("Investment/Technology Anchors"), Tier 2 ("Commercial Scale-up and Demonstration") and Tier 3 ("Farmer Aggregation and Sector Platforms"), then re-ranks the same enterprises 1 through 9 in a companion GTTF-priority table.

Enterprise	Tier	Scale & Positioning	Key Gaps
Yalelo Uganda Ltd	Tier 1	Largest vertically integrated commercial aquaculture enterprise in Uganda; regional market presence	High energy costs; needs climate-smart technologies, advanced monitoring, renewable energy integration
De Heus Uganda	Tier 1	Leading formal aquafeed supplier serving commercial and emerging fish farmers	Dependence on imported feed ingredients; limited alternative protein integration
Victoria Treasures Ltd	Tier 1	One of Uganda's leading fish processors with export orientation	Underutilisation of installed capacity due to inadequate fish supply; needs energy-efficient processing and traceability upgrades
KAMOS Agro Fish Ltd	Tier 2	Medium-scale commercial producer with expansion potential	Limited access to finance; high feed costs; limited automation and monitoring
MIG Fish Farm Ltd	Tier 2	Emerging commercial producer in the Lake Victoria aquaculture corridor	Limited investment capital; weak biosecurity systems; inadequate digital farm management tools

The companion GTTF-priority ranking table adds one further enterprise not named in the main Tier table - Rock Springs Fish Farm Ltd, ranked the #2 overall GTTF priority as the sector's hatchery and genetics anchor - an inconsistency present in the source chapter and reproduced here rather than corrected. Three farmer-platform organisations (Source of the Nile Fish Farmers Association, WAFICOS, and UCFFA) sit in Tier 3, consistently flagged with limited commercialisation and dependence on project-based funding.

B.9 Livestock (Beef and Small Ruminants)

Livestock's Pillar 4 opens with a technology-matching assessment by technology gap rather than by enterprise, then assigns tiers in a "Comprehensive Sector Actor Landscape" table. Two named anchor enterprises - Uganda Meat Industries and Leather Industries of Uganda - are discussed at length in the chapter's investment-blueprint narrative but do not themselves appear as rows in the Tier table.

Enterprise	Segment	Scale / Capacity	Tier	Key Gaps
Uganda Meat Industries (Soroti)	Formal Abattoir	~100 head/day throughput; ~55% average carcass yield (desk estimate, not yet independently verified)	Named anchor (not a Tier table row)	HACCP certification alone is not sufficient for export - Uganda's FMD-endemic status blocks fresh beef export without FMD-free corridor designation

Enterprise	Segment	Scale / Capacity	Tier	Key Gaps
Leather Industries of Uganda (Jinja)	Tannery / Leather Processing	Requires a finishing upgrade, not a greenfield tannery	Named anchor (not a Tier table row)	Animal RFID/traceability must be bundled with any tannery grant under the EU Corporate Sustainability Due Diligence Directive
Aswa Ranch (Gulu)	Commercial Ranch	~5,000+ cattle; large land base; feedlot infrastructure still nascent	Tier 3 ★	Herd size and throughput fit still need KII confirmation before feedlot capital is committed
Maruzi Ranch (Apac)	Commercial Ranch	Large commercial ranch in the cattle corridor	Tier 3 ★	Solar water supply and precision nutrition for carcass-weight consistency not yet in place
Harvest Money Agro (Kampala)	Formal Abattoir	Urban-proximity abattoir; expressed interest in formal retail certification	Tier 2-3	HACCP processing upgrade and solar cold hub needed
City Abattoir Kampala	Formal Abattoir / Processing	Kampala formal retail and food-service supply	Tier 2	Cold-chain upgrade and HACCP pre-certification support needed

The chapter's own sector-wide hard-gate flag is unambiguous: "do not commit abattoir capital until the FMD regulatory pathway is resolved in KII; this is explicitly flagged as the single biggest threat to the entire livestock investment case," with a parallel condition that tannery finishing capital should not be disbursed until a CSDDD-compliant traceability plan and an EU buyer offtake agreement are both in place.

B.10 Cassava

Cassava defines its tiers by hard financial thresholds: Tier 1 enterprises hold total assets above UGX 360 million, more than 100 employees, audited financials and demonstrated commercial off-take; Tier 2 covers medium-scale processors handling 10-50 tonnes of roots daily with assets between UGX 100M and UGX 360M; Tier 3 is smallholder producer groups processing under 10 tonnes daily.

Enterprise	Location	Scale / Capacity	Tier	Key Gaps
Bukona Agro Processors Ltd	Nwoya	PPP structure (UDC holds UGX 11.9bn, 40.5% equity); ~10,400 MT DC/month, ~100% of design capacity on the ethanol line	Tier 1 - Priority	10 litres of highly acidic stillage per 1 litre of bioethanol, managed via open lagoons, with no waste valorisation
Dei Bio-Pharma Ltd (Kamuli)	Kamuli	USD 5M+ committed facility; ~13,000 MT FCR/month designed; operating status at KII time was still "commissioning"	Tier 1 - Priority	Throughput and actual root volumes could not be confirmed at KII; balance sheet not available for review - phased disbursement recommended

Enterprise	Location	Scale / Capacity	Tier	Key Gaps
Pura Organic Agro Tech Ltd	Nakasongola	~2,600 MT FCR/month; ~30% utilisation	Tier 1 - Priority	Standard flash-drying tower consumes 45-55% of processing costs in energy; may be over-specified for current throughput
PRO Industries PTE Ltd	Luwero	ENA/industrial ethanol; ~13,000 MT FCR equivalent/month, operational	Tier 1 - Priority	Batch fermentation/distillation (Indian/Chinese origin) with high steam consumption and inconsistent 96% purity
Lukonge Cotton Company	Pallisa	UNBS-certified starch; ~2,600 MT FCR/month; ~30% utilisation	Tier 1 (advancing to full validation)	Seasonal feedstock supply gaps and wet-process water management
De Heus Uganda (Buikwe)	Buikwe	Confirmed HQCC buyer; ~3,200 MT DC/month, operational and certified	Tier 1 - confirmed buyer	Cross-references Chapter 8's Grain and Animal Feed profile of the same company
Smart Start Industries	Masindi	Bioethanol; ~3,432 MT DC equivalent/month, operational and upgrading	Tier 1 - validate capacity pre-disbursement	High-efficiency ethanol extraction and peeling/washing/drying at scale still upgrading
Rwibaale Cooperative	Kyenjojo	Primary processing; near-breakeven, grant-dependent	Tier 2 - strongest cooperative case	No current UNBS certification; solar/biomass hybrid drying needed
Adyaka Cooperative	Apac	Primary processing; developing	Tier 3	Pipeline development stage

Two Tier 1 candidates carry an explicit caution flag rather than a clean "confirmed operational" status: Rwenzori Holdings (Kyenjojo) is still under commissioning and marked "validate commissioning status before disbursement," and Fermarco Industries (Kitagwenda) is marked "temporarily closed... do not treat as operational" following its July 2026 KII. Bukona's own GTTF opportunity is quantified in unusual detail: an ANDRITZ anaerobic digestion and evaporator system converting stillage to DDGS animal feed, projected at roughly UGX 14.4 million/day in gross DDGS revenue plus a further UGX 5.6 million/day in biogas thermal offset, an estimated IRR of ~28.5% and a ~3.2-year payback - though the chapter itself flags that cassava's share of feedstock must be verified at 70% or higher before disbursement, since a partial shift to sorghum would undermine the cassava-specific impact case.

B.11 Municipal and Agro-Industrial Waste

Waste's Pillar 4 groups its eleven core enterprises into Tier 1 ("established commercial operations with a clearly defined technology investment need") and Tier 2 ("processing capacity exists, but feedstock partnerships or capital strengthening are needed first"), plus a separate Strategic Anchor category for two large off-takers that are not themselves grant recipients.

