UGANDA DEVELOPMENT CORPORATION
Driving Industrial Growth

REPORT

OF THE VALUE CHAIN ANALYSIS STUDY ON THE BEEF SUB SECTOR IN UGANDA

JUNE 2023

VALUE CHAIN ANALYSIS STUDY ON THE BEEF SUB SECTOR IN UGANDA

UGANDA DEVELOPMENT CORPORATION

PREPARED BY

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This beef value chain study report is a product of consultations, interviews with key beef and livestock sector actors, and literature reviews on the beef sub-sector and the agriculture sector in Uganda in general. The key actors consulted included policy and strategy makers and implementers in government, more so the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), private sector players, and individuals involved in production, marketing, exportation, and value addition. We highly appreciate the collaboration and support of the Beef Value Chain (BVC) actors during the data collection. We also acknowledge the contribution made to this report by the team of consultants from Ace Policy Research Institute (APRI), including Jacklyn Makaaru Arinaitwe, Edgar Tusingwire, Apollo Segawa, Christopher Sebatta, George Adoko, Rashid Ahimbisibwe, Anthony Tamusuza, George Bogere, Peter Babyenda, and Amos Okech.

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Abbreviations **and acronyms**

AHMIS	Animal Health Management Information System
AI	Artificial Insemination
AMR	Anti-Microbial Resistance
ASSP	Agriculture Sector Strategic Plan
BCR	Benefit-Cost Ratio
BOQ	Bill of Quantity
BOT	Build, Operate, Transfer
BVC	Beef Value Chain
CAADP	Comprehensive Africa Agriculture Development Programme
COMESA	Common Market for East and Southern Africa (COMESA)
CBA	Cost Benefit Analysis
CBO	Community Based Organisation
CBPP	Contagious Bovine PleuroPnemonia
COCTU	Coordinating Office for Control of Trypanosomiasis
CoVAB	College of Veterinary Medicine and Animal Resources and Biosecurity
CSO	Civil Society Organizations'
DAH	Department of Animal Health
DAP&M	Department of Animal Production & Management
DAR	Directorate of Animal Resources
DCZ	Disease Control Zone
DDA	Dairy Development Authority
DFZs	Disease Free Zones
DINU	Development Initiative of Northern Uganda
DNA	Deoxyribonucleic Acid
DRC	Democratic Republic of Congo
EAC	East African Community
EIA	Environmental Impact Assessment
FAO	Food and Agricultural Organisation
FAOSTAT	Food and Agriculture Organization Statistics

Abbreviations **and acronyms**

FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
GHP	Good Hygiene Practices
HACCP	Hazard Analysis and Critical Control Point
HIV	Human Immunodeficiency Virus
ICT	Internet Communication Technology
IEC	Information, Education and Communication
ILRI	International Livestock Research Institute
IRCA	International Register of Certificated Auditors
IRR	Internal Rate of Return
ISO	International Standards Organisation
LITs	Identification and Traceability System
LED	Local Economic Development Program
LSD	Lumpy Skin Disease
LSP	Livestock Services Project
MAAIF	Ministry of Agricultural, Animal Industry and Fisheries
MDAs	Ministry, Departments and Agencies
MIP	Meat Investment Plan
MIS	Management Information System
MOBIP	Market – Oriented and Environmentally Sustainable Beef Meat Industry in Uganda Project
MoU	Memorandum of Understanding
MUK	Makerere University Kampala
NAADS	National Agricultural Advisory Services
NADDEC	National Animal Disease Diagnostics and Epidemiology Centre
NAGRC & DB	National Animal Resources Genetic Center and Data Bank
NALIRRI	National Livestock Resources Research Institute
NARO	National Agricultural Research Organisation
NDP	National Development Plan
NEMA	National Environment Management Authority

Glossary

NGO	Non-Governmental Organization
NLPIP	National Livestock Productivity Improvement Project
NPA	National Planning Authority
NPV	Net Present Value
NRM	National Resistance Movement
OIE	World Organisation for Animal Health
OPM	Office of the Prime Minister
OWC	Operation Wealth Creation
PESTEL	Political, Economic, Social, Technological, Environment and Legal
PPP	Public Private Partnership
PWD	People with Disabilities
QMS	Quality Management System
RPLRP	The Regional Pastoral Livelihoods Resilience Project
RVF	Rift Valley Fever
SDGs	Sustainable Development Goals
SPS	Sanitary and Phytosanitary
SWOT	Strengths, Weaknesses, Opportunities and Threats
TADs	Transboundary Animal Diseases
UBOS	Uganda Bureau of Statistics
UDC	Uganda Development Corporation
ULI	Uganda Livestock Industries
UMI	Uganda Meat Industries
UMPCU	Uganda Meat Producers Cooperative Union
UNBS	Uganda National Bureau of Standards
UVB	Uganda Veterinary Board
UVRI	Uganda Virus Research Institute
WTO	World Trade Organization

Glossary

Beef: Culinary name for meat from cattle

Meat: Edible part of the muscle of cattle, sheep, goats or swine

Bleeding: Removing as much blood from the carcass as possible before further handling

Carcass: The body of an animal killed for meat or the trunk of an animal such as a cow, sheep or pig for cutting up as meat

Dressing: Preparation of carcass after evisceration, ready for storage or sale

Evisceration: Process of removing the internal organs in the abdominal and thoracic cavities

Flay: Strip the skin off a carcass

Green offal: Digestive tract of ruminants such as the stomach, or the intestines which still contain faecal matter

Lairage: pens, yards and other holding areas used for accommodating animals in order to give them necessary attention (including water, fodder, rest) before they are moved on, used for specific purposes or slaughtered

Offal: Part of internal organs of a slaughtered animal

Slaughterhouse: Any building or place used for killing of animals where the flesh is intended for human consumption

Splitting: Dividing carcass into parts

Sticking: Severance of the major blood vessels in the neck or immediately anterior to the heart by means of a knife

Stunning pen: Compartment which is suitable for confining only one animal at a time while it is being stunned and which is so constructed as to confine, without discomfort, to prevent any substantial movement of the animal forward, backward or sideways

Stunning: Rendering an animal senseless before it is killed

EXECUTIVE SUMMARY

Uganda's livestock sector contributes about 4% to the Gross Domestic Product (GDP) and 16% to the agricultural sector's GDP as of 2019/20. With about 15 million head of cattle and livestock activities growing by about 8%, the beef sub-sector has the potential to contribute to the country's foreign earnings, and food and nutrition security, as well as reduce the import bill. Against this background, beef was earmarked in the third National Development Plan (NDP III) as one of the priority commodity value chains for promotion under the agro-industrialization programme.

Hence, with a growing need to generate evidence of the beef sub-sector's potential and critical investment options, the Uganda Development Corporation (UDC) as the investment arm of the Government of Uganda, guided by its strategic plan in line with the National Development Frameworks such as the NDP III, and other current GOU development frameworks, commissioned this beef value chain study to inform appropriate interventions/investments to boost productivity and value enhancement of the sub-sector.

The key objective of the study was to obtain facts to inform the planning and implementation of strategic interventions in the beef sub-sector. The specific objectives of the analysis were: (i) To map the beef value chain actors and elaborate their roles; (ii)To analyse the value added at each stage of the beef value chain to identify the most profitable and sustainable nodes, products, and activities; (iii) To evaluate the quantity and quality of production along the beef value chain; and (iv)To identify and analyse the processes, relationships, and business linkages along the core segments of the beef value chain to identify opportunities, gaps, and challenges.

The beef value chain study was conducted in 17 districts, 15 of which were selected based on their level of cattle keeping and supply activity while two of these (Kampala and Wakiso) were selected for their significance in beef trade, processing, exports, imports, and consumption in Uganda. The study employed a mixed method design where primary and secondary data were used, while both quantitative and qualitative data (from key informant interviews and Focus Group Discussions) were collected and analysed. The respondents in this study were small-medium and large-scale cattle keepers, live cattle and beef traders, cattle market managers, transporters, supermarkets, hotels and restaurants, and processors (slaughter slabs, abattoirs, quality/fresh cuts). The study also covered regulators, research institutions, and policy bodies such as UNBS, NALIRI, ILRI, MAAIF, and NAGRC &DB.

Using a market system framework (Fintrac, 2014 & USAID, 2018), data were analysed using descriptive statistics as well as financial analysis and gross margin analysis to profile and map the beef value chain actors as well as assess the profitability of each node of the value chain. In addition, SWOT and PESTEL analyses were done to identify the opportunities and challenges within the value chain.

OVERVIEW OF UGANDA'S BEEF INDUSTRY

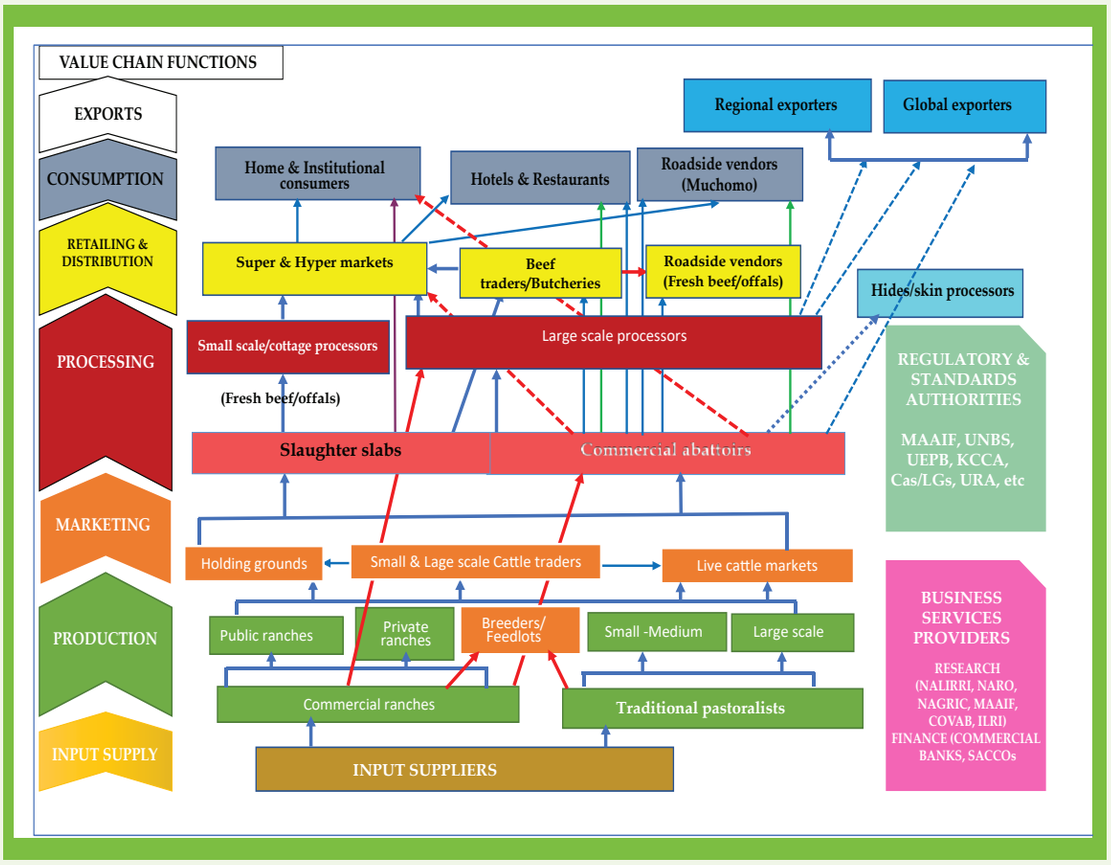
Findings showed that Uganda ranks third in the East African Community (EAC) with 15.5 million head of cattle led by Tanzania and Kenya with 28.3 million and 21.7 million head respectively. Uganda's cattle productivity has stagnated at 150 Kg of beef per animal in the last 10 years, slaughtering only 1.2 million cattle which yield about 165,000MT of beef compared to 487,000MT produced in

Tanzania. Uganda's current per capita beef consumption is 6.5 kg which is projected to grow to 22 kg by 2050 (FAO, 2019), signalling an increasing domestic demand amidst growing international demand. Uganda exported live cattle worth US$ 7 million mainly to Rwanda, DRC, and Burundi, and beef exports in the form of frozen, chilled, or fresh beef by 2021 were only US$ 2.6 million against US$ 10,000 worth of beef imports (ITC, 2022). The main export destinations are DRC, UAE, South Sudan, and Viet Nam.

Structure of the beef value chain in Uganda

At the production level, the beef value chain is dominated by small-medium cattle keepers who produce over 80% of the beef followed by large-scale ranchers. In Northern Uganda and Karamoja, over 80% of the small-medium cattle keepers keep the local breeds while in Central and Western regions, 52% of the farmers are trying to improve breeds through crossing. The main system of cattle rearing is the rangeland extensive system with 92% of the cattle keepers managing cattle under this system. About 52% of the small-medium cattle producers own less than 25 cattle while 23% own between 25 and 50 cattle. Annually, the farmers sell 3-12 cattle aged 1-3 years, with an average weight of 140 kg. Although 47% of the small-medium cattle keepers sell cattle in organized markets, about 80% also sell at the farm gate.

UGANDA BEEF VALUE CHAIN MAP



Source: *Author illustration based on the 2022 beef value chain data*

Uganda's beef value chain actors

Uganda has a long and complex beef value chain with many actors and spans about 8 nodes. The nodes are at input supply, production, marketing, slaughter, processing, retailing, distribution, consumption and export. At the input supply level, the main actors are veterinary drug shops only with almost no feed suppliers (feed suppliers only supply dairy farmers) since few beef cattle keepers buy any concentrated feeds. At the production level, the major actors are small-medium cattle keepers, large-scale cattle keepers (rangeland and normadic keepers), ranchers and a few feedlot operators.

The rangeland management system is the most dominant among the small-medium producers where 92% of them graze cattle on open and usually communal grazing fields and share watering points in valley tanks or water reservoirs. However, in Central and Western Uganda, about 20% of the producers have adopted stall and supplementary feeding since some have upgraded their cattle breeds. Only 8% of the small-medium cattle keepers kept cross breeds, showing the dominance of the local cattle breeds at this node of the value chain.

Although 90% of the small-medium producers had sold cattle in the last two years, it was found that the average number sold per year per farm was only six cattle which weigh about 140 kg each. The main selling points were the farmgate where 80% sold from; although another 47% also sold in cattle markets. At the small-medium cattle production node, the live cattle traders were the value chain governors who had all the powers to determine prices and quality attributes of the cattle they wanted to buy and producers only had to comply. Only 16% of the small-medium producers were found to have a written contract with local traders and large-scale traders they supplied cattle. Small-medium producers were found to be operating profitable farms with average annual revenue of UGX 8.4 million and gross profit margin of 24%.

About 52% of the large-scale cattle producers kept cross breeds (between locals, Sahiwal, Brahman, etc.) with an average herd size of 1,500 cattle. Overall, 20% used the rangeland system, while 50% kept cattle using semi-intensive systems. The average age of cattle at the time of sale for large-scale cattle farms was three and a half years and weighed between 170 kg and 200 kg. Large-scale cattle producers sold about 250 cattle annually at UGX 1,800,000 for bulls and UGX 1,775,000 for cows.

Only about 27% of the large-scale cattle producers had contracts with their buyers and 36% belonged to beef cooperatives although 73% of them also belonged to dairy cooperatives since many kept dual-purpose cattle (for beef and milk). The value chain governors at this large-scale node were the producers since they could use the economies of scale to determine prices following buyer specifications. The large scale producers were found to be operating profitable farms with average annual revenue of UGX 447 million and gross profit margin of 64%.

At the marketing and aggregation level, there were live cattle traders, cattle markets, and holding grounds. Findings showed that about 70% of these businesses were formal (registered). Live cattle traders, who were the value chain governors at this stage, mainly aggregated cattle from farmers (100%), fellow traders (50%), and cattle assemblers/agents (10%). Beef prices ranged from UGX 9,300/kg at the farm to UGX 10,800/kg at the abattoir to UGX 18,000/kg at the butchery. The key price determinants were season, market demand shifts -- caused by exports to neighbouring states and livestock trade restrictions due to quarantines. Live cattle traders were operating profitable businesses with average monthly revenue of about UGX 38 million and gross profit margin of 92%.

At the processing level are the abattoirs and meat processors and butchers. All these actors operated formally registered business that were inspected and regulated by the urban authorities. The majority (58%) of the butchers

used motorcycles (bodaboda) installed with meat boxes to transport beef from abattoirs/slaughter houses to their premises, although some processors had specialized trucks with cold facilities to transport beef. Butchers handled about 1000MT of beef each annually,earning them monthly gross margins of about UGX 11 million and gross profit margin of 32%. The beef processors handled about 90MT each annually from which they earned average monthly revenues of UGX 144 million and gross profit margin of 42%.

The supermarkets were key actors at the distribution stage for both fresh/frozen beef and processed beef products such as sausages. Supermarkets handled about 12MT each annually from which they earned average monthly revenues of UGX 60 million and gross profit margin of 62%.

Regulation and standards in the beef value chain

Regulatory and standardization functions were performed by the mother ministry, MAAIF, in conjunction with other agencies such as UNBS, UEPB, KCCA, City Authorities/ Local Governments, URA, and UNBS. Business development service providers in the value chain included research organizations such as NALIRRI, NARO, NAGRC & DB, COVAB, and ILRI. Others included UIRI for business incubation, the Food Science and Biotechnology School at Makerere University, transporters. Financing was done by commercial banks, VSLAs, and SACCOs.

Challenges facing the beef value chain actors

At the production level, producers faced challenges such as diseases and parasites- mainly foot and mouth disease, East Coast Fever (ECF) and ticks, prolonged droughts that led to a shortage of pastures and water, limited access to better buyers/markets, low prices, and long distances to markets. The main constraints for the downstream actors at the marketing level such as traders, processors, and exporters were poor quality cattle, poor road infrastructure, high electricity costs, limited access to modern machinery and technology, and high taxes.