Enterprise	Location	Core Business	Tier	Key Gaps
Bukona Agro Processors Ltd	Nwoya	Ethanol from maize and cassava, DDGS as principal co-product	Tier 1	DDGS value and energy cost constrained by inadequate drying and unrecovered waste heat
DEM Farm Uganda Ltd	Mityana	120,000-bird poultry farm with an existing certified organic fertiliser line	Tier 1	Existing fertiliser line has expansion headroom; wastewater nutrient recovery not yet captured
OranaGate Fruit Processing Ltd	-	Orange, mango and other fruit juices and concentrates	Tier 1	2.5 T/hr of fruit-processing residue not currently recovered as boiler fuel
Soroti Fruit Juice Factory (TEJU)	Soroti	Orange and mango juices	Tier 1	BSF and fertiliser feasibility study already complete but not yet moved to commercial implementation
Bioconvision Jinja Ltd	Jinja	Commercial BSF production from organic waste	Tier 1	Operating at 4-5 T/day against a 10 T/day design capacity, constrained by automation and feedstock consistency
BioBloom Uganda Ltd	Kampala	BSF larvae and organic fertiliser production; Bokashi fermentation	Tier 1	Scaling requires decentralised, climate-controlled modular units rather than one large facility
Bongomin Group	Mbale	Biomass carbonisation, 20,000 T/yr design capacity	Tier 2	Runs at only 60% of design capacity due to biomass drying and aggregation gaps
Ugavoil Products Ltd	Kasese	BSF poultry feed, frass and vermicompost	Tier 2	Feedstock contamination limits actual throughput to ~4 T/day against a 10 T/day design
Asante Agro / Asante Waste Management	Kampala + 6 cities	Integrated waste collection, 400+ customers	Tier 2	Existing collection network not yet structured as a dedicated feedstock aggregation hub
Marula Proteen	Kigali / Uganda	BSF-assisted composting, proven in Rwanda	Tier 2	Replicating the Rwanda model in Uganda needs long-term feedstock partnerships not yet in place

De Heus Uganda Ltd and Kenchic Uganda Ltd both appear as Strategic Anchors rather than grant recipients: De Heus manufactures 50,000 T/yr of aquafeed (with a second 50,000 T/yr line being installed) but cannot currently source enough domestic BSF protein at sufficient volume or quality, while Kenchic generates reliable, concentrated hatchery and abattoir waste streams but prefers commercial supply partnerships to building its own internal waste-processing capacity - in both cases, the GTTF opportunity is facilitating a supply agreement between them and the Tier 1/2 BSF producers above, not funding new equipment at either anchor.

B.12 Cross-Sector Observations

A handful of enterprises recur across more than one chapter's enterprise profiling, and read differently once placed side by side. De Heus Uganda appears as a Tier 1 aquafeed anchor in Fish and Aquaculture (B.8), a confirmed HQCC buyer in Cassava (B.10), and a Strategic Anchor off-taker in Agro-Industrial Waste (B.11) - three chapters independently treating the same company as a market anchor rather than a grant recipient, which argues for a single coordinated De Heus engagement rather than three separate chapter-level conversations. Bukona Agro Processors Ltd is profiled twice with genuinely different investment cases attached: a Tier 1 ethanol/

starch case in Cassava (B.10) built around cassava-feedstock verification, and a Tier 1 waste-heat-recovery case in Agro-Industrial Waste (B.11) built around its DDGS by-product stream - the same enterprise, two distinct and non-overlapping GTTF opportunities. Ugachick Poultry Breeders Ltd is profiled as the priority Tier 3 anchor in Poultry (B.5) and again as a Tier 1 enterprise in Grain and Animal Feed (B.6), reflecting its dual role as both an integrator and a feed producer - a reminder that its GTTF investment case sits across two chapters rather than one. Finally, SR Kuku appears in Poultry (B.5) as the counterparty confirming an already-active Danish supplier relationship, and again in Grain and Animal Feed (B.6) as a Tier 1 - Priority enterprise in its own right, underscoring how tightly the feed and poultry sub-sectors are linked at the enterprise level, consistent with Chapter 14's own cross-cutting finding that feed cost is the dominant variable in animal-protein competitiveness.

ANNEX C

Technology Provider Longlist and Assessment

Submitted to: aBi Development Limited | The GRASP Program

Prepared by: Access2Innovation (A2i) | Arie Towers, Nakasero, Kampala

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Annex C: Technology Provider Longlist and Assessment

C.1 Purpose and Scope

This annex consolidates every Danish, EU and comparator technology provider identified against a specific investment gap across the ten value chain chapters of the Final Landscape Assessment Report (Chapters 4 through 13), organised by value chain in chapter order. Each entry states the provider's country of origin, the technology category it supplies, and the Uganda-specific application the report matched it against; where a chapter also assessed a named Asian or other comparator, that assessment is carried alongside it. The purpose of drawing these together in one place is to give aBi Development and the GTTF Steering Committee a single reference against which to check for a provider already engaged across more than one sector, before a fresh introduction is made, and to see at a glance where the technology-matching evidence is strong (a named provider, a performance figure, a confirmed or desktop-level Uganda engagement) against where it still rests on desk research alone.

Two qualifications apply throughout. First, this is a landscape-stage longlist, not a procurement shortlist: every entry in this annex is explicitly described in its source chapter as requiring supplier engagement, a site-specific feasibility check, or after-sales service verification before a transaction is structured around it, and this annex does not repeat that verification, it only consolidates the claim. Second, the report's technology-transfer mandate is Danish and EU providers specifically; Asian and other comparators appear here only where a chapter presented them for completeness or competitive-positioning purposes, not as GTTF-eligible alternatives.

C.2 Coffee

Uganda's coffee processing technology ecosystem is anchored by two principal equipment supply chains identified in Chapter 4: freeze-dry technology for industrial soluble processing (Track A) and roast-and-pack technology for white-label retail (Track B).

Provider	Country	Technology	Uganda Status	GTTF Relevance
GEA Group (NIRO CONRAD)	Denmark / Germany	Continuous freeze-drying; NIRO spray-dry range	Desktop lead - formal engagement not yet confirmed	Primary Track A technology; industry benchmark for high-volume Robusta soluble coffee
Buhler AG	Switzerland	RoastMaster drum roaster; destoning; colour sorting; green bean cleaning	Desktop lead - active in Uganda's milling sector generally; coffee engagement not yet formalised	Primary Track B technology; global benchmark for consistent roast profiling
Alfa Laval	Sweden	Heat exchangers; evaporation concentration for soluble coffee	Desktop lead	Relevant to Track A concentration stage ahead of freeze-drying

Provider	Country	Technology	Uganda Status	GTTF Relevance
Satelligence / SOURCETRACE	Netherlands / United States	EUDR-compliant satellite traceability; geolocated deforestation monitoring	Desktop lead - active in Kenya and Rwanda	Essential compliance infrastructure for all three investment tracks ahead of the December 2026 EUDR deadline
OLAM / Touton (EU trading arm)	France / Netherlands	Green coffee trading and processing partnership structure	Active in Uganda green bean trade	Potential off-take partnership providing EU roaster market access for Track A output
Volcafe (ED&F Man)	Switzerland / Germany	Green coffee sourcing, quality grading and EU market access	Active - major Uganda green bean purchaser	Potential structured off-take partner for Track A/B output

C.3 Dairy

Chapter 5 assesses Danish and EU providers directly against Chinese and Asian alternatives, reflecting the chapter's unusually strong EU/Danish technology fit in chilling, treatment and pasteurisation.

Provider	Country	Technology	Indicative EU/ Danish Price	Asian Comparator and Assessment
DeLaval / GEA / Alfa Laval	Sweden / Germany / Sweden	MCC solar chilling equipment	USD 35,000-60,000 per unit	Snowman, Bingshan (China): USD 15,000-28,000; higher maintenance, shorter asset life, limited Uganda service network
Lyras A/S	Denmark	UV-C cold treatment for whole milk (patented turbulent coil flow)	USD 76,000 (12,000 L/hr unit)	No equivalent system exists at commercial scale for whole milk
GEA VTIS / Alfa Laval Hybrid	Germany / Sweden	Energy-efficient HTST pasteurisation (35-40% energy reduction)	USD 200,000-350,000 per installation	Hento, Kefai (China): USD 60,000-130,000; limited energy recovery, no documented East Africa deployments
Bigadan A/S / PlanEnergi	Denmark	Dairy effluent biogas (SCADA-monitored)	USD 800,000-2,000,000+ (site-specific)	Chinese fixed-dome digesters: USD 200,000-600,000; higher documented failure rate in tropical conditions

C.4 Piggery

Chapter 6 ranks seven Danish and EU providers by strategic fit, reflecting the sector's genetics, biosecurity and circular-economy priorities.

Rank	Provider	Country	Technology	Scale / Indicative Cost
1	Frontmatec A/S	Denmark	Modular HACCP-compliant pig abattoirs	30-80 carcasses/hour; USD 120,000-250,000
2	Skov A/S / SEGES Innovation	Denmark	Climate-controlled housing, ventilation and biosecurity	Medium to large commercial farms
3	FOSS Analytical A/S	Denmark	NIR feed analysis (mycotoxin, protein, moisture, energy)	USD 18,000-35,000 per system
4	DanBred / Topigs Norsvin	Denmark / Netherlands	AI genetics, breeding stock, high-performance genetics	15-25% FCR improvement potential
5	Bigadan A/S / PlanEnergi	Denmark	Farm-scale anaerobic digestion and biogas	~500-pig scale; USD 4,000-9,500
6	Buhler AG / Innovafeed / BioCycle / Enterra Feed	Switzerland / France / others	Black Soldier Fly protein production and processing	Viable from ~500+ pigs or clustered scale
7	Skov A/S / Big Dutchman	Denmark / Germany	Climate control and environmental management	Medium to large commercial farms

A field note on genetics is worth carrying alongside this table: URA import records for live pure-bred breeding swine (2015-2025) show South Africa, not Europe, as the dominant country of origin by import weight and value, with France and Denmark supplying smaller shares. The chapter treats pig genetics as, in practice, an EU/Southern-Africa technology-transfer question rather than an EU/Danish one exclusively, and flags this for direct confirmation with named enterprises before a single region of genetic origin is stated in enterprise-level deal documentation.

C.5 Poultry

Chapter 7 pairs each named technology gap with a specific Danish or EU provider, several of which are already confirmed active with named Tier 1 enterprises through KII engagement.

Technology Gap	Provider(s)	Country	Uganda Fit Assessment
Solar hatchery and in-ovo vaccination	Petersime N.V.; HatchTech B.V.; Pas Reform	Belgium / Netherlands	Pass - a prior 22-unit A2i deployment validates Uganda fit
NIR feed quality testing	FOSS Analytical A/S; Bruker	Denmark / Germany	Pass - active East Africa service network
Closed ventilated broiler housing	Big Dutchman; Fancom; Roxell	Germany / Netherlands / Belgium	Pass - direct response to open-sided housing FCR penalty
HACCP processing lines (modular)	Meyn Food Processing B.V.; Stork/Marel; Baader	Netherlands / Iceland / Germany	Pass - active sub-Saharan Africa deployments

ANNEX D

Donor Program Matrix by Sector

Submitted to: aBi Development Limited | The GRASP Program

Prepared by: Access2Innovation (A2i) | Arie Towers, Nakasero, Kampala

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Annex D: Donor Program Matrix by Sector

D.1 Purpose and Scope

This annex consolidates the active and historical donor and government programme landscape mapped in each value chain chapter's ecosystem-mapping section (Pillar 3), organised by sector in the same order as Chapters 4 through 13. Its purpose, stated consistently across every source chapter, is to identify the specific white space the GTTF should occupy rather than to catalogue development activity generally: each table below carries not just what a programme does, but what it deliberately does not do, so that GTTF grant capital is directed at a genuine gap rather than a duplicated effort. Where a chapter names a non-replication finding explicitly - confirmation from a donor's own programme staff that its geographic or technical scope does not overlap with a proposed GTTF investment - that finding is carried here rather than paraphrased, since it is one of the more consequential pieces of due diligence in the underlying chapters.

D.2 Coffee

Programme / Initiative	Partner	Scope	Strategic Relevance to GTTF
Green Technology Matching Grants	aBi Development / A2i / Danish Embassy	UGX 700M-1B per investment; 5:1 leverage	Direct funding vehicle for wet mill, drying and Track A/B equipment
Bank of Uganda Agricultural Credit Facility (ACF)	Bank of Uganda	Concessional commercial co-lending	Co-debt for matching-grant leverage ratio target
Uganda Green Enterprise Finance Accelerator (UGEFA)	dfcu Foundation / Danish support	First call for applications September 2025	Pre-investment capacity building and finance readiness
Italy EUR 120-150M Climate Fund (UNIDO ACT Coffee)	UNIDO / Italian Ministry of Foreign Affairs	Concessional loan for climate resilience in coffee	Kampala Coffee Hub / processing infrastructure
Saudi Arabia / Nonda Coffee Park (USD 200M)	Government of Saudi Arabia / Uganda	~USD 44M GoU + USD 156M Saudi private investment	Direct capital for value addition at scale - the largest single financing line in the sector
EU-EAC Market Access Upgrade Programme (MARKUP)	European Union / European Development Fund	EUR 3.7 million Uganda allocation, launched 2018	Historical precedent for EU-funded quality/value-addition support; not a current funding source
World Bank Group / IFC Uganda Country Portfolio	World Bank / IFC	~USD 4.05 billion country portfolio; IFC ~USD 82.2 million active	General-purpose blended finance; potential co-financing partner for larger Track A transactions
SASI / Youth for Coffee	GIZ (German BMZ) via Global Coffee Platform	EUR 2 million (Kenya and Uganda), announced December 2025	Coordination partner for youth-led service enterprises, not a processing-capital competitor

GTTF white space: Freeze-dry soluble processing (Track A) and white-label roasting and packaging (Track B) as investable, technology-specific interventions sized for small and mid-scale Ugandan enterprises. No mapped programme currently finances this specific gap; the chapter recommends MAAIF and the GRASP/GTTF team confirm directly with UNIDO ACT Coffee, the EU Delegation and the World Bank AgriConnect team that no overlapping equipment-financing scope is introduced before a Track A or B transaction is signed.

D.3 Dairy

Programme	Donor	Scale	Complementarity and Gap
SNV TIDE / ISDAP (closed 2023)	Netherlands	~EUR 12 million	Foundation layer; cooperative and MCC infrastructure predates later technology upgrades - no hardware investment gap
SNV INCLUDE (2024-2029)	Netherlands	USD 17.2 million	Confirmed NOT active in Kiruhura, Ibanda, Mbarara or Ntungamo - non-replication confirmed directly by SNV INCLUDE management
Heifer International SSID/ADAP	Private donors	7 solar MCCs	Preferred first deployment sites for UV-C technology layering, not duplication
Resilient Livestock Value Chain Project (ReLIV)	IFAD / GCF / GEF / GoU	USD 181.33 million total	Active since September 2024 in the same south-west cattle-corridor geography; the top non-replication consideration identified in this chapter
World Bank UCSATP	World Bank / GoU	USD 311.9 million	Farm-level climate resilience across 69 districts; does not address processing technology or cold chain - no replication risk
aBi Development Dairy Strategy 2017-2022 (completed)	aBi / Denmark / EU	USD 5.0 million+	Established cooperative infrastructure; no current aBi dairy capital grants active

GTTF white space: Three areas remain uncovered by any active programme as of July 2026 - the post-harvest quality and cold-chain gap at collection stage (13.6% post-harvest loss), the commercial-scale green processing technology and DDDP regulatory pathway gap, and the dairy effluent biogas gap. Field engagement identified a fourth, previously undocumented gap: tanker and transport-stage clean-in-place (CIP) infrastructure, named directly by Brookside Uganda's quality team as the single biggest quality intervention needed in the cattle corridor.