Conclusions:

From all the data analysed in this beef value chain study, the following were the key messages that were picked out:

i) **The beef sector in Uganda has a lot of unlocked potential at all levels of the value chain,**

although some interventions are needed to unlock this potential. At the production level, cattle keepers have the will to increase productivity. However, they are constrained by the predominantly local breeds and systems --that over-rely on rangeland grazing and less on supplementary feeding which leads to overstocking. In addition, live cattle traders on average source cattle from 3-5 markets scattered all over to fill their trucks. These result from lower supply compared to demand, hence, increasing transaction costs. ii) Cattle keeping is a profitable venture: Cattle keepers, small, medium, and large-scale earned positive gross margins although these margins can still go up if counterfeit drugs are reduced on the market; improved breeds are adopted; and supplementary feeding technologies are adopted as well as improvements in water accessibility.

iii) **The cattle and beef trade are profitable ventures:**

Cattle and beef traders earned way higher margins than producers. This is an indication of a disproportionate distribution of value and gains along the value chain.

iv) **Beef processing is a profitable venture and value addition at lower costs can make it even more profitable.**

We found profit margins of 26% among processors; although with lower operational

costs, this could be higher. More investments by Government and the private sector need to be given priority in areas of cold facilities, reduced electricity costs, and access to reasonably priced beef/live cattle for beef processors.

v) **Extension services and institutional development need to be tagged and enhanced:**

Veterinary extension services are mainly provided by veterinary practitioners recruited by Government at local Governments. Other extension service providers such as water engineers, animal feeding and management extension workers, as well as Community development officers (for institutional development), are not very active in the livestock sector. This creates a knowledge gap on these critical aspects of production.

vi) **More investments are needed in transport, cold storage, and water and power infrastructures:**

The current transport systems for the animals from cattle markets do not ensure quality beef at the end of the chain. Abattoirs lack cold storage facilities -- this means beef must be sold immediately after slaughter, yet butchers also lack such facilities.

vii) **Research and Development:**

There is a vibrant R&D agenda for the livestock sector and beef sub-sector. Institutional capacity is already strong with multiple ongoing R&D activities in areas such as the development of Anti-tick vaccines and verification of their efficacy, new Embryo synchronization technologies at NALLIRI, Agricultural Value Chain Development (AVCDP) where Artificial Insemination (AI), and farmer training /training to equipping AI Technicians are supported.

viii) **Policy environment:**

The current policy environment favours more domestic beef and cattle trade compared to export trade. For example, the Animal Identification and Traceability Bill is still in its infancy and has not yet been tested and even the meat export policy and strategy are not yet drafted.

POTENTIAL AREAS FOR UDC INVESTMENT IN THE BEEF VALUE CHAIN

UDC was established with the primary objective of promoting and facilitating the industrial and economic development of Uganda. This mandate when applied to agribusiness is primarily focused on supporting value addition and the upper ends of the value chains where there are insufficient investments by the private sector. With MAIIF and its departments and authorities focusing mainly on the productivity nodes of the value chain, even with the BVC, UDC should naturally focus on value addition. Based on the main constraints identified at the beef processing node, UDC investments in the following areas would upgrade the value chain and position the beef sub-sector for exploiting the local, regional and export markets. These proposed investments may be handled according to the set Investments procedures and criteria of UDC involving PPPs and other models.

At production level:

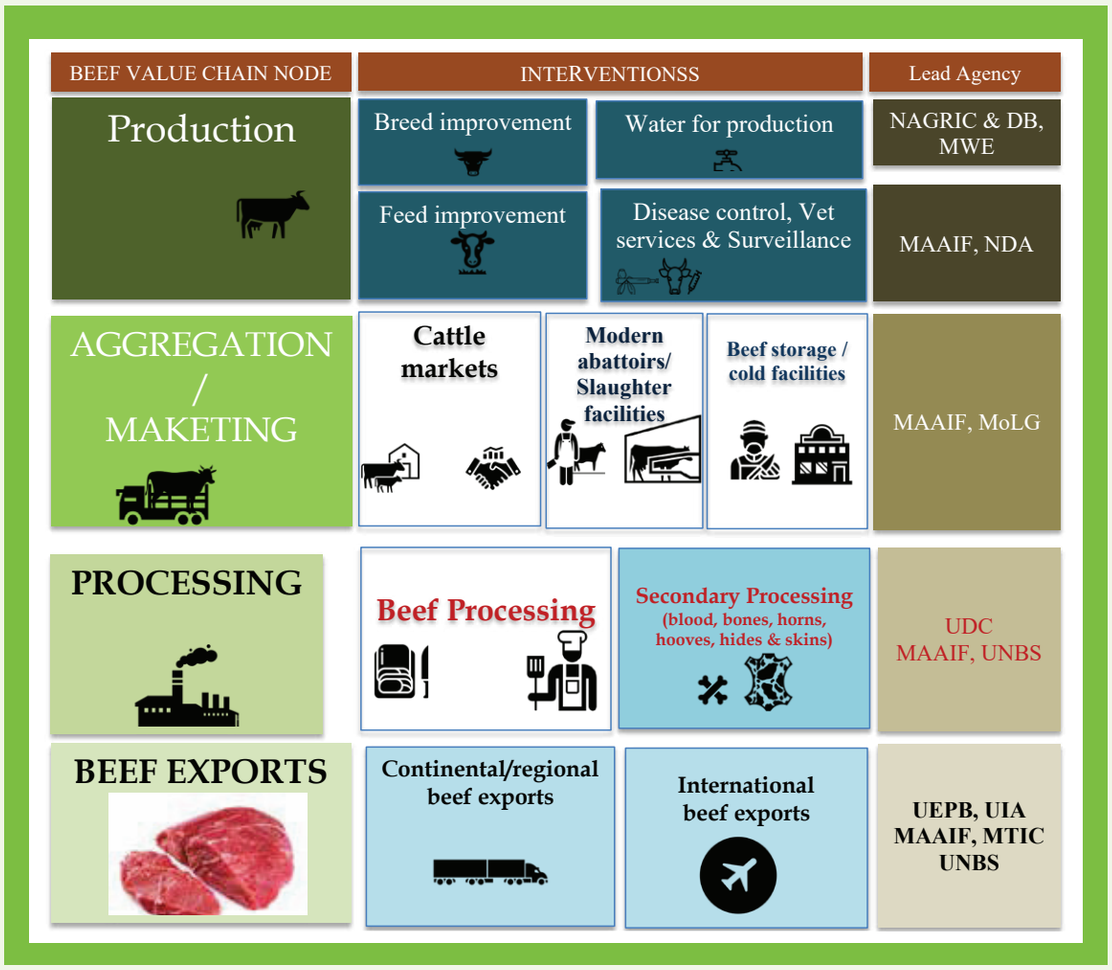
1) **Breed improvement:**

MDAs such as MAAIF (livestock sector) and agencies such as NAGRC & DB need to partner with ranchers and the private sector to promote beef-specific breeds such as the Brahman and Romagnola that are not yet fully adopted. Interventions will include setting up AI and community bull service centres.

2) **Ramping up production:**

Production ramping is necessary to reduce the price of beef for processing. This can only be achieved rapidly through contract ranching and nucleus farms (small-medium farms organized around ranches) establishment to supply established abattoir/slaughter/processing facilities followed by additional services such as

Illustrated proposed beef value chain interventions and the lead agencies



Source: *Author illustration based on the 2022 beef value chain data*

training, AI services, and transport services.

3) Institutional development along the value chain:

UDC will need to partner with line ministries such as MAAIF (livestock sector) and MTIC (Trade and cooperatives) to set up/strengthen beef producer cooperatives as well as trader associations. This will also entail building the capacity of the Veterinary Officers as well as Community Animal Health Workers (CAHWs) to pass on skills and knowledge to the producers and aggregators. This will ensure a stable and sustainable supply of cattle/beef to the processing facilities and both domestic and export markets.

At the aggregation/marketing level:

1) Modern abattoir and setting up cold facilities:

UDC may partner with private sector players, KCCA, and beef trader association (s) in Kampala and/or Wakiso to set up a modern abattoir with cold facilities and modern equipment. Regional abattoirs in the cattle corridor equipped with refrigerated beef distribution trucks would also be an ideal investment that may also reduce the cruelty in animal transportation and improve beef

quality. Such a high-end setup can spur further investments by the private sector to exploit the extended value chain using the outputs and waste from this facility. The high-quality standards that may be installed in such a facility can also spur fresh beef exports from Uganda. Such a facility may enjoy economies of scale that can make value addition more profitable for the private sector.

2) Beef quality improvement:

There are capacity gaps in terms of skills in handling cattle from cattle markets to handling beef at the abattoirs and processing facilities. Only 20% of the processors, 25% of the beef traders, and none of the butchers indicated they possessed skills in carcass treatment. UDC can partner with UNBS, MAAIF, MOH, Makerere School of Public Health, COVAB, and others to build the capacity of the actors.

At the processing level:

1) Alongside the abattoirs, beef processing facilities

may also be established that can add value to the beef by processing it into products such as sausages, deli meats, minced meats, and beef cuts (targeting the supermarkets). The key impediment to the private sector to further exploit beef value addition are the high costs of utilities and beef prices. UDC investments that help drive down costs can ensure scale and cost-effectiveness to make a profitable venture as indicated in the illustrated inforgraphic above. Such a facility can also produce sausage casing from intestines and other related cold chain products.

2) Investing in mobile slaughter facilities:

UDC can solve the problem of scattered farmers and exploitation by traders who earn high margins by investing in mobile slaughter facilities: Mobile cattle slaughter facilities are self-contained units that can be transported to farms or ranches to slaughter cattle. The investment costs per mobile unit are estimated at UGX 800 million and UGX 1.2 billion. They are beneficial to small-scale producers who do not have access to a traditional slaughterhouse. They offer a number of advantages over traditional slaughterhouses, including: be ing located closer to the source of the cattle, which can reduce stress on the animals and improve the quality of the meat; they can be used to slaughter animals of all sizes, including young calves and large bulls; they can be operated by a small crew, which can save on labour costs; and, they can be used to slaughter animals in a humane and sanitary manner. Other benefits are: reduced stress on animals; improved animal welfare; increased control over the slaughter process; and, lower costs.

3) UDC can also invest in extended value chain nodes using the by-products from the abattoirs.

i. Facilities for handling blood, bones, horns, hooves, and gut wastes that can then be used to produce animal feeds, fertilizers and even cooking gas may be a good investment by UDC.

ii. A tanning factory could be another ideal investment by UDC.

Most private-sector tanneries, like the one in Masaka, are struggling due to poor waste management and high operational costs. A proper well designed and managed tannery in an ideal location in the cattle corridor would be a game changer in the BVC.

iii. The natural industrial extension for a tannery would be an investment in shoes, belts, bags, suitcases, high-end leather fashion items, and related products facility. No large factory currently exists in the country and a UDC investment could change this.

iv. A tannery can also have complementary industries handling cattle hair into brushes and other related products.

Such a facility can also be equipped with units that can produce products from Horns like Buttons, scrappers, and even artefacts.

v. An incubation Hub supporting MSMEs

that can be interested in making shoes, belts, buttons, brushes, and horn artefacts can also be another investment angle geared towards youth job creation and private sector development.

At the export level:

1) Facilitation of beef traders and processors to process beef export certifications to high-value markets especially high beef importing countries.

2) Cold chain Hub development:

UDC can also invest in establishment of cold chain hubs, mainly in the cattle corridor districts and near the export routes such as Busia, Malaba, Nimule, Elegu and Entebbe airport to enable exporters maintain beef and its products in the best form of quality and elongate the shelf life.

3) Interventions for quality improvement and standards:

These can include training of personnel, especially at UNBS and processing facilities to enforce and conform to the international standards.

Recommendations

The following recommendations are made from the evidence generated and would go a long way in increasing the productivity and competitiveness of the Uganda beef value chain:

i) The government of Uganda through MAAIF and NAGRC & DB and NALIRRI should streamline access to better technologies

especially improved beef breeds of cattle, spray equipment as well as water and power access. Farmers are largely using local breeds and communal grazing with high carrying capacity because of low productive cattle breeds kept currently. Uganda targets to export at least 30,000MT of beef annually by 2025. Hence, one of the key interventions is to increase the supply of quality and safe beef and beef products by raising the production and productivity of beef cattle.

ii) Cattle producer institutional development:

The only beef cooperative in Uganda, the Uganda Meat Producers Cooperative Union (UMPCU), has only 2,600 members and 34 primary cooperatives. This is an indication that many of the cattle farmers are not organized as a bloc except those in dairy cooperatives. The Government, therefore, needs to develop farmer institutions such as cooperatives and associations to ease access to extension services, technologies, and markets. Strong producer institutions will be vehicles for the promotion of technologies and systems such as Bull Schemes, Multiple Ovulation Embryo Transfer (MOET), Creation of Stud Books (Catalogue/Register of certified breeding animals), Community-Based Artificial Insemination (AI) Services, and veterinary and breeding Services.

iii) GOU should support beef SMEs such as abattoirs, butchers, and processors to develop competitive edge

by ensuring that they access the necessary technologies and equipment for slaughter, handling, transport, and storage of beef to upgrade the quality of products and increase value. By building and developing relationships with established actors, by organizing them into strong associations or cooperatives, the target can be to create a Ugandan beef brand that is produced and marketed as Ugandan and preferred by customers throughout Uganda and in export markets. This will require intervention at the slaughter, transport, storage, processing, and marketing stages of the value chain.

iv) More investment in Research and Development:

There are several planned research interventions, but funding is low. It is highly recommended that R&D is given enough funding to push for increased output of technologies, dissemination, and push uptake to foster increased productivity and eventually beef production to cover the

current and future demand gaps.

v) Expedite the formulation and enactment of the meat export policy and strategy, Animal Identification and Traceability Bill:

UMPCU has started talks with MAAIF to develop the policy and strategy. However, such policies and strategies are only successful if they go through a consultative process involving all stakeholders. It is advisable that GOU and other donors to the livestock sector urgently formulate this policy and strategy so that the NDPIII plans to export more beef have legal and policy backing. In this regard, it was found that the NADECC Lab is not funded/financed by the government because it is not fully established by law.

vi) Strengthen disease surveillance, production, and procurement of effective vaccines and drugs for disease control and prevention.

There is a high presence of counterfeits in animal drugs and vaccines which was mentioned by many farmers and veterinary practitioners. GOU needs to come up with tough measures on counterfeits but also strengthen disease surveillance to curb disease outbreaks to reduce the frequency of quarantines.

vii) More investments should be directed toward the water for Commercial Beef Production Interventions as well as animal feeds.

These two constitute the highest cost and burden in cattle keeping especially in the climate-constrained cattle corridor. Increased water and animal feed access will ensure cattle keepers can increase the numbers of cattle kept and sold to increase beef supply for domestic and export markets. These may include: Rehabilitation of the Dams and Valley Tanks, the promotion of small-scale water harvesting technologies, and the rehabilitation/Construction of Water Facilities.

viii) There is a need to invest in improved product quality through interventions at slaughter and processing levels.

Such interventions may include but are not limited to, strengthening meat inspection and hygiene services, putting in place requisite infrastructure, competent personnel, and enforcement of regulatory measures such as mandatory meat inspection and records management.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The beef value chain was earmarked in the third National Development Plan (NDP III) as one of the priority commodity value chains with a high potential to contribute towards food and nutrition security, Uganda's foreign earnings, as well as reducing the import bill. Therefore, Uganda Development Corporation (UDC), the Investment arm of the Government, guided by its strategic plan that is aligned to the various National Development Frameworks such as the NDP III, commissioned a value chain study of the beef sub-sector to inform appropriate interventions/investments to boost productivity and value enhancement of the sub-sector.

The study targeted to assess the entire beef value chain by engaging and studying the various actors in the value chain and their roles, aspirations, and value created to single out the major actors and governors of the beef value chain and what investments can be targeted to each as well as documenting the challenges and opportunities along the value chain. This analysis was envisaged to guide the Government on which strategic interventions need to be implemented in the beef value chain to maximize its contribution to food and nutrition security, the country's foreign earnings as well as the reduction of the import bill.

1.2 ABOUT THE UGANDA DEVELOPMENT CORPORATION

The UDC, the investment arm of the government was established to promote and support the competitiveness of the industrial sector and socioeconomic growth of the Ugandan economy. The mission of UDC was derived from its mandate to "establish sustainable investments in areas strategic to Uganda's social and economic transformation, and prosperity of Uganda". The Uganda Development Corporation is thus involved in numerous development projects and a wide range of industries, including infrastructure development, mineral beneficiation, and agro-industry to accomplish its mission. The Corporation assesses several potential opportunities for investment, whether solely or in partnerships, to analyse their viability and contribution to national development to ensure the correct process for project viability. The Corporation appraises potential investment opportunities through, research, feasibility studies, value chain analysis, business valuation, and due diligence.

1.3 OBJECTIVES OF THE STUDY

To undertake a beef value chain analysis in Uganda so as to obtain facts that will inform the implementation of strategic interventions in the beef sub-sector.

The specific objectives of the assignment were as follows:

(i) To map the value chain actors along the Uganda beef value chain with their roles;

(ii) To analyse the value added at each node of the beef value chain;

(iii) To identify the most viable/profitable and sustainable nodes, products, and activities in the beef value chain.

(iv) To evaluate the quantity and quality of production along the beef value chain, and the resources needed to participate in the various entry points identified within the various beef market segments.

(v) To identify and analyse the processes, relationships, business viability, and linkages along the core segments/stages of selected value chains to provide expert information on the existing value chain opportunities, gaps, and challenges.

(vi) To identify the opportunities, constraints, and challenges at each level of the beef value chain with reference to past, present, and planned sector interventions.

(vii) To identify potential areas for investment in the beef value chain.

1.4 JUSTIFICATION OF THE STUDY

UUganda's livestock sector contributed about 4% to the total Gross Domestic Product (GDP) and 16% to the agricultural sector's GDP in 2019/20 (UBOS, 2020; MoFPED, 2021), while cattle are estimated to provide about 27% of the gross value of national livestock output (Behnke & Nakirya, 2012). By 2019, Uganda had about 14.8 million cattle amidst increasing demand for livestock products although livestock activities also grew by 7.7% around the same time, indicating that the sector was responding to demand but at a slow rate. By 2020, Uganda had a negative trade balance of about US$ 4.1 billion, representing a deficit of -2.34% in trade growth (World Bank, 2021).

Therefore, with the increasing demand and population and the need for more exports to close the trade deficit, Uganda needs to critically examine the potential for investment into some of its seemingly viable and competitive sectors and sub-sectors such as the beef sub-sector.