D.4 Piggery

Programme / Funder	Scale	Period / Status	Current Focus	Complementarity / Non-Replication
USAID Feed the Future SIA / Chemonics	National	2019-2025 (Closed)	BDS for agribusinesses; investment readiness	No biosecurity or green technology focus; GTTF occupies the capital investment space this programme did not enter

Programme / Funder	Scale	Period / Status	Current Focus	Complementarity / Non-Replication
ILRI - Pig Value Chain Research	Central and Eastern Uganda	2015-2022 (Closed)	Value chain analysis; ASF epidemiology	Research only; provides analytical baseline for GTTF investment design
CGIAR/ILRI - Climate and Livestock	East Africa	2024 (Active)	Pig heat stress and GHG modelling; biogas co-benefit analysis	Validates the technical case for climate-controlled housing and biogas investment
A2i BSF Produce and Supply (DGBP)	Central Uganda	2024-Present (Active)	BSF protein production demonstration	Direct predecessor - single most relevant proof-of-concept in the entire portfolio; GTTF extends to commercial scale
FAO-ECTAD Uganda	National	Ongoing (Active)	ASF surveillance; biosecurity training	Training only; GTTF addresses the enterprise-level capital gap FAO-ECTAD cannot fill
MAAIF/FAO ASF Emergency Response Plan	National	2024-2026 (Active)	Government-led biosecurity investment roadmap	GTTF biosecurity grants complement and accelerate this plan - aligned, not duplicative
aBi Development - ACF Piggery Portfolio	National	2020-Present (Active)	ACF co-financing for biosecurity housing and processing	5:1 leverage feasibility confirmed for GTTF grants of USD 69K-111K
IFAD / LADEP	National (rural)	Active	Livestock and agribusiness development financing	Confirmed co-financing pathway; potential co-financier for combined packages
NAGRC&DB - Pig Genetic Improvement	Entebbe and national	2020-2024 (Active)	AI genetics and crossbreeding programme	Primary domestic partner for DanBred/Topigs Norsvin AI genetics investment
SEGES Innovation / Skov A/S Feasibility Review	East Africa	2024 (Published)	Climate-controlled housing and biogas feasibility for tropical environments	Danish institutional feasibility validation substantially reduces technology adoption risk

GTTF white space: Of the ten mapped programmes, none addresses the simultaneous combination of green technology capital investment, circular-economy integration (BSF plus biogas), and EU/Danish technology transfer. The chapter also flags a verification gap rather than a funding gap: UPPA's assumed role as the sector's central bankability and aggregation platform is not corroborated by the three most recent piggery KIIs, and should be treated as provisional pending direct verification.

D.5 Poultry

Programme / Funder	Scale	Period	Current Focus	Complementarity Gap
USAID Feed the Future SIA / Chemonics	National	2019-2025	BDS for agri-SMEs; investment readiness	No poultry-specific green technology, hatchery, NIR or HACCP focus
A2i Solar Incubators (DMDP/ DGBP)	Multi-district Uganda	2021-2022	22 solar-powered incubators for rural DOC production	Direct predecessor validating solar hatchery technology under Ugandan conditions - DMDP closed, gap is real
A2i BSF Animal Feed Value Chains (DGBP)	Central Uganda	2024 (Active)	BSF protein production from livestock waste	Direct predecessor; GTTF investment extends to 10x commercial throughput
FAO-ECTAD Uganda	National	Ongoing	Newcastle Disease surveillance and vaccination	Surveillance only; GTTF addresses the capital gap for biosecurity infrastructure
aBi Development - Agribusiness Grants	National	Ongoing	Matching grants for agribusiness SMEs	Not targeted at green technology; GTTF provides the green-technology dimension absent from aBi's standard instrument
SNV INCLUDE Programme	21 districts	2024-2029	Cooperative development and market linkage	Addresses people (farmer behaviour); GTTF addresses technology (capital equipment) - non-overlapping
IFC / Proparco	East Africa	Active	Commercial debt to large agro-processors	Validates senior debt for Tier 1 processors; GTTF grant is a marginal de-risker, not a substitute

GTTF white space: Commercial-scale transfer of European green processing technology (no active programme finances HACCP-certified modular processing lines, solar cold chain or NIR feed-quality systems at enterprise scale); BSF circular economy at poultry-farm scale (validated by A2i's 2024 pilot but not yet financed at commercial deployment scale, and directly linked to the same alternative-protein supply constraint addressed at municipal scale in the Waste chapter); and IoT biosecurity infrastructure at commercial farm level, which FAO-ECTAD's surveillance mandate does not cover.

D.6 Grain and Animal Feed

Programme / Donor	Implementing Partner	Focus Area	Status	Complementarity / Gap
WFP Purchase for Progress (P4P)	WFP Uganda	Grain aggregation; institutional buyer linkage	Active	Focuses on Grade 1 grain supply to WFP; no post-harvest technology investment or feed sector linkage

Programme / Donor	Implementing Partner	Focus Area	Status	Complementarity / Gap
aBi Development Ltd	aBi Trust	Working capital grants; aggregator finance; storage	Active	GTTF must confirm the precise aBi portfolio before engagement to avoid replication
EAGC / Warehouse Receipt System	East Africa Grains Council	Warehouse receipts; aflatoxin management; regional standards	Active	Covers only 5-8% of trade; lacks technology for grain drying, optical sorting or hermetic storage at scale
EU / MARKUP Programme	UNIDO, ITC	Agro-processing value addition; SPS compliance	Active	Focused on horticulture and coffee; limited grain and feed engagement - significant white space
SNV Netherlands / PROFIT-II	SNV Uganda	Pig and poultry feed access for smallholders	Ending 2025	Addresses feed cost and quality partially; no green technology for milling, pelleting or ingredient quality
Netherlands / RVO seed and inputs instrument	Netherlands Enterprise Agency	~EUR 12M seed instrument; ~EUR 6M complementary market-systems programmes	Incoming (2026-2030)	Strong complementarity on certified seed supply upstream; GTTF should coordinate with RVO to avoid overlap

GTTF white space and sector intelligence: A meeting with the Grain Council of Uganda (30 July 2026, 200+ member businesses) found registered national grain storage at only ~30% utilisation - a working-capital problem, not a physical infrastructure deficit, since loan approval and disbursement runs 9-18 months against seasonal grain market dynamics. This is corroborated independently by WARC's own technical advisor, who estimated a 2:1 ratio of working capital to plant cost as a minimum design parameter. For GTTF, this means working capital structuring alongside any storage or drying investment is a design prerequisite, not an optional add-on.

D.7 Horticulture

Chapter 9 does not carry a dedicated donor-programme matrix in the format used by the other nine chapters; this is consistent with the chapter's own acknowledgement that it carries a thinner field-validated evidence base than the rest of the report. The clearest donor-relevant material in the chapter is a mapping of Danida's own business instruments against horticulture's five technology windows (Table 9.12), used to indicate which financing instrument - feasibility and demonstration versus business-partnership and finance - is appropriate at each stage of market validation, rather than to catalogue third-party donor activity in the sector.

Instrument Type	Danida Business Instrument Logic	Applicability
Feasibility and demonstration instruments	Resolve sizing and service-model uncertainty before commercial commitment	Appropriate at the current evidence stage for most of the chapter's enterprise cases

Instrument Type	Danida Business Instrument Logic	Applicability
Business-partnership and finance instruments	Follow only where market, throughput and co-investment evidence is sufficient	Not yet appropriate for horticulture as a whole, pending the evidence-closure exercise Chapter 17 recommends

GTTF white space: The chapter's own conclusion is that landscape-stage evidence supports retaining horticulture in the GTTF pipeline, but that no additional sector-wide donor mapping should substitute for enterprise-level due diligence; investment approval readiness is explicitly assessed as "not assessed in this landscape chapter" pending that due diligence.

D.8 Fish and Aquaculture

Chapter 10 describes donor engagement narratively rather than in a scored matrix; the summary below preserves that structure while making the same GTTF non-replication logic explicit.