UDC found it important to study and appreciate the beef value chain, the various actors in the chain, and their roles/responsibilities/expectations/aspirations. This study sought to understand who the major actors in the beef value chain were, who among the actors were benefiting more from the beef value chain, and their gross margins. It also looked at the factors affecting the volume of beef in the market, and the challenges and opportunities in the beef value chain. The purpose was to guide the designing of appropriate investment interventions at the right nodes of the beef value chain to maximize its contribution to food and nutrition security, the country's foreign earnings, as well as the reduction of the import bill.

1.5 STRUCTURE OF THE REPORT

This report is structured into eight (8) chapters. The first chapter gives a brief introduction and background to the beef value chain study and an overview of UDC as the client that commissioned this study. The second chapter elaborates on the methodology followed in conducting the study including the study area, types of respondents and their selection, sampling procedures, data collection methods, data types as well as analytical methods used to generate the results. The third chapter explores the situation of Uganda's beef industry. The chapter also gives the

evolution of the beef industry, its structure and actors, and its past performance. The fourth and fifth chapters present the findings of the study with the former presenting the current structure and organization of the Uganda beef value chain, while the latter presents the value chain actors and their roles. Chapter Six presents the past, present, and planned future interventions in the beef value chain in Uganda. Chapter Seven explores the profitability of the beef value chain at the various nodes of the chain. Chapter eight presents the key messages that can be drawn from this beef value chain study, market opportunities, conclusions, and recommendations.

CHAPTER 2

METHODOLOGY

This chapter provides the approach that was taken by the consultant to accomplish the deliverables and the methodology that was used to deliver the assignment objectives.

2.1 STUDY AREA AND SCOPE

The beef value chain study was conducted in 17 districts between November 10, 2022, and November 30, 2022. Of the sampled districts, 15 were selected based on their high level of cattle keeping and supply activity while two (Kampala and Wakiso) were selected for their significance in beef trade, processing, exports, imports, and consumption in Uganda. The 15 beef-producing districts were selected from five regions but mainly from the cattle corridor.

In terms of scope, the beef value chain study covered the entire span of the beef value chain involving all actors at the various nodes. The study covered the pre-production stage (input and veterinary services supply), production stage (small-medium scale, extensive/large-scale cattle keepers, ranchers, and feed lots), marketing and distribution (live cattle and beef traders/ aggregators, cattle markets, transporters, supermarkets, hotels/restaurants), processing (slaughter slabs, abattoirs, quality/fresh cuts) as well as exporters and importers. The study further covered regulators, research institutions, and policy bodies such as the Uganda National Bureau of Standards (UNBS), National Livestock Resources Research Institute (NALIRRI), International Livestock Research Institute (ILRI), Ministry of Agriculture Animal Industry and Fisheries (MAAIF), and National Animal Resources Genetic Centre and Data Bank (NAGRIC D&B).

2.2 STUDY DESIGN

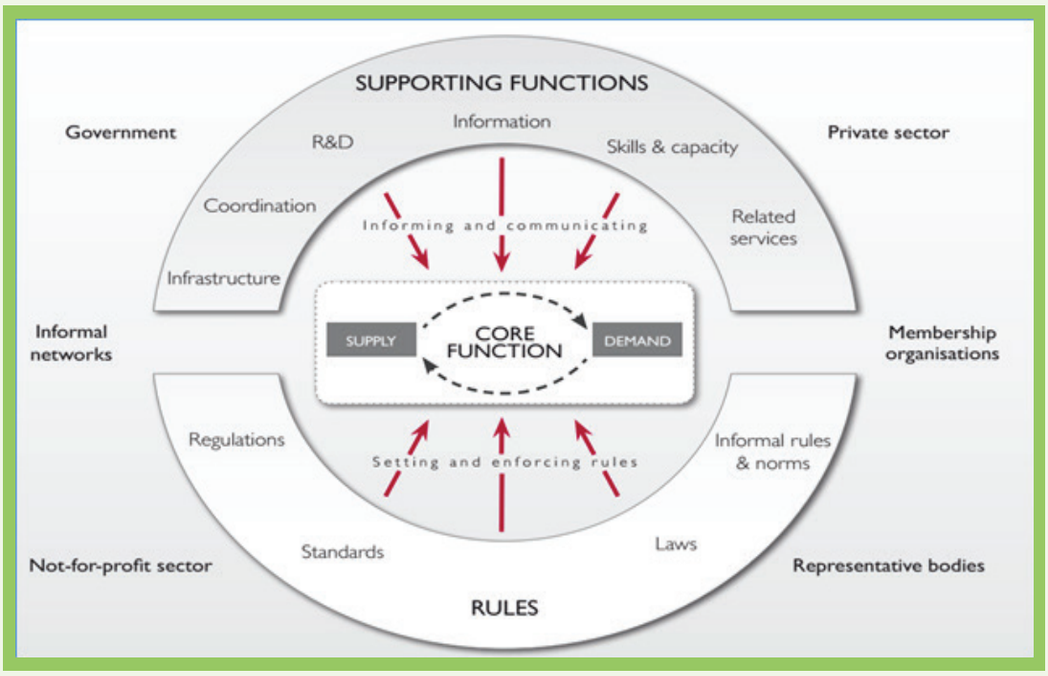
TThe design of the study involved the use of mixed methods in which both qualitative and quantitative, primary and secondary data were collected. Primary quantitative data were collected from small to medium and large-scale cattle keepers through a survey while qualitative data were collected using key informant interviews with key actors and support players involved at various livestock and beef value chain nodes, and Focus Group Discussions (FGDs) mainly with producers (cattle keepers).

Secondary data was sourced from; the 2008 census statistics, the new livestock census by UBOS and MAAIF, socio-economic surveys, statistics bureaus and relevant institutions (ministries, central bank, customs office, etc), sectoral strategies and research papers from ministries, national research agencies, regulatory bodies, think tanks,

professional and industry associations, trade and market data and documents, global databases (e.g., FAO, World Bank, International Trade Centre Trade Map), Industry and sector surveys and documents from international organizations (e.g. FAO, World Bank, International Monetary Fund [IMF], International Livestock Research Institute [ILRI] and other development partners.

Other quantitative secondary data were collected through data mining from websites and reports by credible trading and policy agencies, including the East African Community (EAC), the Intergovernmental Authority on Development (IGAD), African Union (AU), the European Union (EU), the Common Market for Eastern and Southern Africa (COMESA), the European Free Trade Association (EFTA) and others such as the International Trade Centre (ITC), FAOSTAT, and the United Nations Comtrade (UNComtrade), among others. Production data from the primary surveys mainly from key cattle-rearing districts in Uganda and secondary data from Food and Agriculture Organisation Statistics (FAOSTAT) and the Common Market for East and Southern Africa (COMESA) for at least the last six years (2015-2021) or so, and the levels of production were analysed as the total domestic supply of beef and its products such as leather and its products as well as meat and related products. A market system framework (Fintrac, 2014[1] & USAID, 2018[2]) was employed in the conceptualization of the beef value chain study design since it allowed the researchers to holistically analyse the value chain in terms of actors, their roles, supporting functions, and rules in the respective markets (Figure 1). For each

Figure 1: The market system framework



Source: *Fintrac (2014)[4] & USAID (2018)[5]*

[1]- *Fintrac (2014). https://www.fintrac.com/sites/default/files/2017-10/market_systems_approach.pdf*

[2]- *USAID (2018). https://www.usaid.gov/sites/default/files/documents/1866/Market-Systems-Resilience-Measurement-Framework-Report-Final_public-August-2019.pdf*

of the beef value chain nodes, an in-depth understanding of the factors affecting the core transactions of the market at the supply and demand ends and a detailed analysis of the market were conducted to identify the constraints to growth affecting the beef value chain actors.

Assessment of the beef value chain was also done through consultations with different market actors to identify the constraints and opportunities that could unlock the potential of the beef sub-sector.

2.3 SAMPLING METHODS AND SAMPLE SIZES

The study respondents were drawn from various levels of the beef value chain from production to marketing, to processing, distribution, and consumption. At the production level, ranchers and feedlots, large-scale and small-medium producers (cattle keepers) were sampled using simple random sampling. At the marketing level, live cattle traders, transporters, cattle market and holding grounds managers, abattoirs, and beef traders/aggregators (butchers) were sampled using both random sampling and snowballing. At the processing level, large-scale beef cuts and small-scale processors were also interviewed. At the distribution level, live cattle/beef exporters and importers, and supermarkets were sampled. At the consumption level, home consumers, hotels, and restaurants were sampled randomly. Regulators and service providers such as District production coordinators, Veterinary officers and commercial officers, NGOs, UNBS, MAAIF, and NAGRC & DB were also interviewed as key informants. The next sub-sections elaborate on how these were sampled.

2.3.1 Sampling procedure of cattle keepers

The populations of the small-medium scale cattle keepers (between 10 and 200 head of cattle and the extensive/large-scale cattle keepers were obtained from the 2020 UBOS Statistical Abstract. This prompted the use of the statistical formula for known populations by Yamane (1967) based on a 95% confidence level and precision level, N=population of cattle keepers, n=the targeted sample, e= 0.05 or 5% margin of error inserted in equation i.

$$n = \frac{N}{(1+N(e)^2)} \qquad \text{(i)}$$

Number of households:

$$n = \frac{2{,}479{,}000}{1+2{,}479{,}000(0.05)^2} = 385 \text{ cattle keepers} \qquad \text{(ii)}$$

This hence gave a total sample of 385 small to medium cattle keepers from 15 districts.

The populations of ranchers (owning 500-3,000 head of cattle), large-scale cattle keepers (>200 head of cattle), and feedlot operator populations were not certainly known before the study. Hence, based on the literature, we purposively selected 15 large-scale producers at a level of ranches. In addition, a total of 4 ranches and 2 feedlots were sampled and interviewed.

For the small-medium cattle keepers, a multi-stage simple random sampling procedure was used to sample the respondents. At the first stage, two leading cattle-keeping sub-counties were selected purposively for having the highest concentration of cattle keepers. At the second stage, one parish per sub-county was selected, while the third stage involved selecting two villages. The final stage involved randomly selecting at least 5 cattle-keeping households per village.

The ranchers, feed lots, and cattle/beef traders were selected by snowball and purposive sampling. The ranchers, feedlots,

[5]- *Snowball sampling is a non-probability sampling method where new units are recruited by other units to form part of the sample. Snowball sampling can be a useful way to identify people with specific traits who might otherwise be difficult to reach.*

Table 1: Selected leading cattle keeping districts

Region	Sampled top districts per region	Percentage of households owning cattle
Central	Nakasongola	47%
	Sembabule	21%
	Kyankwanzi	30%
	Kampala & Wakiso	Urban
Western	Ntungamo	27%
	Kiruhura	32%
	Mbarara	19%
Eastern	Serere	60%
	Katakwi	61%
	Bukedea	55%
Karamoja	Kaabong	56%
	Nakapiripirit	70%
	Kotido	68%
Northern	Apac	44%
	Kitgum	21%
	Amolator	54%

Source: *UBOS (2020). Statistical Abstract-based on the 2008 National livestock census*

and large-scale cattle producers are few and well-known in their districts and sub-counties, hence based on information from districts and sub-county local government officials these were traced and interviewed. The cattle markets in districts were jointly mapped by the field team and local government staff and the respective market days were identified for proper targeting of cattle traders and transporters.

2.3.2 Sampling procedure for other value chain actors

For the other beef value chain actors such as live cattle traders, beef traders, cattle and abattoir managers, processors, transporters, veterinary practitioners, veterinary drug shop operators, and researchers, a non-probabilistic sampling approach was used. In this approach, where the category of respondents was fewer than 30, all the available actors were interviewed, while in other cases; snowball sampling was used to get some of the respondents. Snowballing was mainly used to trace and interview transporters, processors, and butcheries (from information obtained from abattoirs where they buy the beef) (Table 2).

2.3.3 Key informant interviews

For Key informant interviews (KIIs) were conducted with the district production coordinators, veterinary officers, commercial officers, transporters, and cattle market masters in the selected districts. On the agribusiness side, KIIs with traders (small, medium & large), processors (butchers, meat packers), abattoir and cattle market leaders, and agro-input dealers per district/city were conducted. KIIs with cattle transporters, exporters, and importers per site/district/city were also conducted. Table 3 presents a list of the key value chain facilitators and actors that are part of the beef value chain ecosystem and value chain.

Table 2: Samples of cattle keepers and other beef value chain actors

Value chain node & actors	Central	Western	Eastern	Karamoja	Northern	Kampala & Wakiso	Total
Inputs							
Agro dealers	6	6	6	6	6		30
Breeders						2	2
Animal health workers	6	6	6	6	6		30
Production							
Small to medium scale farmers (>10-200)	69	139	47	54	76		385
Large scale formers/commercial farmers (>200)	3	3	3	3	3		15
Total farmers	72	142	50	57	79		400
Feed lots	1	1					2
Aggregators							
Traders live animals	3	3	3	3	3		15
Slaughterhouses/abattoirs	3	3	3	3	3	6	21
Transporters beef						12	12
Cooperatives/associations	2	2	2	2	2		10
Cattle markets and holding ground managers	3	3	3	3	3		15
Total	**13**	**13**	**13**	**13**	**13**	**18**	**83**
Processors						10	10
Retail							
Butcheries	3	3	3	3	3	20	35
Beef consumers	3	3	3	3	3	20	35
Restaurants/hotels	1	1	1	1	1	10	15
Supermarkets & meat shops						10	10
Exporters						7	7
Buyers of skins and hides						6	6
Other actors							
Regulators national						4	4
Regulators district	3	3	3	3	3	2	17
Research institutions						5	5
Development partners						5	5
Total							**31**

2.3.4 Focus Group Discussions

Focus Group Discussions were held with beef farmers in the sampled districts at the community level. Ten (10) FGDs within 10 communities in five regions were conducted. The FGDs comprised 5 FGDs for men only (1 per region), and 5 for women only (1 per region). The reason for same-sex FGDs was that women usually are dominated by men in discussions and shy away from expressing their opinions as a basis for alleviating bias.

Table 3: Key value chain facilitators and actors

Value chain actor	Role
NAGRC&DB, NADDEC, NARO-NALIRI	Genetic pool improvement, AI, Vaccines, training and extension services, trade and markets and related aspects
International Livestock Research Institute, Coordinating Office for the Control Trypanosomiasis.	Policy and research to improve the regulatory environment and support
NARO-NALLIRI, Makerere University COVAB, ILLIRI	Research and training in production, feed, pastures, breeding and related activities
UIRI, CURAD	Enterprise development support in the beef value chain
MAAIF, MTIC-UNBS,	Policy and regulatory environment, water and infrastructure provision
MOBIP, Regional Pastoral resilience project	Training, improved pastures and infrastructure
Uganda Meat Producers Cooperative Union (UMPCU), UNFFE	Collective trading of beef animals and Beef
Finical Institutions	Financing of value chain activities
Finical Institutions e.g., Centenary Bank, Post Bank, Stanbic Bank, Uganda Development Bank.	Financing of value chain activities

NB: All abbreviations are in the list of acronyms

2.4 DATA COLLECTION AND MANAGEMENT

Quantitative data were collected using semi-structured questionnaires administered by enumerators programmed on Tablets using the KoboCollect App and hosted on a server. Once data was uploaded it was then downloaded in STATA format and analysed in the same software. The second data category was qualitative data from KIIs, and Focus Group Discussions using guides with appropriate questions.

2.5 DATA ANALYSIS METHODS

This sub-section presents the specific methods and approaches used to analyse data for each of the value chain study objectives. The analysis of the data followed the objectives of the assignment as indicated below. It should be noted here that data analysis considers disaggregation such as by sex, age, scale, geographical location, etc.

2.5.1 Quantitative and qualitative data analysis techniques

The quantitative data were analysed using descriptive statistics i.e., mean, 95% confidence intervals, frequency, proportions, percentages, cross-tabulations, and totals showing trends over time. Measures of variability such as standard deviation were also generated where applicable. The results from the analysis were disaggregated by key socio-demographic characteristics such as district, age group, and sex, among others.

Qualitative and thematic analysis techniques were used to analyse qualitative data collected from key informant interviews and a desk review. Qualitative data were transcribed, coded, and entered in ATLAS

Ti software for analysis and generation of response outputs. The findings were compared to those at the national level using data collected during the literature review and secondary data phase to establish the progress made in achieving the desired targets. For each objective, the questions designed to achieve the objective were then analysed separately from the transcripts and used to write the report and triangulate with quantitative data.

2.5.2 Mapping beef value chain actors

VValue chain mapping forms the basis of value chain analysis. Determining the value chain flow/map for each level of the chain under the beef sub-sector with statistics and figures reduced the complex economic reality of diverse business operations, multiple actors, interdependencies, and relationships to a comprehensible visual model.

Country and regional databases including ITC, COMTRADE, COMESA, EAC, and SADC were studied to understand national and international beef trade dynamics. The largest actors were identified, and information on domestic production, export, and import was summarised in tables, maps, and graphical forms. The pre-production value chain node was assessed based on sources of inputs in the production of cattle and beef using drug trader key informant interviews.

Value chain actors are the individuals and enterprises who directly operate in the production, aggregation, processing, and distribution of a commodity. They are largely private actors (e.g., livestock keepers, traders, micro-/small/medium enterprises, or private manufacturing companies), but can include public institutions (e.g., animal genetics and other input providers). There is a wide variety of actors. They differ in terms of size, contribution to the chain, access to and control over resources (e.g., inputs and technology) as well as connections to the end market (e.g., business relations and market. Gender roles played by men, women, and youth were also given attention to understand their existence in cattle-keeping communities.

The results of the value chain analysis based on primary and secondary data and data from key informant interviews were used to do a value chain mapping and profiling of the actors. To analyse data for the value chain mapping, the value chain concept as developed by Michael Porter in 1985 (Feller et al., 2006) and later improved by other scholars was adopted. Porter defined value as the amount that the buyers are willing to pay for what a firm provides. In this regard, therefore, the primary focus in the value chain is on the benefits that accrue to the chain actors, the interdependent processes that generate value and the resulting demand and funds flow that are created (Devaux et al., 2009; Horton et al., 2010; Kaplinsky and Morris, 2001).

Profiling of the actors captured information such as business ownership, registration/licensing status, size determined by the number of persons employed, profitability, products, characteristics of the business owner(s), experience, etc. Others included the number of customers, customer requirements, what customers value, seasonal variation, and competition as well as managerial relations in the beef value chain.