Development Partner	Focus Area
International Fund for Agricultural Development (IFAD)	Smallholder commercialisation, value-chain development and aquaculture productivity
World Bank	Agricultural transformation, water-resource management and fisheries development
Food and Agriculture Organization (FAO)	Sustainable fisheries and aquaculture development; fish health and biosecurity systems
European Union	SPS compliance, fisheries governance reform and export-readiness initiatives
Government of Uganda / MAAIF (Department of Aquaculture Management and Development)	Policy formulation, regulation, standards, hatchery and cage-culture infrastructure planning under NDP IV

GTTF white space: Despite this institutional and donor foundation, the chapter identifies persistent gaps in infrastructure (cold chain, processing, feeder-road connectivity), appropriately structured finance (working capital, medium-term equipment financing, reduced collateral requirements), and technology adoption (automated production, real-time water-quality monitoring, digital farm management, renewable energy, precision feeding). The chapter frames GTTF's role as catalytic and complementary to this existing donor foundation, concentrating specifically on commercial technology transfer and private-sector adoption of Danish and European green technologies rather than duplicating the institutional and policy work already under way.

D.9 Livestock (Beef and Small Ruminants)

Programme / Funder	Scale	Period	Current Focus	Complementarity / Non-Replication
IFAD LADEP Uganda	National	Active	Livestock and Agribusiness Development Project; documented co-financing pathway	IFAD is a co-financing partner, not a programme to avoid; GTTF grant de-risks technology adoption

Programme / Funder	Scale	Period	Current Focus	Complementarity / Non-Replication
World Bank UgIFT	National	Active	Rural infrastructure including livestock	Covers rural public infrastructure; GTTF covers enterprise-level technology - co-financing potential for cold-hub infrastructure at strategic road nodes
USAID Feed the Future SIA / Chemonics	National	2019-2025	BDS across multiple value chains	No livestock-specific HACCP, tannery or cold-chain technology focus
FAO-ECTAD Uganda	National	Ongoing	FMD and tick-borne disease surveillance	Surveillance only; GTTF addresses the enterprise-level capital gap for abattoir biosecurity
aBi Development Agribusiness Grants	National	Ongoing	Matching grants across multiple value chains	Standard grants not targeted at green technology or HACCP certification
SNV INCLUDE Programme	21 districts	2024-2029	Cooperative development and market linkage	Addresses people; GTTF addresses technology - non-overlapping
IFC / Proparco	East Africa	Active	Commercial debt to large agro-processors	Validates senior debt availability for Tier 1 abattoirs; GTTF grant is a marginal de-risker, not a substitute

GTTF white space: Three genuine gaps identified - commercial-scale HACCP abattoir certification and cold-chain technology transfer (no active programme finances kill-floor engineering, blast chillers or cold-hub infrastructure at enterprise scale); leather finishing tannery technology (no active programme finances European tannery finishing technology for Leather Industries of Uganda or any other Ugandan tannery); and solar-powered water supply for cattle-corridor drought resilience at commercial scale. The chapter also notes that feedlot and abattoir manure-to-biogas systems form the same organic-waste-to-value chain addressed at farm scale in Poultry and Piggery and at municipal scale in the Waste chapter, and recommends these be read together rather than as unconnected technology lines.

D.10 Cassava

Programme	Funder	Intervention Focus	Status	GTTF White Space
NextGen Cassava / CAVA II	USAID / BMGF	Disease-resistant varieties; seed systems; farmer productivity	Completed	Green processing technology; industrial off-take linkages not covered
World Bank ATA-AS / ACDP	World Bank	Agricultural research, extension, seed systems	Active (seed component)	Industrial processing not covered
GIZ Agro-Processing	GIZ	SME business models; market linkages	Active (general)	Cassava-specific industrial technology not prioritised

Programme	Funder	Intervention Focus	Status	GTTF White Space
PRELNOR	European Union	Northern Uganda rural livelihoods; cassava food security	Completed	Industrial processing, ethanol and starch outside programme scope
aBi Development Grant Facility	aBi / Danida	Agribusiness SME grants, some processing equipment	Active	EU-origin green technology for Tier 1 enterprises is the primary white space
Parish Development Model (PDM)	Government of Uganda	Smallholder agricultural inputs; farmer groups	Active - national	Does not extend to Tier 1/2 industrial processors

GTTF white space: A decade of donor and government support has consistently invested in primary supply creation (disease-resistant varieties, seed dissemination, mobile chippers) without corresponding investment in the industrial processing infrastructure needed to absorb peak seasonal harvests - donor-funded primary processing hubs have frequently stagnated because cooperatives lacked thermal drying technology and working capital to meet industrial quality standards. This is the specific gap the chapter positions GTTF to close: European-origin controlled drying, high-efficiency starch extraction, anaerobic digestion of ethanol stillage, and solar-biomass hybrid primary processing at industrial scale.

Three regulatory catalysts also carry direct GTTF investment implications and should be verified before capital commitment: enforcement of the Biofuels Act 2018 bioethanol blending mandate (currently enforced only at E-1 to E-5 against a statutory E-20 target, meaning the ethanol off-take market is not yet a confirmed commercial anchor); VAT and tariff treatment of cassava starch and HQCF, which may disadvantage domestic producers against zero-duty Egyptian starch under COMESA; and UNBS enforcement of the US 597 and EAS 772 quality standards, which the chapter recommends GTTF support directly as a complement to its technology investments.

D.11 Agro-industrial Waste

Institution	Statutory Mandate	Role in Supporting Waste Valorisation
MAAIF	Agriculture, livestock, fisheries and agro-industrialisation	Promotes value chain development and feedstock availability for processing technologies
NEMA	Environmental regulation and waste management	Regulates compliance; implements circular-economy and waste-management policy
UNBS	Standards development and certification	Develops product standards for feeds, fertilisers and bio-based products - a critical market-access gate
MTIC	Industrial development and competitiveness	Supports agro-industrialisation and enterprise development
UIA	Investment promotion and facilitation	Facilitates domestic and foreign investment and industrial park development
MEMD	Renewable energy policy	Supports biomass energy, biogas and waste-to-energy technologies
NARO	Agricultural research and innovation	Develops technologies for resource utilisation and bio-based innovation

Donor programmes referenced: UNIDO's Resource Efficient Cleaner Production programme, EU-funded agricultural value chain development programmes, and development-partner-supported biogas and renewable energy initiatives are all active in adjacent circular-economy themes.

GTTF white space: Despite an enabling institutional framework, three regulatory gaps constrain investment at scale - incomplete UNBS product standards for BSF-derived feed ingredients and organic fertilisers; a waste-management regulatory framework that lacks sector-specific guidance to distinguish commercial waste valorisation from general waste disposal for licensing purposes; and emerging EU-level requirements (the EU Deforestation Regulation and evolving SPS rules for bio-based products) that create both a future market-access risk and an early-mover compliance opportunity. No existing donor programme is dedicated specifically to agro-industrial waste valorisation technology transfer at commercial scale, and none currently links Danish and EU technology providers systematically to Ugandan waste valorisation enterprises - the gap this chapter positions the GTTF to close.

D.12 Cross-Sector Observations

Three patterns recur across the sector-level tables above and are worth reading together rather than sector by sector. First, USAID's Feed the Future Systems, Institutions and Advocacy (SIA) programme, implemented by Chemonics and closed in 2025, appears as a "no overlap" comparator in Piggery, Poultry, Grain and Animal Feed, and Livestock alike: it built business development services and investment-readiness capacity across multiple value chains but consistently stopped short of green technology, HACCP certification, or hardware investment, meaning the GTTF is not competing with a closed programme's remaining scope in any of these four sectors. Second, SNV's INCLUDE programme (2024-2029, 21 districts) recurs in Poultry, Grain-adjacent Piggery, and Livestock as a "people, not technology" comparator, addressing farmer organisation and market linkage in a way the source chapters consistently describe as complementary rather than competing with GTTF's technology-investment mandate - though Dairy's chapter carries the more consequential finding that INCLUDE is confirmed not active in the specific south-west milkshed districts GTTF is targeting, a non-replication finding worth re-verifying directly rather than assuming it extends to other sectors. Third, aBi Development's own Agricultural Credit Facility and Agribusiness Grants recur as the most consistently cited co-financing partner across Coffee, Piggery, Poultry, Livestock and Cassava, reinforcing Chapter 3's independent finding that Uganda's agricultural financing landscape is not capital-constrained so much as it is constrained by production volume, quality and bankability - exactly the gap GTTF's technical-assistance-plus-grant structure is designed to close.

ANNEX E

Data Sources and Bibliography

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Prepared by: Access2Innovation (A2i) | Arie Towers, Nakasero, Kampala

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Annex E: Data Sources and Bibliography

E.1 Purpose and Scope

This annex consolidates the reference list carried at the end of each value chain chapter in the Final Landscape Assessment Report (Chapters 4 through 13), organised by sector in chapter order and alphabetised within each sector, consistent with the Harvard referencing convention applied across the report during final assembly. Nine of the ten value chain chapters carry a dedicated chapter reference list; Horticulture (Chapter 9) does not, and its absence is noted in Section E.4 below rather than filled with citations drawn from elsewhere, since the report's own editorial record does not attribute a reference list to that chapter.

Three source types recur throughout: published statistical and institutional sources (FAOSTAT, UBOS, MAAIF, World Bank, UNBS and equivalent Danish and EU sources); manufacturer and technology-provider documentation, used to support the technology-matching claims in Annex C; and A2i's own primary research record - key informant interview reports, stakeholder and enterprise mapping documents, and internal working notes, several of which are marked Confidential and held internally rather than published. Where an A2i internal document repeats across chapters with the same year, the report's own editorial convention disambiguates them with a letter suffix (2026a, 2026b, and so on); that convention is carried through unchanged in this annex.

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ANNEX F

Stakeholder Consultation Log

Submitted to: aBi Development Limited | The GRASP Program
Prepared by: Access2Innovation (A2i) | Arie Towers, Nakasero, Kampala

Document status	Final - supplementary annex to the GRASP Final Landscape Assessment Report, prepared for submission to aBi Development Limited. Derived from the ten value chain chapters (Chapters 4-13) of the Final Landscape Assessment Report and, where noted, the GRASP/GTTF stakeholder engagement trackers.
Client / approval body	aBi Development Limited, under the Green Agrifood Systems Programme (GRASP)
Prepared by	Access2Innovation (A2i)
Distribution	Confidential - prepared for aBi Development Limited and the GTTF Steering Committee. Not for onward distribution without the written permission of aBi Development Limited.
Parent document	Supplementary volume to the GRASP Final Landscape Assessment Report

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Annex F: Stakeholder Consultation Log

F.1 Purpose and Scope

This annex records the institutions, enterprises and individuals engaged during the GRASP Landscape Assessment's stakeholder consultation phase (June-August 2026), organised by value chain in the same order as Chapters 4 through 13 of the Final Landscape Assessment Report. Entries are drawn from the consulting team's engagement trackers and from key informant interview (KII) references embedded throughout the ten value chain chapters. Consistent with A2i's editorial convention for this study (Day One Validation Session, Action Point 11), individual names, direct phone numbers and email addresses are held in the consulting team's working files rather than reproduced here; this annex records organisation, role or title, and engagement status only. A reader needing to reach a specific named contact should request it through A2i's engagement lead rather than from this document.

Engagement status uses four categories, applied as consistently as the underlying source material allows: **Completed** (a KII or documented consultation has taken place), In progress (contact made, meeting scheduled or data request outstanding), **Not started / contact needed** (identified as a target but not yet engaged), and **Institutional / desk** (engagement conducted through published documentation, programme reports or a standing institutional relationship rather than a discrete interview).

Coverage is uneven across sectors by design, not oversight. Coffee, Dairy, Poultry, Livestock, and Grain and Animal Feed carried dedicated field consultants and structured engagement trackers running to several dozen entries each; the remaining five value chains relied more heavily on desktop research supplemented by targeted enterprise KIIs, consistent with the study's brief that engagement should be desktop-based with targeted consultations only where data gaps require validation. Piggery, Cassava and Agro-industrial Waste each carry a smaller number of enterprise-level KIIs that were sufficient to ground their investment cases; Horticulture and Fish and Aquaculture carry the thinnest field-validated stakeholder base of the ten chapters, a gap both chapters acknowledge directly and recommend closing through a short evidence-closure exercise before GTTF capital is committed against a named partner in either sector.

F.2 Cross-Cutting Institutions (All Value Chains)

A small number of national institutions were engaged once on behalf of all ten value chains rather than sector by sector, to avoid duplicated requests to the same data custodians.

Organisation	Category	Role in Study	Engagement Status
Uganda Bureau of Statistics (UBOS)	Government Statistics	National production, trade and household survey data across all ten value chains	In progress - formal data request and physical letter delivered; response pending
Bank of Uganda (BoU)	Central Bank / Finance	Agricultural Credit Facility portfolio data; agri-credit market trends; FX volatility	Completed - data received
Private Sector Foundation Uganda (PSFU)	Private Sector Body	Enterprise investment trends; access-to-finance and de-risking experience; policy environment	Completed - physical meeting held with PSFU leadership and programme staff

Organisation	Category	Role in Study	Engagement Status
Uganda Free Zones and Export Promotion Agency (UFZEPA)	Trade Promotion / Export	Export and import volumes by value chain, 2015-2025; agrifood technology trade baseline	In progress - initial meeting scheduled
Uganda National Bureau of Standards (UNBS)	Standards and Compliance	Certification and compliance rates by value chain; market surveillance and rejection data; technology type-approval timelines	In progress - contact re-established after travel; meeting rescheduled
Uganda Revenue Authority (URA) - Customs	Customs / Trade Data	Export and import volumes and values by value chain; registered agri-enterprise and trade compliance data	Not started
World Bank / IFC Uganda	Development Finance	Active agrifood portfolio relevant to processing and feed manufacture; appetite for GTTF co-financing structure	Institutional / desk, supplemented by direct outreach

F.3 Coffee

Organisation	Category	Role in Study	Engagement Status
MAAIF Coffee Development Department (successor to the dissolved Uganda Coffee Development Authority)	Government Regulator	Regulatory transition status; export certification and licensing under the new institutional structure	In progress - formal correspondence opened June 2026
Kyagalanyi Coffee Ltd	Tier 1 Enterprise	Track A/B processing enterprise profile and technology position	Completed - full KII field visit
Rubanga Cooperative	Tier 2 Enterprise / Youth Service Enterprise	Farm-level service model and youth-led entrepreneurial coffee servicing	Completed - full KII field visit
Sucafina Instant	Off-take Anchor	Confirmed Track A (industrial freeze-dry) off-take relationship	Completed - KII
GIZ / Global Coffee Platform (Sustainable Agricultural Supply Chains Initiative)	Donor Programme	Youth-led coffee service enterprise coordination; complementary financing check	Institutional / desk

F.4 Dairy

The Dairy Tracker is the most extensively developed of the five structured trackers, organised into seven sections spanning regulators, milk collection centre (MCC) cooperatives, processors, donor and strategic partners, private-sector bodies, research institutions, and national data custodians.