The value chain map was used to analyse the Beef value chain's potential to generate value addition, the potential to create jobs, contribution to increased trade, likelihood to generate regional value chain integration, actors' participation in global value chains, the potential of the beef value chain to attract investment, facilitation of scale up and upgrading of operations within existing beef markets and their products in the local, national, and regional markets. In addition, descriptive statistics were used to add figures on market shares, prices, and volumes to the profiles of the actors.

2.5.3 SWOT, BFA and PESTEL Analysis

In order to understand the overall market system and structure, the beef value chain structure was analysed at three levels: **the core value chain** – consisting of the actors involved in the production, aggregation, processing, and distribution; the extended value chain – including supporting functions that ensure smooth business transactions, knowledge and skills, research and development services and inputs such as feed, veterinary and financial services. The third aspect is the enabling environment which comprises organizations, and formal and informal rules and regulations governing business transactions.

Other parameters analysed included: competitors (actual and potential) including number, size, product offering and strategies, size and barriers to entry; economies of scale, distribution channels, product differentiation, any substitute products, and customer and supplier powers. The other analytical methods included carrying out a SWOT analysis and a Broad Factors Analysis (BFA), commonly called the PESTLE Analysis. The BFA was used to assess and summarize the four macro-environmental factors — political, economic, socio-demographic (social), and technological which are known to exert a significant effect on a business's operating environment, presenting opportunities and posing threats to the beef industry[6].

Country A is said to have a revealed comparative advantage in each product i when its ratio of exports of product i to its total exports of all goods (products) exceeds the same ratio for the world as a whole: Using equation 1, RCA can be estimated.

2.5.4 Revealed Comparative Advantage

Potential comparative advantage is measured using a country's revealed comparative advantage (RCA) in producing and exporting a full range of products each year. RCA is based on the Ricardian trade theory, which postulates that patterns of trade among countries are governed by their relative differences in productivity. Although such productivity differences are difficult to observe, an RCA metric can be readily calculated using trade data to "reveal" such differences. The only weakness of this approach is that applied national measures which affect competitiveness such as tariffs, non-tariff measures, subsidies, and others are not considered in the RCA metric (UNCTAD, 2021). The weakness was, however, countered by further analysis of tariffs, non-tariff measures, subsidies, and other metrics from secondary data and triangulated with survey and key informant interviews.

Country A is said to have a revealed comparative advantage in each product i when its ratio of exports of product i to its total exports of all goods (products) exceeds the same ratio for the world as a whole: Using equation iii, RCA can be estimated.

$$RCA_{Ai} = \frac{\frac{X_{Ai}}{\sum_{j \epsilon P} X_{Aj}}}{\frac{X_{Wi}}{\sum_{j \epsilon P} X_{Wj}}} \geq 1 \qquad \text{(iii)}$$

Where;

- P is the set of all products (with iϵP),
- XAi is the country A's exports of product i,
- Xwi is the world's exports of product i,
- jϵPXAj is the country A's total exports (of all products j in P), and
- jϵPXwj is the world's total exports (of all products j in P).

When a country has a revealed comparative advantage for a given product (RCA >1), it is inferred to be a competitive producer and exporter of that product relative to a country producing and exporting that good at or below the world average. A country with a revealed comparative advantage in

[6]- *https://corporatefinanceinstitute.com/resources/knowledge/strategy/broad-factors-analysis/*

product i is considered to have an export strength in that product. The higher the value of a country's RCA for product i, the higher its export strength in product *i*.

2.5.5 To review the key previous interventions in Uganda's beef sub sector

This involved reviewing published information from research institutions, development partners, and the government that already existed. Reviewing and analysing this information revealed the type of primary research and/or fieldwork needed to obtain specific data, fill information gaps, or update information. Secondary and primary data and information for the analysis fed into the entire analytical framework for the beef value chain study. Physical visits to some of the interventions to get current and first-hand information were also done.

A desk review made use of information from programme documents including those of development partners (operating in the same geographical location, sub-sector, and value chain), National documents (including NDP III), data, and strategies from ministries of agriculture, industry, trade, etc.

2.5.6 Identification of opportunities, constraints, and challenges

While the desk review helped to identify information gaps, primary research filled the information gaps that arose. The information obtained was used to identify the opportunities, constraints, and challenges at each level of the beef value chain which in turn informed the recommendations that will guide the strategic interventions needed in the beef sub-sector. Information was collected on beef value chain actors' involvement -- strengths, weaknesses, opportunities and threats (SWOT) of the value chain. In addition, a PESTEL analysis was done to understand the enabling environment around the operations and performance of the beef value chain and actors in terms of political will and support, economic situation affecting demand and supply, social aspects, technological aspects, and environment and legal aspects.

In addition, a "Customers, Actors, Transformation, Worldview, Owner, Environmental constraints" (CATWOE) analysis was conducted. This was important since beef value chain actors' viewpoints are likely to affect UDC's investment goals and processes in the beef sub-sector. It was envisaged that every change also affects all actors and stakeholders. Therefore, there was a need to analyse the possible repercussions of the actions.

2.5.7 Determination of Gross Margins (GM) along the Beef Value Chain

Profit margin is a percentage measurement of profit that expresses the amount earned per unit of sales. The more money per sale, the higher the profit margin. The gross profit margin and net profit margin, on the other hand, are two separate profitability ratios used to assess financial stability and overall health. The gross profit margin is a measure of profitability that shows the percentage of revenue that exceeds the cost of goods sold (COGS). The key parameters for GM estimation are all costs, sales, and revenues made by a given actor in a specified period, such as a year.

The key performance variables used in gross margin determination were the Gross Margins and Share of Value.

a. The GM was measured according to Barnard and Nix (1979) as the difference between revenue and variable cost for each actor. It is a short-run measure of enterprise performance. Its limitation is that it does not control for time value of money (Lampkin and Measures, 1994). In this study, GM was used to assess the performance of beef value chain actor enterprises. It was computed as shown in Equation iv.

$$GM = (q*p) - TVC \qquad (iv)$$

Where, GM is the gross margin, Q is the quantity of a product sold, p is the price per unit sold.

b. Share of value (SoV)

SoV was applied to compare GMs of actors operating at various levels for each of the VCs studied.

The level with actors depicting the highest GM captures the highest SoV in the VC. In this study, the SoV was computed as shown in Equation v..

$$\text{SoV} = \text{GMi} \,/\, \text{TGMvc} * 100 \qquad \text{(v)}$$

$$SoV = \left(\frac{GM_i}{TGM_{vc}}\right) * 100 \qquad \text{(vi)}$$

Where, GMi is the gross margin of the actor in a value chain, TGMvc is the sum of GMs in the entire chain. This can also be measured from the final consumer price as the denominator and difference in supply channels actor's prices as numerators.

The net profit margin is the ratio of net profits to revenues. Expressed as a percentage, the net profit margin shows how much of each currency unit collected as revenue translates to profit. The gross margins and net margins are indicative of the financial viability earned by the actors at each node of the beef value chain and help determine the strategic interventions that need to be implemented

2.5.8 Analysis of beef value chain upgrading to improve them.

In this section the value chain upgrading concept and how it was applied in this study is explained.

The upgrading concept describes how firms and sectors shift towards making better products, making them more efficiently or moving into more skilled activities and improving their performance and rewards in high-value markets (Giuliani et al, 2005; Kilelu et al., 2017) . Kilelu et al. (2017)[7] adds that although such value chain uprading processes may catalyse smallholder market inclusion, their effects are largely bounded by existing value chain structures (e.g. production system, fragmented markets), timeframe and how prevailing institutional constraints are addressed, which may constrain the intentions of such collaboration action. In other sections we also make a linkage between actors' relationships and how these shape their desire and ability to upgrade. As Kaplinsky et al. (2002)[8] state, not only must firms innovate (doing things better than before) but they must target areas in which to upgrade (doing new things and doing things better than anyone else).

Therefore, in the analysis of this concept, we looked at the following areas:

1) Process upgrading, i.e. interventions for increasing efficiency of production;
2) Product upgrading, i.e. improving product quality and value for consumers;
3) Functional upgrading, i.e. entry into new or movement to a higher value-added function in the value chain;
4) Channel upgrading, i.e. entry into new markets for the same product;
5) Intersectoral upgrading, i.e. entry into new value chains using the knowledge acquired from participation in the beef value chain.

2.6 ETHICAL CONSIDERATIONS

The following research ethics and standards

7- *Kilelu, C., Klerkx, L., Omore, A., Baltenweck, I., Leeuwis, C., & Githinji, J. (2017). Value chain upgrading and the inclusion of smallholders in markets: reflections on contributions of multi-stakeholder processes in dairy development in Tanzania. The european Journal of development research, 29, 1102-1121.*

8- *Kaplinsky, R., Morris, M., & Readman, J. (2002). Understanding upgrading using value chain analysis. Retrieved on April, 3, 2017.*

were taken into consideration during the study;

(i) Informed consent to participate in the study was sought from all respondents. In instances where consent was not granted, the interviewer thanked the respondents and aborted the interview, and moved to the next respondent, although such cases were very few.

(ii) During data collection, no names of respondents were recorded anywhere on the consent form or questionnaire and information collected from Unique identifiers was allocated to each respondent for purposes of questionnaire editing.

(iii) Only the UDC and the research team have access to the primary data collected. The datasets were securely locked with limited access by the research team or any other user who met the requirements to access them.

(iv) An introductory letter from UDC to stakeholders at the district and to all respondents, specifying the purpose of the study was provided to support the team in creating rapport and easy identification.

2.7 QUALITY CONTROL MEASURES UNDERTAKEN

A quality assurance framework was followed for the assignment with appropriate actions taken to ensure quality of the process as indicated in Table 4.

Table 4: Quality assurance measures

Issue	Action to ensure quality
Theoretical underpinnings	• Ensuring publicity of the entire exercise among stakeholders to be consulted for the different fieldwork activities. • Study framework with clear logic • Robust survey tools • Relevant questions
Study rigor	• Training of research team in research protocols, protection of children and respect of human subjects • Pre-test of survey instruments • Careful data collection and recording • A systematic, thorough analysis
Researcher conduct	• Approval for field work at the district level • Ethical behaviour – gain consent and assent • Participation of target group • Respect for different perspectives • Supervision and review of collected data on a daily basis to check for completeness and consistency • Ensuring time allocated to conduct the checks/reviews is reasonable. • Keeping constant communication with the client on the progress of work
Credibility of results	• Triangulation • Validation by informants and peer review • Link between data and conclusions
Utilization of findings	• Relevance to policy • Link to research • Clear reporting and dissemination

CHAPTER 3

SITUATIONAL ANALYSIS OF UGANDA'S BEEF INDUSTRY

3.1 BACKGROUND TO UGANDA'S BEEF INDUSTRY

Uganda is a low-income economy whose average annual growth rate has been 6.2%, with the agriculture sector contributing about 23.8% to the Gross Domestic Product (GDP) and employing over 70% of the workforce. The other sectors that support the Ugandan economy are industry and services which contribute about 27.1% and 41.9% to GDP, respectively (UBOS, 2021)[9] .

The agriculture sector is dominated by smallholder farmers although, with the increasing commercialization of several crop and livestock value chains, medium and large-scale farmers are gaining in numbers, all of whom operate at various levels of efficiency (Food and Agriculture Organization-FAO, 2019). On the other hand, the livestock sector accounts for about 17% of agricultural value added and 3.9% of GDP; and an estimated 58% of households, the majority of whom are subsistence-oriented smallholders, depend on livestock for their livelihoods. According to the latest figures from the Uganda Bureau of Statistics (UBOS, 2021)[10], livestock production accounts for about 3.9% of the National GDP and more than 60% of the rural households in Uganda derive their livelihoods from livestock. The informal livestock sector was 5,835 billion Uganda shillings in value added in FY2020/21 up from 4,490 billion shillings in FY 2018/19, while the formal sector value added was 4,426 billion shillings in FY2020/21.

The latest figures indicate that the livestock population consists of 12.1 million cattle, 15.6 million goats, 4.4 million sheep, 4.5 million pigs, and 48.3 million poultry (Annual Agriculture Survey 2018, UBOS)[11] . It is also estimated that about 93.6% of Uganda's cattle herds are indigenous of which 70.4% are Zebu/Nganda; 29.6% are Ankole, while only 5.6% are dairy exotic/crossbreeds and 0.8% are beef exotic/crossbreeds. The per capita consumption for all meat is 12.1 kg (FAO, 2010), with beef averaging 6.5 kg, pork 3.5 kg, goat meat 3.9 kg, mutton 0.3kg, and poultry 1.52 kg. The demand for beef exceeds current levels of supply. This is attributed to rapid population growth (at 3.3% per annum), increasing urbanization, increased purchasing power, and changes in consumption habits.

The greatest concentration of livestock is found in the "cattle corridor" (Uganda's cattle corridor is illustrated in Figure 2.) which extends from South-Western to North-eastern Uganda. The corridor covers twelve (12) districts namely Ntungamo, Mbarara, Mpigi, Kiboga, Luwero, Apac, Lira, Soroti, Kumi, Mbale, Moroto, and Kotido (INFOTRADE, 2011). Most of the beef production is done on extensive production systems mainly located in the cattle corridor system in Central Uganda.

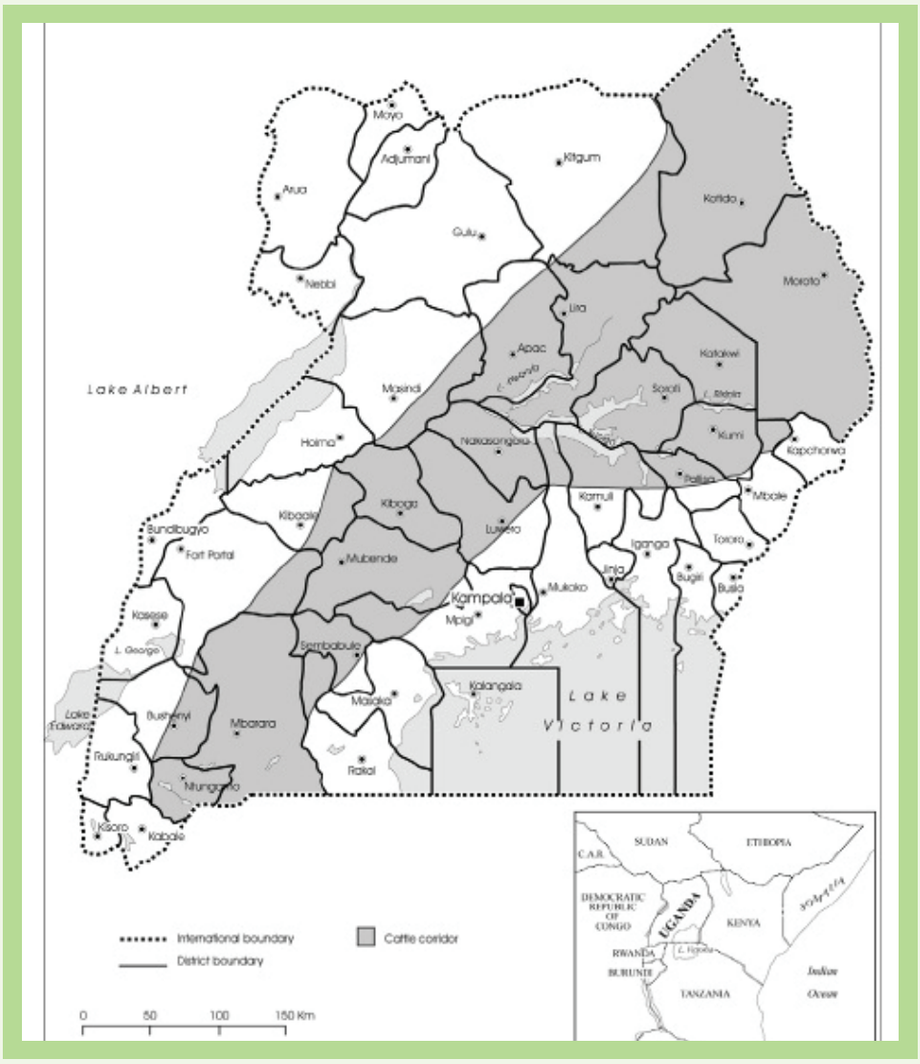
The livestock sector is governed by several policies and regulations including the national

[9] *ubos.org/wp-content/uploads/publications/01_20222021_Statistical_Abstract.pdf*

[10] *https://www.ubos.org/wp-content/uploads/publications/01_20222021_Statistical_Abstract.pdf*

[11] *Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and Uganda Bureau of Statistics (UBOS). 2018. Statistical Abstract 2018. Kampala. Uganda.*

Figure 2: Uganda's cattle corridor (Ref; GOU Case 237, July 2011)



delivery of veterinary services, national veterinary drug policy, national hides, skins and leather policy, animal breeding policy and the animal feeds policy, among others. The recently enacted Meat Industry development law aims to improve the production, processing, and marketing of meat and meat products.

In economic value terms, cattle are considered the most important livestock, given that it contributes 40% to the value of livestock production and 7% to agricultural production value. Much of the cattle in Uganda are produced in the cattle corridor, Western (16%) under four major production systems -- Agro-pastoral (49%), pastoral (41%), commercial ranching (8%), and semi-intensive (2%).

By 2018, there were about 2.5 million agricultural households in Uganda of which

[12] *Mbabazi M.C., Ahmed M., 2012. Analysis of incentives and disincentives for beef in Uganda. Technical notes series, MAFAP, FAO, Rome. http://www.fao.org/.pdf*

[13]. *Asizua, D.; Mpairwe, D.; Kabi, F.; Mutetikka,D.; Hvelplund,T.; Jørgen Madsen. 2009. Growth and slaughter characteristics of Ankole cattle and its Boran and Friesian crossbreds. South African Journal of Animal Science 2009, 39 (Supplement 1) 91. ©South African Society for Animal Science*

34% owned an average of five cows each and sold three cows per year (UBOS, 2020). The cattle-keeping households benefit from cattle through income, food, draft power, insurance and savings, social capital, and other goods and services. In terms of nutrition, the beef cattle also give milk, though in smaller amounts but also contribute beef, whose consumption levels stand at 6.5 kg per capita (FAO, 2019).

3.1.1 Beef Production Systems in Uganda

Researchers have characterized five main beef cattle production systems in Uganda, namely: (i) commercial ranching; (ii) pastoral; (iii) agro-pastoral; (iv) semi-intensive; (v) and intensive (feedlot) [12,13]

According to information available from the Uganda Meat Producers Cooperative Union Ltd (UMPCU), one of the key actors at this node, the number of commercial beef farmers is small, consisting of 119 ranchers and 2,651 farmers organized under UMPCU. Major positive changes are happening in the industry although still highly dependent on traditional extensive grazing systems with low-input, low-output characteristics, there is a move towards more intensive feedlot systems, improved pastures, and silage making albeit at a slow pace. Small companies among others are taking the lead in transforming production systems into high-yield feedlot and silage-fed beef production. Yields are highest during the rainy season with poor supply consistency. Old and culled animals form the bulk of the meat consumed in Uganda, thus poor-quality beef supply.

3.1.2 Feeds and Nutrition

Feeding and nutrition are key components of successful beef production enterprises. They benefit beef producers in three ways: it ensures that the animals' dietary needs are satisfied; healthy productive animals are maintained and raised; and the wider management goals are achieved. Feeding may account for 40 to 70% of the farm costs, depending on the nature of the production system, and hence, significantly contributes to the profitability and sustainability of the enterprise.

Uganda's rangelands provide natural pastures which are the main source of livestock feed in Uganda. These areas cover over 84,000 km2 and hold 80% of the national livestock herd. In addition, there are other scattered drylands throughout the country, especially in the North. However, the rangelands are losing their productivity due to deteriorating rangeland conditions because of, irregular and uneven rainfall distribution, heavy invasion by termites, shrub and weed encroachment, poor management of communal rangeland resources such as water for production facilities and cattle dips, over-grazing and localized over-stocking, land tenure conflicts, uncontrolled bush fires, and lack of a Rangeland Policy (Byakagaba et al., 2018).

Although fodder production and conservation technologies such as hay, silage, and haylage have been adopted in other countries, Uganda has not fully embraced them. This is attributed to limited knowledge and skills, lack of appropriate machinery and equipment, and high cost of labour and improved planting materials. Several initiatives including the Market-Oriented and Environmentally Sustainable Beef Meat Industry in Uganda (MOBIP) project and others are actively pushing to change this.

Uganda produces large quantities of agro-processing by-products and crop residues that would be useful in beef production. Unfortunately, most of them are not utilized. The use of mixed concentrates in beef production is limited for economic reasons. Currently, they are used as supplements for early weaning of calves in a mixed milk-beef system. However, the use of concentrates is projected to increase as intensive production systems such as feedlots are adopted. The constraints to the animal feed industry include weak institutional and regulatory framework; limited access to raw materials; weak market; lack of knowledge and skills and

inadequate institutional support services.

Commercial beef production can only be stimulated and sustained through reliable and sufficient water supplies. However, the major constraints include uneven water distribution; abundant but under-utilized water resources; poor operation and management of the available watering facilities; inadequately constructed watering facilities and distribution infrastructure; and poor access to communal water facilities due to location. The status quo leads to dependence on poor-quality water in the wetlands that are infested with worms.

Key interventions are proposed to improve animal nutrition supported by many programmes like Market-Oriented and Environmentally Sustainable Beef Meat Industry in Uganda (MOBIP) through entities like NALLIRI. They include Boosting the knowledge and skills of key players in the beef industry on beef cattle nutrition (feeds and feed management and supplementation), Capital investments to support at least 100 hectares of pasture grass-legume demonstration farms as avenues for a continuous learning experience, and Supporting forage seed producers for quality seed production. The expected outputs of the interventions include at least 1,000 kg of forage seed procured and distributed, the capacity of at least 100 farmer institutions built alongside creating a functional relationship with farm input service providers. The planned activities include: Establishing and/or expanding improved pastures; Promoting fodder conservation; Increasing usage of supplementary feeding; Establishing beef feedlots; Promoting the use of machinery in pasture production, conservation and utilization; Supporting pasture growers to acquire low-cost irrigation technologies; and Improving the use of crop residues and industrial waste products.

3.1.3 Animal breeding and genetic improvement

As already indicated, most of Uganda's cattle herds are indigenous of which 70.4% are Zebu/Nganda; 29.6% are Ankole, while only 5.6% are dairy exotic/crossbreeds and 0.8% are beef exotic/crossbreeds (NAGRC&DB, 2017). The most popular breeding method, especially in extensive cattle production systems, is the use of a bull for mating. Selection of the breeding bull is majorly subjective, based on visual observation of production parameters. Herd records are poor, and this makes traceability of animals virtually impossible. The breed societies are not yet established. In-breeding is common, leading to undesirable traits such as small size and poor growth rate.

Artificial insemination (AI) and embryo transfer are gaining popularity, especially on smallholder dairy farms in central, western, and southwestern regions. This is spearheaded by the National Animal Resources Genetic Centre and Data Bank (NAGRC&DB), a body corporate under MAAIF, supplemented by commodity-specific institutions such as Dairy Development Authority (DDA) and in collaboration with the private sector. There is no specific agency that spearheads the development of the beef sector.

The following are key constraints to genetic improvements:

a) The high costs of improved breeding services, due to few sources of breeding materials within the country; lack of breed societies/associations; high cost of utilities such as electricity; high taxation of related goods and services; and poor distribution network for the inputs and services (e.g., semen, liquid nitrogen);

b) High prevalence of animal diseases and vectors;

c) Inadequate Animal Breeding Extension Services;

d) Inefficient policy and regulatory framework occasioned by: lack of

statutory instruments in the Animal Breeding Act; non-deterrent penalties provided under the regulatory framework; and inadequate funding for enforcement.

3.1.4 Animal Health

The country's tropical environment makes it ideal for a wide range of cattle diseases. These diseases often lead to livestock losses and massive trade disruptions due to frequent quarantines in the production areas. All diseases have production-limiting effects and others are directly trade-sensitive and partially or completely inhibit trade even when a handful of animals are affected. These include Foot and Mouth Disease (FMD), Contagious Bovine Pleuro Pneumonia (CBPP), Lumpy Skin Disease (LSD), and Rift Valley Fever (RVF). Others are transmissible to humans (zoonotic diseases) such as Anthrax, Rabies, Brucellosis, and Bovine Tuberculosis.

The World Organisation for Animal Health (OIE) performance evaluation of Uganda Veterinary Services in 2018 concluded that the National Veterinary Services were performing at a low standard. This was partly attributed to a weakening position of the government Veterinary Services (the Veterinary Administration) within the overall institutional landscape in terms of less funding and integration of veterinary services with crop production services (hence less departmental/sector independence).

The key constraints to animal health in the country are: :

(i) Weaknesses of the Animal Diseases Act which is not comprehensive enough;
(ii) Inadequate infrastructure to implement some parts of legislation;
(iii) Inadequate disease control infrastructure;
(iv) Inadequate capacity to diagnose diseases;
(v) Limited access to essential inputs;
(vi) Poor veterinary extension services;
(vii) Poor funding; and
(viii) Limited research along the beef value chain.

3.1.5 Cattle marketing

Marketing beef animals in Uganda is normally undertaken at four levels:

(i) Farm gate;
(ii) Primary markets;
(iii) Secondary markets; and
(iv) Tertiary markets.

AAt the farm level, animals are purchased through direct negotiation with the producer. There are no standards or weighing facilities to guide the negotiation process. Price is determined from the physical attributes of the animal and guessed meat yield. The current cattle marketing system is prone to spreading animal diseases.

There are several constraints faced by farmers in cattle marketing: farmers are not well organized into groups; animals are not graded according to quality; poor accessibility of livestock markets; lack of accurate market information; poor roads; insufficient coordination and scheduling of livestock markets; bad market infrastructure; and poor transportation of animals destined for slaughter.

3.1.6 Slaughter and processing facilities

Uganda lacks sufficient quality abattoirs to hygienically handle animal slaughter. Most of the cattle slaughter infrastructures are in poor condition and some are not conducive for the production of hygienic beef and beef products (MAAIF, 2021 & World Bank, 2013; RPLP project report) , . Although meat inspection is carried out by veterinary personnel, there are no laboratories, cold chains, and proper waste disposal facilities. There are formal beef grading standards set by UNBS that follow the US, US CODEX STAN, and US EAS[16].

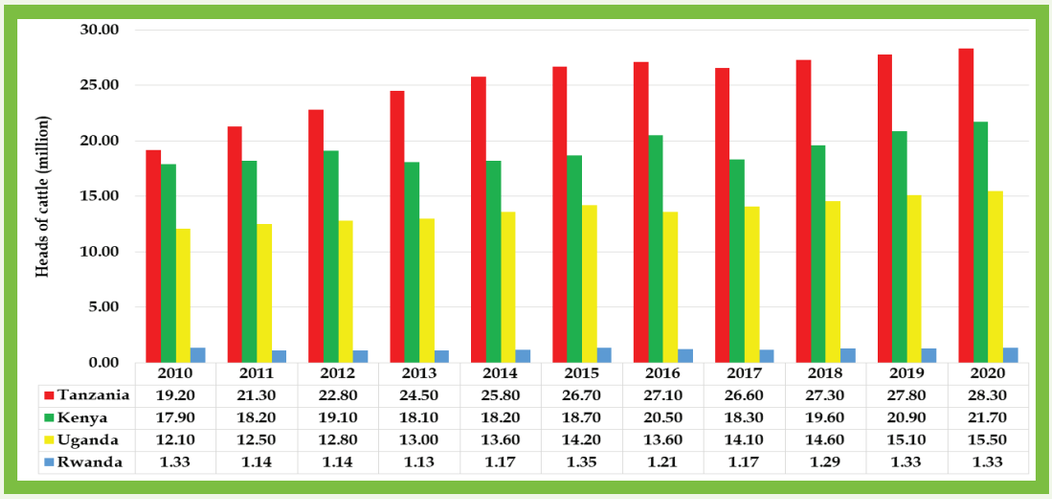
[17] *https://livestocklivelihoodsandhealth.org/wpcontent/uploads/2015/07/Tanzania_Livestock_Modernization_Initiative_July_2015.pdf*

The key players in beef processing and value addition are:

(i) Egypt-Uganda Food Security Company Ltd.;
(ii) Pearl Meat Company;
(iii) Fresh Cuts Ltd;
(iv) Uganda Meat Industries Ltd (UMI);
(v) Uganda Industrial Research Institute;
(vi) Makerere University Food Technology Business Incubation Centre.
(vii) Lubowa Investment Ltd.;
(viii) Meat Processors Ltd.;
(ix) Your Choice; and
(x) Sanga Meat Company.

Four of them (i.e., Uganda Meat Industries,

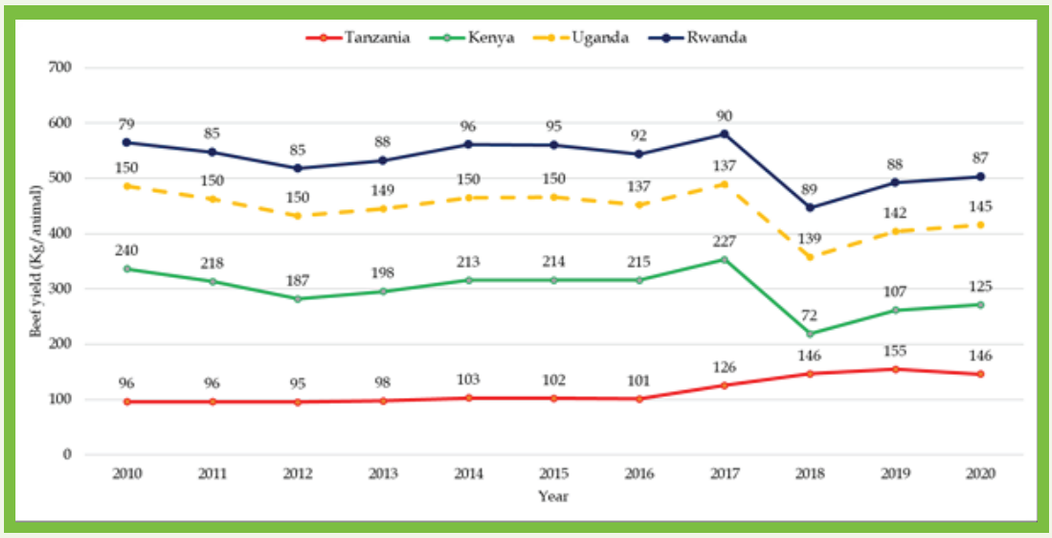
Figure 3: Cattle stocks (million heads of cattle) in Uganda and other EAC countries



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Tanzania	19.20	21.30	22.80	24.50	25.80	26.70	27.10	26.60	27.30	27.80	28.30
Kenya	17.90	18.20	19.10	18.10	18.20	18.70	20.50	18.30	19.60	20.90	21.70
Uganda	12.10	12.50	12.80	13.00	13.60	14.20	13.60	14.10	14.60	15.10	15.50
Rwanda	1.33	1.14	1.14	1.13	1.17	1.35	1.21	1.17	1.29	1.33	1.33

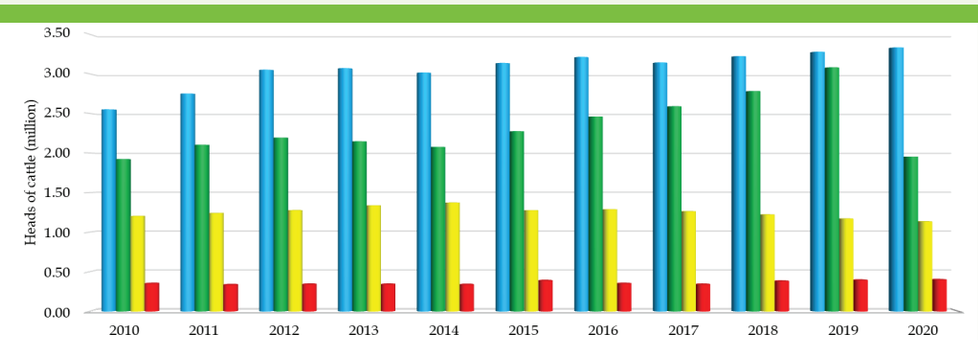
Source: FAO, 2022

Figure 4: Yield/Carcass Weight of beef with the bone, fresh or chilled in EAC



Source: FAO, 2022

Figure 5: Cattle slaughtered in Uganda and other EAC countries (2010-2021)



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Tanzania	2.55	2.75	3.05	3.07	3.01	3.14	3.21	3.14	3.22	3.28	3.33
Kenya	1.92	2.10	2.19	2.15	2.08	2.27	2.46	2.59	2.78	3.08	1.95
Uganda	1.20	1.24	1.28	1.34	1.37	1.27	1.29	1.26	1.22	1.17	1.13
Rwanda	0.35	0.34	0.34	0.34	0.34	0.39	0.35	0.34	0.38	0.39	0.40

Source: *FAO, 2022*

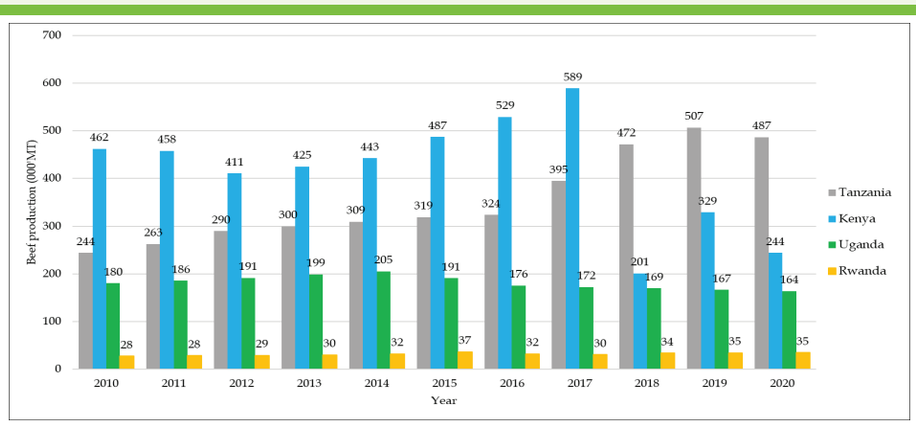
Egypt-Uganda Food Security Company, Pearl and Sanga Meat Companies) double as abattoirs and processors and are targeting both domestic and export markets. In addition, there are a sizeable number of small-scale processors targeting mainly the local markets in urban centres.

3.1.7 Cattle and beef productivity in Uganda

Uganda is third in the East African Community (EAC) in terms of the head of cattle stock, with an increasing number from 2016 to 2020 estimated at 15.5 million head by 2020. The other leading countries, Tanzania and Kenya had 28.3 million and 21.7 million heads by 2020 (Figure 3).

In terms of productivity, Uganda experienced constant productivity between 2010 and 2015 at 150 kg of beef per animal, before the beef industry started seeing declining productivity to 145 kg/animal in 2020 despite an increasing beef and offal output over the same period (Figure 4). The high beef and offal output

Figure 6: Beef production in Uganda and other EAC countries (2010-2020)



Source: *FAO, 2022*

[19] *https://webstore.unbs.go.ug//store.php?src=US%20EAS%201026:%202021&preview*

Table 5: Production of edible offal of cattle, fresh, chilled or frozen in the EAC

Edible offal of cattle, fresh, chilled or frozen (MT)

Year	Tanzania	Kenya	Uganda	Rwanda
2010	36,591	88,704	30,426	5,508
2011	39,391	87,936	31,338	5,662
2012	43,475	78,835	32,279	5,804
2013	44,937	81,600	33,583	5,961
2014	46,403	84,974	34,615	6,442
2015	47,867	93,538	32,195	7,316
2016	48,566	101,566	29,647	6,401
2017	59,191	113,081	29,071	6,090
2018	70,754	38,548	28,602	6,748
2019	76,020	63,204	28,099	6,915
2020	73,010	46,890	27,656	6,955

Source: FAO, 2022

Table 6: Production of raw hides and skins of cattle in the EAC

Raw hides and skins of cattle (000'MT)				
Year	Tanzania	Kenya	Uganda	Rwanda
2008	42.11	74.20	24.08	5.33
2009	43.30	78.25	24.80	5.11
2010	46.91	74.84	25.54	3.98
2011	50.50	74.20	26.31	4.09
2012	55.74	66.52	27.10	4.19
2013	57.61	68.85	28.19	4.31
2014	59.49	71.70	29.06	4.65
2015	61.37	78.92	27.03	5.28
2016	62.26	85.70	24.89	4.62
2017	75.89	95.41	24.41	4.40
2018	90.71	32.53	24.01	4.87
2019	97.46	53.33	23.59	4.99
2020	93.60	39.56	23.22	5.02

Source: FAO 2022

amidst declining productivity point to the fact that more beef animals were slaughtered rather than increased beef output per animal. For example, in 2010, 1.2 million animals were slaughtered yet in 2020 this increased to 1.22 million in 2018 (FAO, 2022) (Figure 5). The low yield has been blamed on the reliance on indigenous breeds raised under pastoral systems with inadequate nutrition and poor animal health management (FAO, 2017; MoFPED, 2021).