Organisation	Category	Role in Study	Engagement Status
Dairy Development Authority / MAAIF (post-merger)	Regulatory and Standards Body	Bacteria count and pasteurisation compliance data; UV-C regulatory pathway	In progress - awaiting formal response
Uganda National Bureau of Standards (UNBS)	Regulatory and Standards Body	Milk pasteurisation standard (US 38:2018) revision pathway for UV-C compliance	In progress - phone contact made
MAAIF Animal Production Directorate	Regulatory and Standards Body	Sub-sector policy targets; testing programme for non-thermal processing under the Dairy Industry Act	Not started
Multi-Stakeholder Dairy Platform (MSDP)	Regulatory and Standards Body	Sector coordination on quality upgrading and technology adoption	Not started
Milk Collection Centre cooperatives, Western Corridor (Kiruhura, Ibanda, Bushenyi, Ntungamo, Mbarara districts)	MCC Cooperative	Bacteria count and cooling infrastructure baseline; UV-C pilot site assessment	Mixed - two cooperative-level KIIs completed (Nakaseke and Kiboga-Sembabule clusters); remaining district-level MCC contacts pending field-phase confirmation
Ankole Farmers Cooperative Union (AFCU)	MCC Cooperative Network	Network-wide collection volumes and UV-C pilot feasibility at scale	Contact needed - largest cooperative MCC network in the western corridor
Tier 1 and Tier 2 processors (Pearl Dairy / Lato Milk, Brookside Dairy, Jesa Farm Dairy, Amos Dairies, Paramount Dairy, Edwin Farmers Ltd)	Processor	Bacteria count challenges; pasteurisation technology; UV-C retrofit feasibility; co-financing appetite	Mixed - technical-level KIIs completed at three processors; two Tier 1/2 processor contacts (Amos Dairies, Paramount Dairy) still outstanding, flagged as a priority gap
Uganda Dairy Processors Association (UDPA)	Industry Association	Aggregate installed processing capacity and industry position on quality technology	Not started
Uganda National Dairy Traders Association (UNDATA)	Industry Association	Informal cross-border trade volumes; trader-level technology awareness	Not started
aBi Development Ltd	Donor / Commissioning Client	Active dairy grants; co-financing appetite; GTTF-aBi non-replication confirmation	In progress - partial data shared

Organisation	Category	Role in Study	Engagement Status
Heifer International Uganda	Donor / Implementing Partner	Solar MCC programme performance data; preferred first-deployment sites for technology layering	In progress - KII scheduled
SNV Netherlands Development Organisation (INCLUDE, TIDE/ISDAP legacy)	Donor / Implementing Partner	Programme geographic scope; non-replication confirmation for the south-west milkshed	Completed - non-replication confirmed by SNV management
Opportunity International	Financial Institution	MCC equipment finance products and cooperative loan terms	Not started
Uganda Development Bank (UDB)	Financial Institution	Concessional finance windows for MCC equipment; GTTF compatibility	Not started
Royal Danish Embassy, Kampala	Funder Representative	Strategic alignment on Danish technology; engaged solely through A2i per funder-engagement protocol	Institutional / desk
National Livestock Resources Research Institute (NaLIRRI)	Research Institution	Milk bacteria count and cold pasteurisation research; technical partnership for field trial validation	Not started
Makerere University, School of Food Technology, Nutrition and Bioengineering	Academic Institution	Milk quality and non-thermal pasteurisation research; potential academic validation partner	Not started

F.5 Piggery

Piggery engagement was concentrated on a small number of high-value enterprise KIIs rather than a broad tracker, reflecting the sector's more concentrated commercial base.

Organisation	Category	Role in Study	Engagement Status
Prime Pork Uganda Limited	Tier 3 Priority Enterprise	Vertically integrated genetics-led production and processing anchor	Completed - full KII, including a site visit
Ranchers Finest / Finest Farms	Tier 3 Priority Enterprise	Vertically integrated genetics-to-processing model; alternative aggregation approach	Completed - full KII, including a site visit

Organisation	Category	Role in Study	Engagement Status
Uganda Pork Producers and Processors Association (UPPA) Secretariat	Sector Coordination Body	Collective bankability and aggregation platform; ACF co-financing track record	Not started - flagged for direct verification, as the sector's most recent KII wave did not corroborate UPPA's current scale and activity level
Silverback Feeds Ltd	Tier 2 Feed Manufacturer	NIR feed quality testing and BSF larval meal offtake	Contact needed
Multifeeds Ltd	Tier 2 Feed Manufacturer	NIR spectrometry and BSF larval meal integration	Contact needed
National Animal Genetic Resources Centre and Data Bank (NAGRC&DB)	Government Genetics Institution	AI genetics service network; national pig crossbreeding programme	Contact needed
MAAIF Directorate of Animal Resources	Government Regulator	Sector policy and biosecurity oversight	Not started

F.6 Poultry

Organisation	Category	Role in Study	Engagement Status
MAAIF - Animal Production Directorate / Commissioner, Livestock	Government Regulator	NDP IV production targets; disease surveillance data; SPS certification status	Contact needed - to be confirmed via A2i
Poultry Association of Uganda (PAU)	Industry Association	Flock size and processing capacity trends; feed conversion benchmarks; GTTF anchor-partner candidates	Contact needed - to be confirmed via A2i / association secretariat
Ugachick Poultry Breeders Ltd	Tier 1 Enterprise	Hatchery capacity and constraints; incubation technology interest; existing supplier relationships	Completed - KII held with executive leadership
Biyinzika Poultry International Ltd (Pearl Chicken)	Tier 1 Enterprise	Production system profile; housing technology; cold-chain gaps; co-financing appetite	Completed - KII held with chief executive

Organisation	Category	Role in Study	Engagement Status
SR Kuku / Wind Green	Tier 1 Enterprise	Certified processing operation; abattoir automation interest; Danish supplier relationship	Completed - KII, July 2026
Kenchic Uganda Ltd	Tier 1 Enterprise	Vertically integrated hatchery-to-feed operation; in-ovo sexing technology interest	Completed - KII, July 2026
Nucleus Smallholder Poultry Farms (affiliated nucleus operators)	Cooperative / Outgrower Network	Nucleus-to-satellite technology and income model	Contact needed - to be confirmed via MAAIF / PAU

F.7 Livestock (Beef and Small Ruminants)

Organisation	Category	Role in Study	Engagement Status
MAAIF - Directorate of Animal Resources	Government Regulator	Livestock sub-sector targets; RELIV project scope; disease surveillance data	Contact needed - to be confirmed via A2i
MAAIF - Veterinary Services (Chief Veterinary Officer)	Government Regulator	Export certification requirements; abattoir and traceability regulatory framework	Contact needed - to be confirmed via A2i
Uganda National Bureau of Standards (UNBS)	Regulatory and Standards Body	Beef grading and carcass standards; HACCP certification pathway for abattoirs	Not started
Uganda Meat Industries Ltd (Top Cuts)	Tier 1 / Anchor Enterprise	Primary HACCP abattoir modernisation anchor	Contact needed - to be confirmed via A2i / industry association
Sanga Meat Co. Ltd	Tier 2 Enterprise	Feedlot capacity and precision feeding technology interest	Contact needed - to be confirmed via A2i / industry association
National Animal Genetic Resources Centre and Data Bank (NAGRC&DB)	Research Institution	Genetics and FCR benchmark data	Institutional / desk
International Fund for Agricultural Development (IFAD) - RELIV Project	Donor Programme	USD 181.33 million resilient livestock value chain project; non-replication coordination	Institutional / desk

F.8 Grain and Animal Feed

Grain and Animal Feed carried the most extensive Tier 1 enterprise engagement of any sector outside Dairy, reflecting the value chain's central role as a feed input to four other chapters.

Organisation	Category	Role in Study	Engagement Status
Grain Council of Uganda (GCU)	Sector Coordination Body	National storage, processing and production data; member technology priorities; working capital constraint	Completed - leadership consultation, 30 July 2026
WARC Uganda	Tier 1 Enterprise	Aflatoxin decontamination pilot; grain drying and working-capital-to-plant-cost ratio	Completed - KII, 16 July 2026
Tunga Nutrition (U) Limited	Tier 1 Enterprise	Multi-species feed mill; pelleting line upgrade interest	In progress - meeting scheduled
SR Afrochicks and Breeders Limited	Tier 1 Enterprise	Integrated feed mill and poultry operation; circular biogas potential	Completed - KII, 6 July 2026
KAMP Group Limited	Tier 1 Enterprise	Existing Danish feed technology; feed mill expansion and automation	Completed - KII, 15 July 2026
Mukwano Industries Uganda Limited	Tier 1 Enterprise (Upstream Feed-Ingredient Supplier)	Soybean meal quality; biogas feasibility from crushing effluent	Completed - KII, 4 July 2026
Mandela Millers Limited	Tier 1 Enterprise	Feed plant and drying equipment; HACCP certification	Completed - KII, 29 July 2026
Mount Meru Millers	Tier 1 Enterprise	Oilseed extraction plant renewal	Completed - KII, 13 July 2026
Jeroma Farmers Collection Centre Ltd	Cooperative / Aggregator	Cooperative-scale drying and NIR quality testing	Completed - KII, 5 August 2026
Guru Nanak Oil Mills	Tier 1/2 Enterprise	Oilseed processing technology position	Completed - KII, 13 July 2026
De Heus Uganda Limited	Tier 1 Enterprise / Anchor	Aquafeed and livestock nutrition; regional feed technology benchmark	Completed - KII, 1 July 2026
Bankers (IFC/World Bank Uganda, Centenary Bank, Stanbic Bank, Uganda Development Bank, DFCU Bank)	Financial Institution	Grain and feed processor lending appetite; GTTF co-financing feasibility	Mixed - Stanbic Bank call completed; remaining institutions in progress or not started

F.9 Horticulture

Horticulture's evidence base rests on enterprise key informant interviews and last-mile evidence collection conducted directly by the consulting team, rather than a structured tracker; this reflects a chapter that is explicit

about carrying the thinnest field-validated enterprise base of the ten value chains.