IAccording to the Tanzania Ministry of Livestock and Fisheries Development (MLFD) , the potential for growth of the beef cattle inventory in Tanzania has been high because the country has favourable conditions and vast land, which can support the growth of the industry. There are approximately 60 million hectares of pasture suitable for grazing in Tanzania. The driving factors for Tanzania's good performance and revival of its beef industry have been mainly importation of improved breeds, extending farm credit to producers to improve production systems, expanding cattle population and productivity (carcass yield has increased by 42% in the last 10 years - Kibona et al. 2022) . The reforms in the Tanzania beef sector mainly targeted addressing key challenges such as poor growth rate of beef animals and poor meat quality, poor infrastructure, inconsistent supply of quality feed and water for livestock, diseases, lack of implementation of a meat grading system, fluctuations in prices in the meat market, low technical knowhow of producers,inadequate technical support (training and extension services), inadequate/ weak community beef associations, and complicated land tenure systems (Muzzo & Provenza, 2018).

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3.1.8 Beef and other cattle products

Today, Tanzania is the leading beef producer having toppled Kenya in 2018. Tanzania took over the top position in the region in 2020 with 487,000 MT while Kenya and Uganda only produced 244,000 MT and 164,000 MT of beef respectively, indicating a reduction for Kenya and Uganda (Figure 6).

The reductions in cattle stock and productivity in Uganda and much of EAC have also affected the production of other cattle/ beef products such as raw hides and skins and edible offals. Hides and skins are a renewable resource of national and international significance. More particularly, the production and marketing of hides and skins provide opportunities to support and sustain livelihoods, especially in rural areas. Uganda's offal production from slaughtered cattle has dismally reduced from 30,000 MT in 2010 to 28,000 MT in 2020. Tanzania and Rwanda have seen increases in offal production from 37,000 MT to 73,000 MT for the former and from 6,000 MT to 7,000 MT for the latter (Table 5).In addition, Uganda's raw hides and skins started reducing from 29,060 MT in 2014 to 23,220 MT in 2020. Comparatively, in the same period, Kenya's hides and skins reduced from 71,700 MT to 39,560 MT while Tanzania's increased from 59,490 MT to 93,600 MT (Figure 6).The prices of raw hides and skins have gone up. Before 2019, a kilogramme of raw hides & skins was going for US$2.97 in 2017 and US$2.87 in 2018. In 2019 the export price fell to $2.67 per kilo. High return markets in 2019 for Uganda raw hides & skins for each kg were from exports to Nigeria, Kenya, Germany, Turkey, and Vietnam. In 2023, the approximate price range for Uganda Raw Hides & Skins is between US$ 2.67 and US$ 2.87 per kilogramme or between US$ 1.21 and US$ 1.3 per pound(lb). The price in Uganda Shilling is UGX 9524.52 per kg. The average price for a tonne is US$ 2666.87 in Jinja and Kampala [19].

3.1.9 Cattle and beef employment opportunities in Uganda

The beef value chain offers employment opportunities all across the value chain from production to processing and distribution. UBOS (2020) estimated that by 2018, there were 2,479,000 households engaged in cattle keeping. From the value chain findings, about 60% of these cattle keepers hire about 3 workers who are usually casual farm workers, hence employing about 5.45 million people annually as well as occupying another 2.4 million people who are family members employed on the farm. The large-scale producers and ranchers (estimated to be 200 in Uganda) form only 2% of the producers and each employs about 20 workers which brings the number of jobs created there to about 992,000 workers.

At the cattle trading level, it is estimated that there are about 100,000 cattle traders including the small-medium operating between the farm gate and the cattle market as well as the large-scale traders who have trucks and operate between cattle markets and abattoirs. At the retail level, the mainstream market in Uganda is to a great extent serviced by the wide network of roadside and market stall butcheries estimated to employ 5,000-10,000 butchers countrywide[20]. At the processing level, there are mainly about 10 beef processors who employ about 10 people each (100 workers in total). Thus, in total the entire beef value

[20] *ASL2050 (2017) Country brief Uganda. FAO, Uganda*
[21] *https://www.ugandameat.ug/*

chain in Uganda employs an estimated 7 million people.

3.1.10 Current Government institutional arrangements managing the sector

The Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF) is responsible for promoting, supporting, and guiding the development of the industry by formulating and reviewing policies, laws, and regulations for the sector. At the technical level, the beef industry is housed under the Directorate of Animal Resources and its attendant departments (Department of Animal Health, Department of Animal Production and Marketing, and Department of Entomology). The directorate works in collaboration with other Ministries, Departments, and Agencies (MDAs) that relate to specific segments of the beef value chain such as Uganda National Bureau of Standards (UNBS) (for standards); NARO (research); NAGRC &DB (breeding); COCTU (tsetse control); NEMA (environment); tertiary training institutions (human resource capacity building); Local Governments (for delivery of extension and entomological services); Dairy Development Authority (DDA); Directorate of Agricultural Extension (extension advisory services); and Uganda Veterinary Board (UVB) for regulation of veterinary practitioners.

MAAIF collaborates with other Ministries, Departments, and Agencies (MDAs) whose mandates impact the beef industry. Examples include the Uganda National Bureau of Standards (UNBS); the Ministry of Health (for public health and meat hygiene); and Tertiary training institutions. It also collaborates with Local Governments to deliver extension services, disease control, and enforcement of veterinary regulations. The key challenge is that there is no overarching apex body/ institution that focuses primarily on meat development functions, hence the current fragmentation of functions to different institutions.

On the other hand, the beef industry has strong private sector players and arrangements aimed at tapping into the opportunities the sector offers. These include organised stakeholder associations/societies/ cooperatives to enhance service delivery and address specific categories under common objectives. The Uganda Beef Producers Association (UBPA) which was formed in the 1990s targeted mainly commercial producers (ranchers) but with limited impacts to date. The Uganda Meat Producers Cooperative Union Ltd (UMPCU)[21] was formed in 2012 and is the umbrella organization for 34 primary cooperative societies focusing on the commercialisation of beef production in Uganda.

These primary societies are scattered throughout the Central and Western cattle corridor and there is one in Northern Uganda. The UMPCU is involved right from production, marketing, access to inputs, services and inclusion, lobbying and Advocacy (through engaging different livestock stakeholders on policy direction, review, or reform), and institutional development.

The public and private sectors have been collaborating in many ways to ensure the smooth operation of the sector. They include the following:

a) The Parliament of Uganda enacts laws that provide a conducive environment by guiding and regulating the interventions in the sector;

b) Local governments deliver extension services to farmers; veterinary inspection and certification of animal and animal products; and management of marketing operations;

c) UBOS provides national statistical data that is useful to the industry; others like NEMA for all matters related to sustainable management of the operational environment; Ministry of

[22] *https://webstore.unbs.go.ug//store.php?src=US%20EAS%20 1026:%202021 & preview*

Trade and Industry on matters concerning standards and trade in the domestic and export market; NARO for generation of improved technologies to enhance production; Tertiary Training institutions for imparting knowledge and skills to extension service providers; Ministry of Health concerning food hygiene and zoonotic diseases.

d) Inter-sectoral coordination of beef activities across the different MDAs is handled by the Office of the Prime Minister, which spearheads performance monitoring and production of annual and semi-annual reports by all MDAs.

e) The private sector actors for provision of farm inputs; extension services; trade in cattle, beef, and beef products;

f) Farmers and farmers' organizations that are the main practitioners of beef production;

g) Financial institutions that provide financial services such as loans to investors in the sector; and

h) Development partners who provide technical and financial support to projects in the beef industry.

Some collaborations between the private sector and government include Norbrook Pharmaceuticals for quality vet drugs; Chemiphar for export drug residue analytics; Robran Holdings for pasture improvements; and CURAD for technology transfer, among others. Development partners like the EU have supported large interventions like the MOBIP programme focused on entire value chain support from improved feeds to machinery and research. Others include FAO with a focus on research and policy; the World Bank through MAAIF with pasture improvement programmes; International Livestock Research Institute (ILRI) with genetic improvement programmes and breeding support programmes, among others.

3.1.11 Status of research for the beef industry

All industries grow and benefit from adequate research to bring new technologies and surmount problems. Thus, Livestock Agriculture research is one of the priority interventions that will drive sustainable growth of the sector, and this has been reflected consistently in the NDPs and Agriculture Sector Strategic Plans (ASSPs). However, the main challenges to research in the beef industry are: inadequate supporting infrastructure and equipment; low uptake of the generated technologies; limited involvement of the private sector; underfunding; inadequate human resource; and limited research on the socioeconomic issues, processing, and marketing interventions.

Among key actors in Research on beef are: NARO; NAGRC&DB (National Animal Genetic Resource Centre and Databank); Proposed beef and science research centre of excellence at NARO's research institute at Maruzi; Uganda Industrial Research Institute (UIRI) incubation centre for beef (Meat technology pilot plant); Makerere University, College of Veterinary Medicine, Animal Resources and Biosecurity (CoVAB); and CGIAR/ILRI.

3.1.12 Standards in the Beef Industry

MAAIF and UNBS, as well as regional bodies like IGAD, have worked together to deliver a range of standards for the beef industry, Uganda has developed many standards which meet international requirements (ISO, OIE, WTO, Codex Alimentarius). If enforced along the beef value chain, Uganda's beef and products would be acceptable to consumers in the domestic and export markets.

Some of the standards are;

1. US 736:2019; Hygienic requirements for butcheries;
2. US 737:2019; Production of packaged meat products (processed) Hygienic requirements;

[22] *Identification of livestock investment opportunities in Uganda, The Kingdom of Netherlands, 2012*

3. US 932:2012; Bovine (beef) carcasses and cuts – Specification;
4. US 931:2019; Minced meat -- Specification[22];
5. Certification of Origin: A certificate issued by the Chamber of Commerce confirming that the identified animals originate from a specified country;
6. Certification of Quarantine: A certificate provided by Quarantine authorities certifying that the identified animal(s) have satisfied all export requirements;
7. Standards and Procedures at holding grounds;
8. Standards and Procedures at Pre-quarantine;
9. Standards and Procedures at Export/ Principal Quarantine;
10. Standards and guidelines on Laboratory tests for the most important Transboundary Animal Diseases (TADS).

However, implementation has been faced by several constraints including:

(i) Lack of necessary infrastructure;
(ii) Limited availability of competent personnel and the resources to deploy them;
(iii) Low levels of awareness and poor attitude by value chain actors about compliance and application of SPS measures;
(iv) Budgetary constraints;
(v) Inadequate laboratory capacity; and
(vi) Weak enforcement.

The government plans to further strengthen the Beef value chain standards by addressing several issues as highlighted in the Meat Investment Plan (MIP). The planned interventions include creating awareness, sensitization, and training of stakeholders both in the public and private sectors; and carrying out model demonstrations for key infrastructures such as model abattoirs, butcheries and transport vehicles. As part of capacity building, Pioneer Certification Schemes will be introduced, and establishment of Training of Trainers (TOT) to eventually create a pool of Standards Auditors who will be recognized by the International Register of Certificated Auditors (IRCA).

Other proposed interventions include review and/or formulation of standards for the following: Animal Breeding; Animal Feeds; Animal Health; Pasture and Rangeland Management; Water for Production infrastructure; Meat Hygiene and Safety; Research protocols; Agriculture Extension; Human Competence Standards; Meat Grading; Meat Packaging and Labelling Standards.

3.2 PERFORMANCE OF UGANDA'S BEEF INDUSTRY

3.2.1 The Beef Industry in National Development and Policy Frameworks

Along with the NDP II, the Agriculture Sector Strategic Plan (ASSP) for the period 2015/16 to 2019/20 was formulated. The Plan identified meat as one of the priority enterprises to contribute to the country's socio-economic transformation and development in the medium term. The overall objective of the meat sector programme was "to increase incomes of small- and large-scale beef cattle, goat and poultry farmers through the acceleration of meat production and attain a 7% per year growth rate by the end of the five-year period". The targets set under the meat sector programme include: increasing production of beef from 202,929 MT to 360,000 MT which has not been achieved to date; goat meat from 37,838 MT to 39,775 MT; pork from 22,138 MT to 139,185 MT; and poultry from 46313 MT to 63,647 MT in the years 2014 and 2020 respectively. These targets were to be

[23] *ASL2050 (2017) Country brief Uganda, FAO, Uganda*

[24] *https://worldpopulationreview.com/countries/uganda-population*

[25] *MAAIF, Development of the meat (beef) investment plan for the meat industry in Uganda (MIP) (ref. MOBIP/serv/03), Meat (beef) investment plan 2020/21 – 2024/25. Main report*

achieved by increasing on-farm productivity from 30% to 50% through enhancing genetic improvement; improving animal nutrition; increasing access to water for production; and controlling animal diseases and vectors. These interventions were expected to improve growth rate, calving rate, carcass weight, and reduction of cattle mortalities.

It is also worth noting that the goal of the third National Development Plan (NDP III) for the period 2020/21 to 2025/26 is *"Increased household incomes and improved quality of life"* which the new programmes intend to actualise. The beef industry is one of the major strategic interventions identified in the Meat sector. Further, in his communication to the country in the article *"Real Economy Versus Vulnerable Economy"* (April 2020), His Excellency the President emphasized that the firm ground for economics is in answering the fundamental needs which are food, clothes, shelter, defence and human resource development, among others. The beef sector was highlighted as a major target for increasing national food security as well as household and national incomes.

Additionally, promoting value addition and enhancing access to high-value markets were among others, considered to have a trickle-down effect by enhancing returns to investment, thus influencing further investment in beef production. Statistical data to assess performance has not been readily available. However, consultations with stakeholders revealed that significant progress has been made in some areas as follows:

i. Three export-grade abattoirs were constructed namely, Sanga, Pearl, and Uganda Egypt Friendship Company;

ii. At least ten (10) commercial beef feedlots were established, supplying high-quality beef to premium markets in supermarkets, hotels, and restaurants (e.g., at Seven Hills Farm in Kasanda District, Sanga Meat in Kiruhura District, Temupe Farm in Lyantonde District, Butalangu UMPCU Feedlot in Nakaseke District, and Archid Farm (Bazeyo Farm in Nakasongola District);

iii. Construction and rehabilitation of livestock marketing infrastructure in meat-producing areas under various projects including NLPIP and RPLRP;

iv. Strategic and tactical vaccinations against key diseases especially foot and mouth disease (FMD) and other deadly cattle diseases;

v. Research in the production of vaccines against ticks;

vi. A vibrant, private sector-led organization for beef farmers – the Uganda Meat Producers Cooperative Union -- was established to spearhead the production and marketing of meat; and

vii. Significant progress has been made toward reviewing policies and laws governing livestock development.

3.2.2 Current domestic production, demand and supply

Uganda's current per capita beef consumption is 6.5 kg, a drop from the 9% cited in the 2017 FAO report . The central region has the highest beef consumption because of its highly affluent population and high level of urbanization. According to projections, the Uganda human population in 2022 is 47,249,585, a 3% increase from 2021, and is expected to grow from 40 million to 106 million (more than double) by 2050 and 44 percent of the people will live in urban areas[24] . GDP per capita will increase by 175 percent.

Key factors for projecting the beef demand are:

(i) Population growth – at 3.3 percent per annum, one of the fastest in the world;

(ii) Increasing urbanization - (Kampala: 1980: 450,000; 2012 estimate: 1.5 million; 2019: 4 million during the day);

(iii) Increased purchasing power;

[26] *Identification of livestock investment opportunities in Uganda, The Kingdom of Netherlands, 2012*

(iv) Changes in consumption habits – influenced by variety and socio-cultural transformation; and

(v) Export demand.

3.3 POLICIES, LEGAL FRAMEWORKS, STRATEGIES AND PLANS FOR THE BEEF INDUSTRY

3.3.1 The Meat Investment plan of 2020

The Meat Investment Plan (MIP) was developed in line with relevant current policies and regulatory frameworks which impact the various segments of the beef value chain at production, processing, and marketing levels. These included the Public Health Act; Privatisation Policy; National Environment Management Policy; Tax Policies; and policies that govern trade at national, regional, and international levels. The plan was developed within the context of the country's overall development agenda of Uganda Vision 2040 which aims at transforming Uganda from a predominantly peasant and low-income country to a competitive upper middle-income country by 2040. The MIP is also aligned with the third National Development Plan (NDP III) for the period 2020/21 to 2025/26 whose goal is, "Increased household incomes and improved quality of life".

The vision of the MIP is "A vibrant, profitable and sustainable beef industry providing wholesome products for the domestic and export market" and the Mission is, "To promote, support and guide the development of the beef industry, and ensure supply of adequate, wholesome and safe beef and beef products to consumers in the domestic and

Table 7: Global exports of fresh/chilled beef (2012-2021)

	FRESH/CHILLED BEEF EXPORTS					
	Exported value(US$, Billion)			Exported quantity (000'MT)		
Exporters	2021	2012-2017	2017-2021	2021	2012-2017	2017-2021
World	28.84	107.65	123.65	4,284.47	17,826.55	20,524.37
USA	4.70	13.99	18.85	478.02	1,809.44	2,229.38
Australia	2.99	11.07	13.29	278.99	1,460.35	1,485.81
Netherlands	2.79	12.98	12.72	381.01	1,926.99	1,955.55
Ireland	1.93	9.35	9.53	241.72	1,343.91	1,406.90
Canada	2.53	5.22	8.93	333.03	1,039.09	1,477.39
Mexico	1.83	3.74	6.43	191.94	575.12	912.10
Poland	1.39	4.81	6.20	265.53	1,210.58	1,406.04
Germany	1.16	7.54	5.72	209.18	1,388.12	1,105.94
France	1.08	5.52	5.02	182.64	991.74	921.74
Brazil	1.00	3.95	4.23	177.69	653.26	855.20
Argentina	0.78	3.12	3.60	93.14	311.70	429.79
Belgium	0.68	3.58	3.46	115.32	573.59	611.38
Spain	0.80	2.60	3.35	158.45	572.91	726.39
Paraguay	0.79	1.77	2.80	143.51	351.65	562.55
United Kingdom	0.36	2.43	2.15	61.00	441.36	397.91

Source: ITC (2022)

[28] *https://www.oecd-ilibrary.org/sites/cf68bf79-en/index.html?itemId=/content/component/cf68bf79-en*

Table 8: Global exports of frozen beef (2012-2021)

FROZEN BEEF EXPORTS						
	Imported value (US$, Billion)			Imported quantity (000'MT)		
Exporters	2021	2012-2017	2017-2021	2021	2012-2017	2017-2021
World	31.64	107.75	133.34	6,308.75	26,073.53	30,118.17
Brazil	6.97	20.62	28.21	1,382.51	4,842.62	6,542.47
Australia	4.17	19.21	20.68	742.34	4,428.01	4,262.50
USA	4.56	12.39	17.37	630.52	2,136.63	2,720.20
India	2.94	19.80	16.04	1,010.72	6,558.98	5,431.87
New Zealand	2.47	8.56	10.32	476.51	1,865.00	2,174.70
Argentina	1.99	1.80	8.20	472.23	354.04	1,892.20
Uruguay	2.00	5.14	7.24	370.60	1,086.34	1,504.64
Paraguay	0.77	3.50	3.14	174.91	886.87	807.01
Canada	0.63	1.47	2.16	108.30	289.16	405.01
Poland	0.49	1.27	2.03	106.09	326.88	497.48
Ireland	0.59	0.99	1.87	126.75	284.01	474.13
Netherlands	0.40	1.05	1.48	65.15	147.74	260.14

Source: ITC (2022)

export markets". Its overall objective is to support a sustainable and market-oriented beef industry and increase its contribution to food security, agro-industrialization, and incomes at household and national levels[25].

Table 9:Global imports of Fresh/chilled beef (2012-2021)

	Fresh/chilled beef imported value (US$, Billion)			Fresh/chilled beef imported quantity (000'MT)		
Importers	2021	2012-2017	2017-2021	2021	2012-2017	2017-2021
World	27.61	104.75	119.81	4,157.59	17,087.70	19,728.27
United States of America	4.97	11.18	18.02	611.53	957.49	2,250.44
Japan	2.20	7.73	10.32	263.86	1,077.76	1,344.93
Germany	1.93	9.45	9.64	271.32	1,363.53	1,475.96
Italy	1.92	10.88	9.39	292.07	1,771.75	1,577.62
Netherlands	1.63	8.45	7.90	298.56	1,722.79	1,597.76
Chile	1.47	3.98	5.26	270.91	642.50	1,088.41
Korea, Republic of	1.43	2.05	4.86	117.72	237.56	471.75
France	1.19	6.57	5.43	165.87	1,041.78	835.83
United Kingdom	1.17	6.06	5.46	172.60	917.59	906.20
Mexico	0.80	4.09	3.73	140.43	677.37	671.73
Canada	0.66	3.87	2.92	74.83	490.16	381.91
China	0.60	0.21	1.51	53.591	28.626	162.729
Spain	0.58	2.99	2.92	77.03	433.55	436.54
Portugal	0.55	2.11	2.66	94.39	393.88	488.90
Taipei, Chinese	0.54	1.00	2.06	37.288	95.21	159.205

Source: ITC (2022)

Table 10: Global imports of frozen beef (2012-2021)

	FROZEN BEEF IMPORTS					
	Imported value(US$, Billion)			Imported quantity (000'MT)		
Importers	**2021**	**2012-2017**	**2017-2021**	**2021**	**2012-2017**	**2017-2021**
World	30.97	95.72	127.74	5,895.04	20,307.71	27,434.02
China	11.89	7.44	37.24	2,278.97	1,678.67	7,681.73
United States of America	2.64	12.67	11.92	448.11	1,432.45	1,826.01
Republic of Korea	2.13	6.19	9.48	351.24	1,235.87	1,678.57
Hong Kong	1.37	7.28	8.61	253.29	1,523.81	1,729.42
Japan	1.51	6.09	6.86	320.93	1,486.60	1,636.04
Egypt	0.92	5.55	5.85	172.97	988.24	1,726.60
Russian Federation	0.68	9.29	3.98	168.69	2,289.18	1,112.01
Taipei, Chinese	0.63	2.24	3.01	97.00	383.95	487.43
Indonesia	0.74	1.30	2.95	207.16	301.26	831.45
Malaysia	0.53	2.39	2.46	157.01	719.71	751.32
Israel	0.58	2.19	2.30	82.42	379.28	412.41
Philippines	0.52	1.47	2.10	154.92	479.52	651.55
Iran, Islamic Republic of	0.14	2.04	1.87	30.85	439.40	447.48
United Arab Emirates	0.33	0.94	1.77	83.19	277.44	479.75
Viet Nam	0.52	0.47	1.68	85.37	90.48	320.74
United Kingdom	0.36	1.33	1.56	81.82	339.74	412.66
France	0.330364	1.582191	1.557883	69.394	355.992	364.008

Source: ITC (2022)

The key constraints highlighted in the MIP include; Low production and productivity attributed to a high prevalence of notifiable and zoonotic animal diseases; poor access to improved breeds and breeding services; inadequate animal nutrition and feeding and inadequate access to water sources; Poor animal husbandry and non-climate-smart beef production practices by farmers; Poor infrastructure for production, processing, and marketing of cattle, beef, and beef products; Lack of enforcement of laws and regulations, some of which are outdated; Poor enforcement of laws and regulations -some of which are outdated; Poor implementation of Sanitary and Phytosanitary (SPS) standards, thus hampering Uganda's participation in the export market; Very limited access to appropriate sources of funds for capital investment; and Poor coordination of stakeholders.

The plan identifies several investment proposals grouped into five thematic areas namely: Governance of the beef industry; Beef production and productivity; Animal health; Technology generation and dissemination; and Beef processing and marketing that are set to increase the expansion and output of the value chain.

3.3.2 Policies

Just like with all critical sectors in Uganda's economy, the beef industry is guided by overarching macroeconomic and agricultural sector policies, legislation, and mandatory standards of service provision. These include Decentralization, Privatization, Trade

[27] *https://www.frontiersin.org/articles/10.3389/fvets.2021.660736/full*

liberalization, Land Policy (2013), Environment Management Policy, Water policy, National ICT policy, and Tax policy.

The National Agriculture Policy (2013) provides the strategic direction whose mission is to "transform subsistence farming to commercial agriculture" at the sector level. In addition, the National Agriculture Extension Policy and Strategy (2016) give a new approach aimed at transforming the extension services from a system of parallel institutionally fragmented public and non-state actors to a well-coordinated, harmonized, regulated, and pluralistic service with multiple providers addressing diverse needs.

The policies that directly impact the beef industry include the Animal Breeding Policy (1997); the Animal Feeds Policy (2005); the National Meat Policy (2003); the Policy on Delivery of Veterinary Services (2002); and the National Veterinary Drug Policy (2001). Policies under development include the Livestock Development Policy; the Rangeland Policy: and the Sanitary and Phytosanitary (SPS) Policy. Although the government developed a Beef Master plan way back in 1989, the latest meat value chain planning and investment document is the Meat Investment Plan (MIP) developed by MAAIF in 2020 with support from the MOBIP project.

Some interventions to further improve the policy environment were proposed under the MIP and these included the following: A review of the Policy on Delivery of Veterinary Services; the National Meat Policy; Animal Breeding Policy; Animal Feeds Policy; the National Veterinary Drug Policy; and the National Agriculture Research Policy. Proposed policies to be formulated include: the Rangeland Policy; the Ticks and Tick-Borne Diseases Control Policy; the Tsetse Control and Eradication Policy; Disease Free Zoning (DFZ) Policy; Compensation Policy for Epidemic Diseases Control and Eradication; Sanitary and Phytosanitary (SPS) Policy; and Animal Identification and Traceability Policy. Additionally, the MAAIF will work with the relevant institutions to ensure that other policies that impact the beef industry are reviewed. These include the National Water Policy, Land Policy, and Human Resource Development Policy. Expected outputs will include extensive reviews of at least 13 policies to cover all gaps that are impeding the sector.

3.3.3 Legal frameworks

The laws that govern and regulate the beef value chain include the Animal Diseases Act (1964), the Veterinary Surgeons Act (1958); Animal Breeding Act (2001); the Cattle Traders Act (1943); the Animal (Straying) Act (1922); the Animals (Prevention of Cruelty) Act (1957), the PublicHealth (Meat Rules) Act (1935), and the Cattle Grazing Act (1942). The major observation is that most of them are outdated and need to be reviewed. In addition, the level of enforcement of these laws is inadequate, thus reducing compliance by stakeholders and negatively affecting the quality and safety of products as well as their competitiveness, especially in the export market.

As part of the planned interventions to improve the value chain legal framework, proposed (new) legislations for consideration include the Rangeland Code, the SPS Bill, the Animal Feeds Bill, the Meat Development Bill, the Veterinary Practitioners Bill, and the Animal Identification and Traceability Bill. The laws earmarked for review include Animal Diseases Act (to include vector control, Disease Free Zoning, and Compensation), the Animal Breeding Act; the Cattle Traders Act; and the Public Health Act (meat rules).

3.3.4 Challenges Facing the Beef Sector

When assessing the challenges facing the beef sector, it is imperative to have a holistic analysis that categorizes these challenges as weaknesses and threats to the industry but also looks at the opportunities and challenges that the sector holds. These will, however, be analysed in greater detailin the next chapter using the SWOT and PESTLE analysis and in the results section of this report. However, some critical challenges as documented by

several studies, including the livestock market study[26] , are highlighted as follows: .

- Insufficient infrastructure for production, processing, and marketing of cattle, beef, and beef products;
- Lack of enforcement of laws and regulations, some of which are outdated;
- Low productivity attributed to the high prevalence of notifiable and zoonotic animal diseases, poor access to improved breeds and breeding services;
- Inadequate animal nutrition and feeding and inadequate access to water sources;
- Poor implementation of Sanitary and Phytosanitary (SPS) standards, thus hampering Uganda's participation in the export market;
- Insufficient enforcement of laws and regulations - some of which are outdated;
- Very limited access to appropriate sources of funds for capital investment; and Poor coordination of stakeholders.

3.4 THE GLOBAL AND CONTINENTAL BEEF MARKET

Beef production globally will grow to 75 million MT by 2030, just 5.8% higher than in 2021 and estimated at 72.2 million MT in 2022 , with the Sub-Saharan Africa region projected to have the strongest growth rate at 15%, due to high population growth, compared to North America, the largest producing region, where production is projected to grow 6% by 2030 (OECD, 2022). The OECD report indicated that beef producers have less ability to increase slaughter in the short term but have more flexibility to increase carcass weights, meaning that in the early years of 2030, beef production will be due to higher efficiency rather than more slaughtered animals in the face of recent severe droughts [28].

3.4.1 Fresh and frozen beef exports

The value of the meat trade is dominated by beef and veal, but increasingly dominated by poultry in quantity. By 2021, the global beef and veal exports for fresh and frozen beef stood at about US$61 billion with frozen beef having a share of US$32 billion. The leading exporters of fresh/chilled beef are the USA which commands a 16% market share followed by Australia at 10% and the Netherlands at 10% (Table 7). The Global Frozen Meat Market size was valued at US$ 32 billion in 2021, and it is predicted that it will reach US$ 33.9 billion by 2028 with an annual development rate of 4.9% between 2023 and 2028. Brazil at US$7 billion in frozen beef exports is leading this market segment followed by the USA at US$ 5 billion and Australia at US$4.2 billion (Table 8). Beef demand is driven by changing food preferences of consumers around the world. Consumers are increasing their protein intake, resulting in a rising demand for meat. 8. Brazil at US$7 billion in frozen beef exports is leading this market segment followed by USA at US$ 5 billion and Australia at US$4.2 billion (Table 8). Beef demand is driven by changing food preferences of consumers around the world. Consumers are increasing their protein intake, resulting in the rising demand for meat.

3.4.2 Global and continental Fresh and frozen beef trade

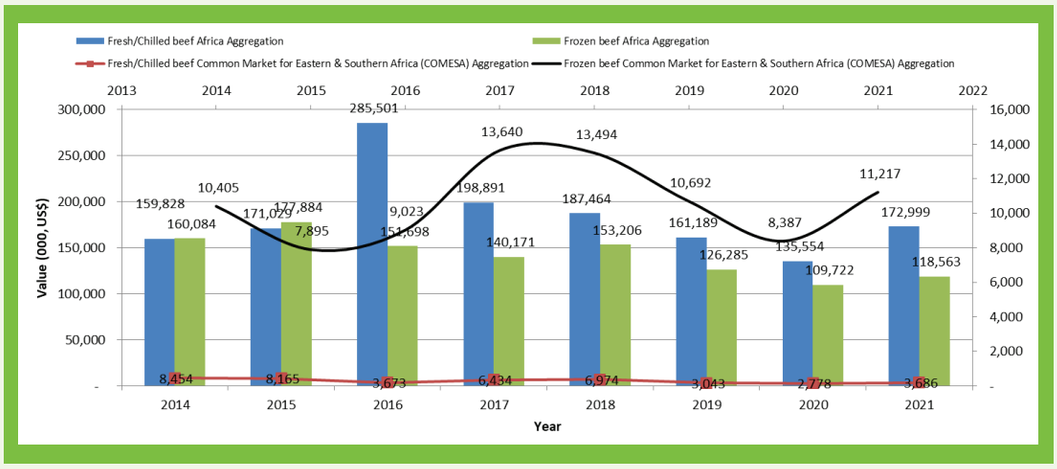
The global value of fresh/chilled beef imports by 2021 was about US$28 billion. The leading importers of fresh/chilled beef are the USA (US$ 5billion), Japan (US$ 2.2billion), Germany (US$ 1.9 billion) and Italy (US$ 1.9 billion) (Table 9). The frozen beef import market was valued at US$ 31 billion led by China (US$ 11.9 billion), USA (US$ 2.6 billion), South Korea (US$ 2.1 billion), Japan (US$ 1.5billion) and Hong Kong (US$ 1.4 billion) (Table 10).

In Africa, import demand is expected to increase the fastest in terms of volume, 1.4 MT, about 48% from 2021 although in Asia, by 2030 the greatest increases in imports will occur in the Philippines and Viet Nam (OECD, 2022). The leading exporters of frozen beef in Africa are South Africa, Namibia, Botswana, Kenya, Eswatini, and Egypt (Table 11). On the

other hand, South Africa, Sudan, Namibia, Tanzania, Botswana, and Eswatini are leading importers. The implication is that Uganda has not taken advantage of regional markets such as COMESA to increase its beef exports.

Africa's fresh/chilled beef exports reduced between 2017 and 2020 from about US$ 199 million in 2017 to US$136 million in 2020 but rose to US$173 million in 2021. Similarly, frozen beef exports reduced from US$ 153 million in 2018 to US$119 million in 2021. In the COMESA trading bloc, by 2021, the fresh/chilled beef exports were at US$ 3.7 million while the frozen beef exports were at US$ 11.2 million (Figure 7). The slag between 2019 and 2020 can be explained by the coronavirus disease (COVID-19) that dramatically decreased trade in goods, trade in services, and foreign direct investment in the world, especially in the second quarter of 2020. In early April 2020, meat packing facilities started to shut down due to the rapid spread of the COVID-19 virus among workers. Furthermore, meat producers and processors faced difficulty in harvesting and shipment of the products due to lockdown situations, a decrease in labour force, restrictions in the movement of animals within and across the country and change in the legislation of local and international export market.[29]

Figure 7: Africa and COMESA's fresh and frozen beef exports (2014-2021)



Source: ITC (2022)

Table 11: COMESA exports of fresh/chilled and frozen beef (2017-2021)

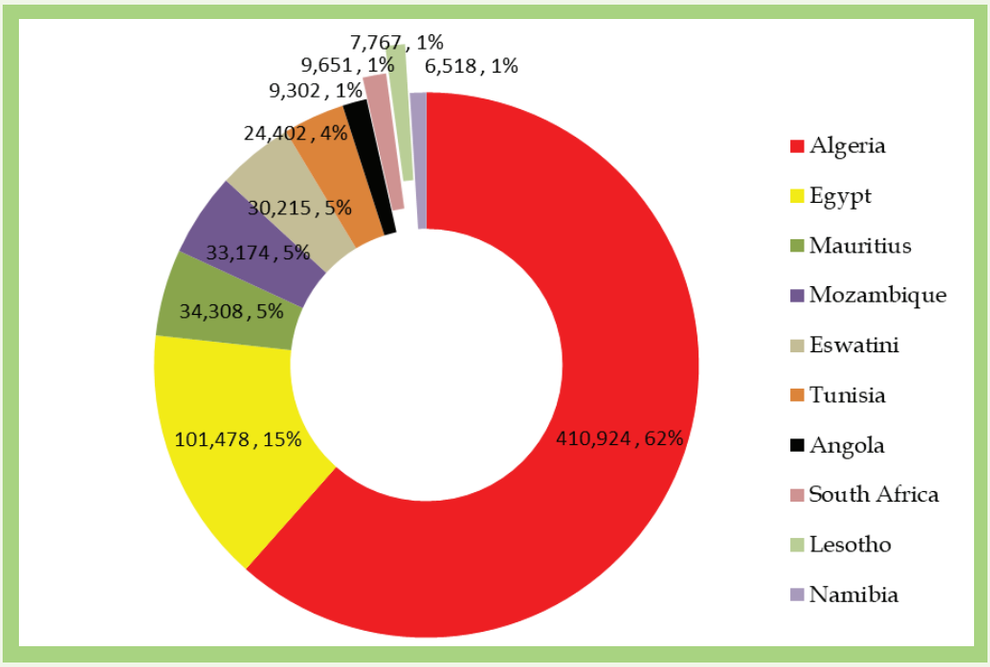
Exports (2017-2021) (US$, millions)				
	Fresh/chilled beef		Frozen beef	
	2021	2017-2021	2021	2017-2021
Common Market for Eastern & Southern Africa (COMESA) Aggregation	3.686	22.915	11.217	57.43
COMESA share of world market,%	0.01%	0.02%	0.04%	0.04%
Eswatini	1.514	6.44	2.26	6.24
Ethiopia	1.075	7.295	0.093	13.932
Zambia	0.486	0.905	0.92	1.722
Egypt	0.404	7.49	1.503	2.966
Kenya	0.198	0.411	5.768	28.625
Rwanda	0.006	0.14	0.117	1.371
Djibouti	0.002	0.048	0	0.002
Uganda	0.001	0.11	0.339	2.11
Burundi	0.00	0.076	0.00	0.00

Source: ITC (2022)

Algeria leads fresh and frozen beef imports in Africa with a 62% market share valued at about US$ 410 million for five years between 2017 and 2021. This is followed by Egypt that imported US$101 million worth of fresh/ chilled beef over those five years and then Mauritius that imported US$34 million and Mozambique at US$ 33 million and Eswatini at US$ 30 million worth of fresh/ chilled beef (Figure 8).