Organisation	Category	Role in Study	Engagement Status
Nile Hortlife	Tier 2 Enterprise	Aggregation and packhouse handling; asset position and cold-chain need	Completed - enterprise KII
Agricado Farms	Tier 2 Enterprise	Aggregation and first-mile handling model	Completed - enterprise KII
Avotein Farms	Tier 2 Enterprise	Aggregation, packhouse and embedded cold-chain evidence	Completed - enterprise KII and management intake
Green Oceanstar	Tier 2 Enterprise	Processing, preservation and value addition (drying/ dehydration)	Completed - enterprise KII
Amfri Farms	Tier 2 Enterprise	Processing and embedded cold-chain evidence	Completed - enterprise KII
Thyma Herbs	Tier 2 Enterprise	Certified-grower production system for export herbs	Completed - enterprise KII
Chemiphar Laboratories	Testing / Compliance Service Provider	Accredited testing capacity and compliance service-model evidence	Completed - enterprise KII
FHL (Fresh Handling Limited, referenced informally)	Prospective Enterprise	Exit-scanner box-integrity concept - evidence not yet independently corroborated	Not started - flagged for formal interview before inclusion in the investment pipeline

F.10 Fish and Aquaculture

Organisation	Category	Role in Study	Engagement Status
Yalelo Uganda Ltd	Tier 1 Enterprise	Vertically integrated commercial cage aquaculture anchor	Completed - enterprise interview
Victoria Treasures Ltd	Tier 1 Enterprise	Fish processing, cold-chain and export orientation	Completed - enterprise interview
Rock Springs Fish Farm Ltd	Hatchery and Genetics Anchor	National broodstock and hatchery technology transfer hub	Completed - enterprise interview
KAMOS Agro Fish Ltd	Tier 2 Enterprise	Pond-based production; commercial scale-up candidate	Completed - enterprise interview
MIG Fish Farm Ltd	Tier 2 Enterprise	Emerging technology demonstrator; RAS and digital monitoring interest	Completed - enterprise interview
Walimi Fish Farmers' Cooperative Society (WAFICOS)	Sector Coordination Body	National aquaculture coordination and policy advocacy	Completed - institutional consultation

Organisation	Category	Role in Study	Engagement Status
Uganda Commercial Fish Farmers Association (UCFFA)	Sector Coordination Body	Regional farmer representation and industry development	Completed - institutional consultation
De Heus Uganda	Feed Anchor	Aquafeed manufacturing and farmer technical support	Completed - enterprise interview (shared with Grain and Animal Feed chapter)
National Fisheries Resources Research Institute (NAFIRRI)	Research Institution	Nutrition, genetics, fish health and biosecurity research partnership	Institutional / desk
Directorate of Fisheries Resources, MAAIF	Government Regulator	Hatchery, feed and export compliance standards	Institutional / desk
Makerere University	Academic Institution	Technical training and applied research partnership	Institutional / desk
DFCU Bank	Financial Institution	Aquaculture-specific financial product development	Institutional / desk

F.11 Cassava

Organisation	Category	Role in Study	Engagement Status
Bukona Agro Processors	Tier 1 Enterprise	Bioethanol and dried-chip processing; ANDRITZ technology engagement	Completed - site visit and KII, June-August 2026
Dei BioPharma	Tier 1 Enterprise	Pharmaceutical-grade starch processing; commissioning-stage operation	Completed - KII, though operating status and throughput could not be independently confirmed at time of interview
Pura Organic Agro Tech	Tier 1/2 Enterprise	Wet starch processing; extraction efficiency and drying technology interest	Completed - KII, including confirmed utilisation data
Rwenzori Holdings	Tier 1 Enterprise (Commissioning)	New cassava processing investment under commissioning	In progress - investment size confirmed; production scale not yet confirmed
De Heus Uganda (Buikwe)	Tier 1 Enterprise	Confirmed buyer for high-quality cassava chips	Completed - KII, 1 July 2026
Fermarco Industries (Kitagwenda)	Tier 1 Enterprise (Temporarily Closed)	Bioethanol production - excluded from operational pipeline pending confirmed restart	Completed - KII, July 2026, confirming closed status
Smart Start Industries	Tier 1 Enterprise	Bioethanol production and efficiency upgrade	Completed - KII, 29 July 2026

Organisation	Category	Role in Study	Engagement Status
Lukonge Cotton	Tier 1/2 Enterprise	Fresh cassava root processing	Completed - KII
Uganda Development Corporation (UDC)	Government / Institutional Partner	Partnership documentation for cassava industrial investment	Institutional / desk

F.12 Agro-industrial Waste (Municipal Bio-waste)

All thirteen enterprises profiled in this chapter, plus the two strategic anchor enterprises, were engaged through a completed key informant interview between May and August 2026, conducted virtually or in person by the A2i enterprise engagement team.

Organisation	Category	Role in Study	Engagement Status
Bukona Agro Processors Ltd	Tier 1 Enterprise	Biomass carbonisation and organic fertiliser	Completed - KII
DEM Farm Uganda Ltd	Tier 1/2 Enterprise	Waste-derived feed and fertiliser production	Completed - KII
OranaGate Fruit Processing Ltd	Tier 2 Enterprise	Fruit-processing residue valorisation	Completed - KII
Soroti Fruit Juice Factory (TEJU)	Tier 2 Enterprise	Fruit seed residue recovery as boiler fuel	Completed - KII
Bioconvision Jinja Ltd	Tier 2 Enterprise	BSF and organic fertiliser facility	Completed - KII
BioBloom Uganda Ltd	Tier 2 Enterprise	BSF production automation	Completed - KII
Bongomin Group	Tier 2 Enterprise	Biomass carbonisation and BSF frass partnership	Completed - KII
Jumol Agrotech Uganda Ltd	Tier 2 Enterprise	BSF and water hyacinth-based feed and fertiliser	Completed - KII
Ugavoil Products Ltd	Tier 2 Enterprise	BSF poultry feed and vermicompost	Completed - KII
Asante Agro / Asante Waste Management	Tier 2 Enterprise	Multi-city organic waste collection and logistics	Completed - KII
Marula Proteen	Tier 2 Enterprise	BSF-assisted composting, Rwanda-to-Uganda replication	Completed - KII
De Heus Uganda Ltd	Strategic Anchor (Off-take Buyer)	Market anchor for domestic BSF protein production	Completed - KII
Kenchic Uganda Ltd	Strategic Anchor (Feedstock Supplier)	Reliable organic waste feedstock for BSF processors	Completed - KII

F.13 Notes on This Log

This annex should be read alongside Annex B (Enterprise Profiles), which carries the substantive engagement findings for each enterprise listed above, and Annex E (Data Sources and Bibliography), which lists the KII reports and stakeholder mapping documents cited throughout the ten value chain chapters. Where an organisation's engagement status is recorded here as "Not started" or "Contact needed," this reflects the position at the time

the underlying chapter was finalised; several of these engagements were already progressing through A2i's field team at that point and should be confirmed against the consulting team's live tracker before this annex is treated as current.





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