In five years between 2017 and 2021, Egypt imported US$ 5.8 billion worth of frozen beef, representing 79% of all Africa imports followed by Libya, Angola and Morocco whose combined import bill was about US$ 606 million in frozen beef (Table 12).

Figure 8: Africa's leading importers of fresh and chilled beef (2017-2021)



Source: ITC (2022)

Table 12: Africa's top importers of frozen beef (2017-2021)

Importer	Frozen beef imports (US$, 000), 2017-2021	Percentage share of all Africa imports
Africa aggregate	7,429,814	100%
Egypt	5,845,708	79%
Angola	301,319	4%
Algeria	299,569	4%
Libya	185,751	3%
Morocco	129,295	2%
South Africa	123,016	2%
Gabon	114,825	2%
Mauritius	69,723	1%
Congo	68,172	1%
Ghana	45,507	1%
Senegal	38,559	1%
Seychelles	28,200	1%
Somalia	22,198	1%
Mozambique	19,756	1%
DRC	16,219	1%
Lesotho	14,658	1%
Liberia	10,402	1%

3.5 OVERVIEW OF UGANDA'S BEEF SECTOR IN THE EXPORT AND IMPORT MARKET

3.5.1 Live Cattle Exports and Imports

Uganda has increasingly exported more live cattle between 2009 and 2020. By 2011, the country exported US$1.4 million worth of live cattle which increased to US$1.6 in 2017 and peaked at US$7 million in 2020. Uganda imported more livestock in 2014 (US$0.33 million) and 2018 (US$0.44 million), making the country a net exporter of live cattle (Table 13).

Table 13: Uganda's value of live cattle exports and imports (2009-2020)

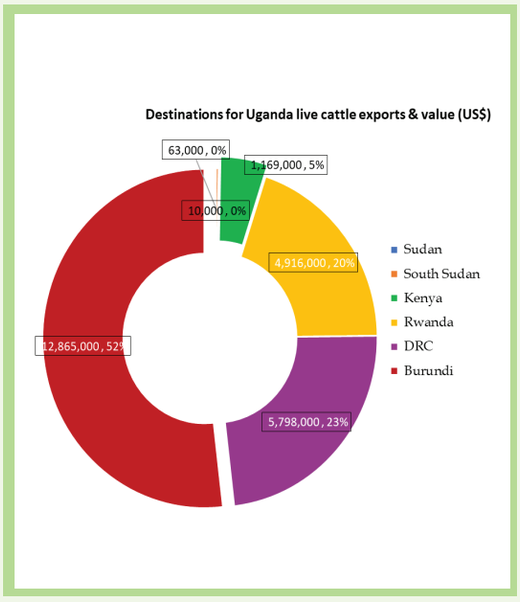
Value of live cattle exports and imports (US$)		
Year	**Exports**	**Imports**
2009	3,834,000	59,000
2010	3,938,000	161,000
2011	1,374,000	302,000
2012	446,000	313,000
2013	1,314,000	163,000
2014	1,504,000	334,000
2015	1,306,000	123,000
2016	688,000	96,000
2017	1,573,000	121,000
2018	1,489,000	442,000
2019	345,000	182,000
2020	7,035,000	241,000

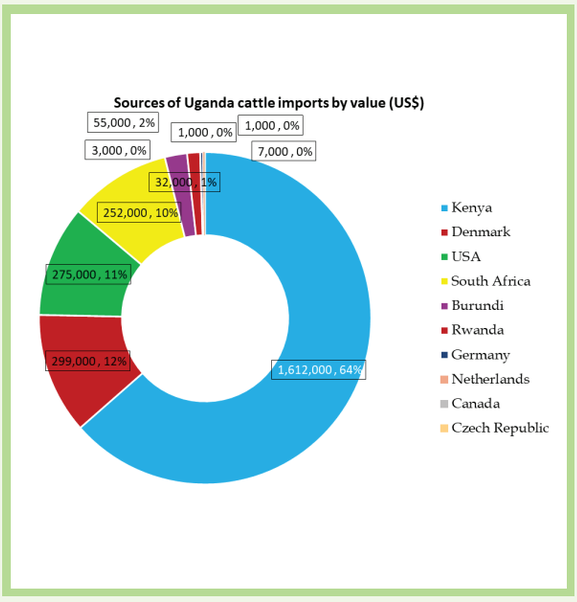
Source: *ITC (2022)*

3.5.2 Beef exports and imports

In the last 11 years, Uganda exported much of live cattle to Burundi that had a 52% export market share equivalent to US$12.9 million, most of which took place between 2009 and 2014 and later in the year 2020. The two other destinations are Democratic Republic of Congo (DRC) with a 23% share followed by Rwanda with 20% share. On the import side, Uganda has been importing much of the live cattle from Kenya (64%), whose live cattle export market is dominated by Seychelles, Tanzania, Mauritius, Uganda and Burundi who buy live cattle (excluding pure-bred for breeding) and pure-bred cattle for breeding[30]. The other countries selling live cattle to Uganda are Rwanda (US$0.3million, 12%), USA (US$0.28, 11%) and South Africa (US$ 0.25, 10%) (Figure 9).

Fig.9: Performance of Uganda beef industry in the global live cattle (bovine) markets (2009-2020)





[30] *https://www.selinawamucii.com/insights/prices/kenya/live-cattle/*

Table 14: Uganda and EAC neighbour beef exports (2018-2021)

Exports of beef (Carcasses/half-carcasses in fresh or chilled forms)								
	Uganda		Kenya		Tanzania		Rwanda	
Year	Quantity (MT)	Trade Value (US$ million)	Quantity (MT)	Trade Value (US$ million)	Quantity (MT)	Trade Value (US$ million)	Quantity (MT)	Trade Value (US$ million)
2017	425.88	1.53	7,228.72	24.74	4,601.78	13.28	N/A	N/A
2018	1,104.99	3.26	6,174.82	25.03	1,280.25	2.06	556.80	2.79
2019	180.07	0.58	4,781.80	23.74	116.09	0.14	439.45	2.21
2020	541.54	2.15	4,303.80	18.78	391.30	0.59	111.56	0.57
2021	660.68	2.62	4,808.15	23.86	3,156.30	12.85	117.25	0.49
Total	2,913.16	10.16	27,297.29	116.15	9,545.73	28.92	1,225.06	6.06

Source: ITC & UNCOTRADE (2022)

Table 15: Uganda and EAC neighbour beef imports (2018-2021)

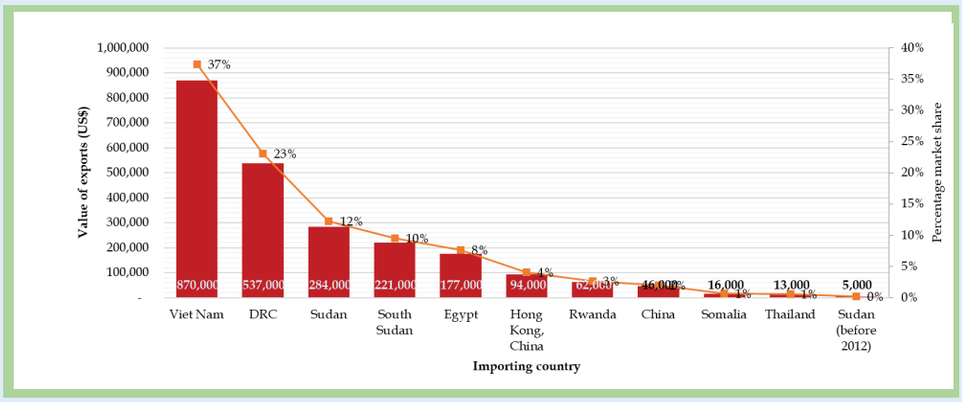
Imports of beef (Carcasses/half-carcasses in frozen, boneless or bone in forms)								
Year	Uganda		Kenya		Tanzania		Rwanda	
	Quantity (MT)	Trade Value (US$ million)	Quantity (MT)	Trade Value (US$ million)	Quantity (MT)	Trade Value (US$ million)	Quantity (MT)	Trade Value (US$ million)
2017	57.74	0.28	81.22	0.54	2282.78	8.68	113.88	0.78
2018	48.18	0.07	98.30	0.42	1699.62	6.78	83.25	0.67
2019	9.59	0.04	134.53	0.64	875.02	5.64	50.71	0.32
2020	5.06	0.01	121.46	0.72	594.40	1.99	104.32	0.49
2021	5.57	0.01	261.77	1.35	422.71	2.38	31.14	0.25
Total	126.14	0.41	697.28	3.66	5874.53	25.46	383.30	2.51

Source: ITC & UNCOTRADE (2022)

3.5.3 Current Markets for Uganda's Beef

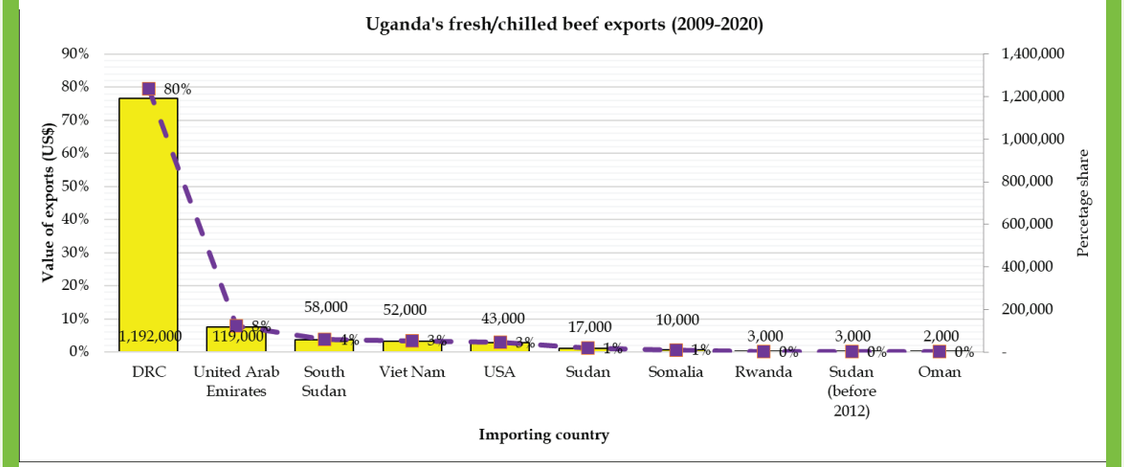
Uganda in the last 11 years has exported 37% of its frozen beef to Vietnam, 23% to DRC, 12% to Sudan and 10% to South Sudan and 8% to Egypt (Figure 8). DRC also dominates the market for fresh/chilled beef with 80% of the market share followed by United Arab Emirates at 8% and South Sudan at 4% (Figure 10).

Figure 10: Uganda's frozen beef export destination (2009-2020)



Source: ITC & UNCOTRADE (2022)

Figure 11: Uganda's fresh/chilled beef exports destinations (2009-2020)



Source: *ITC & UNCOTRADE (2022)*

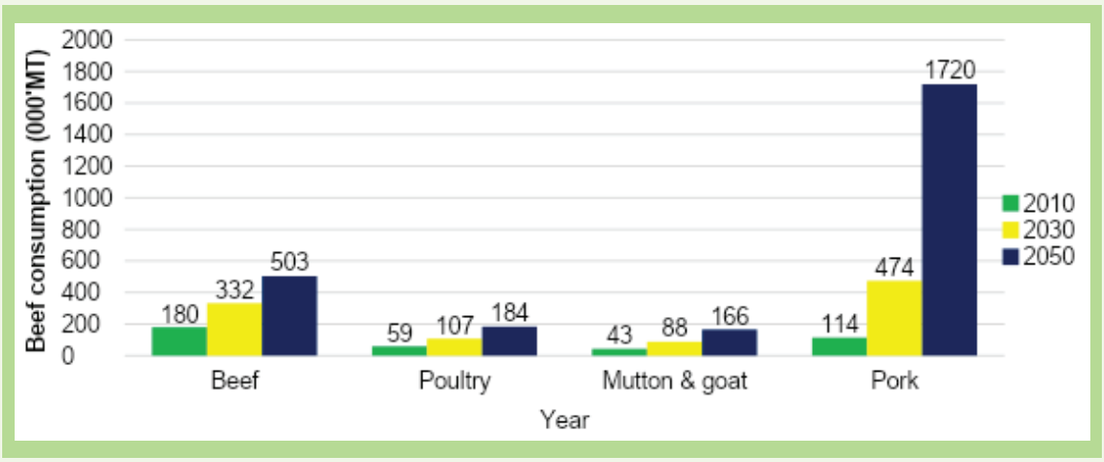
3.6 BEEF AND MEAT CONSUMPTION IN UGANDA

FAO (2017) predicted that the growing and increasingly affluent and urbanized Ugandan population will consume more high-value food products, including livestock products such as beef and its products and offals at an estimated 180% increase between 2010 and 2050. Uganda's beef consumption stood at 180,000MT in 2010 (Figure 10), translating to about 5.6 kg per capita, estimated to increase to 6 kg per capita in 2030 and 2050 (Figure 12). This level of consumption is low given that dietary guidelines recommend a maximum of 600g of cooked lean red meat per week, to meet iron and zinc recommendations[31] . It is only pork that is projected to surpass beef by 2030 and 2050 as the most consumed meat type by Ugandans, whose per capita consumption will be about four times that of beef (Figure 13). The low consumption rate for beef among Ugandans is attributed to the deficit in meat production, poor beef quality and a lengthy period of raising and feeding animals to reach the market and slaughter age, low adoption of intensive animal husbandry practices and supplementary feeding technologies by producers to guarantee proper feeding, nutrition, and faster growth (Makerere University, 2021)[32] .

Although Uganda's beef consumption is about 6.5 kg per capita, data shows that the per capita beef supply is lower at 4 kg, which points to a deficit in supply, compared to Kenya and Tanzania which have twice as much as Uganda's beef supply per capita. However, Uganda leads other EAC countries in the per capita supply of pork (Table 16).

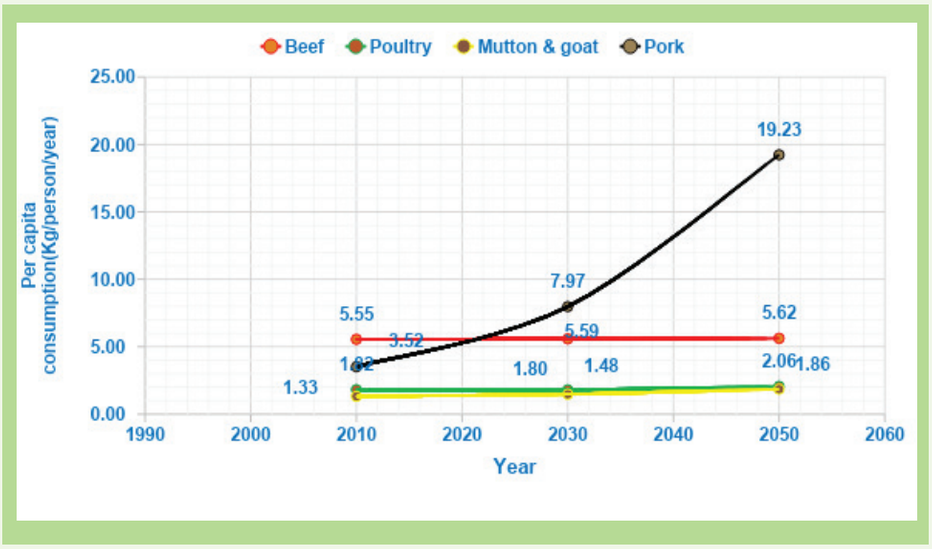
[31] https://www.healthyfood.com/advice/how-much-meat-is-healthy-to-eat/
[32] http://caes.mak.ac.ug/news/ugandans-consume-less-meat-than-recommended-livestock-experts/

Figure 12: Uganda's beef and other meats consumption projections (2010-2050)



Source: FAO (2017). *Uganda Country brief. Africa Sustainable livestock, 2050.*

Figure 13: Uganda's beef and other meats per capita consumption (2010-2050)



Source: Consultant calculations based on FAO (2017). Uganda Country brief. Africa Sustainable livestock, 2050.

Beef protein supply per capita per year for Uganda in the 2010-2019 period shows a steady decrease since 2016 from 723 g/capita/year to 551g/capita/year in 2019. UBOS (2020) attributes this to the decrease in livestock production and the increase in exports of beef commodities. Comparatively, Kenya experienced a similar declining trend from 1,548 g/capita/year in 2016 to 1,281 g/capita/year in 2019, while Tanzania was on an upward trend from 978 g/capita/year in 2016 to 1,084 g/capita/year in 2019 (Table 9). In addition, Uganda's protein supply from other meats such as mutton and goat, and pork has also been following a downward trend. However, by 2019, Uganda was almost at the same level as Kenya and led Tanzania in pork protein supply but not in mutton and goat protein supply (Table 17).

Table 16: Uganda and EAC neighbour beef and other meats supply and consumption (2010-2019)

Meat supply quantity (kg/capita/yr)															
	Beef					Mutton & goat					Pork(pig meat)				
Year	Uganda	Kenya	Tanzania	Rwanda	Burundi	Uganda	Kenya	Tanzania	Rwanda	Burundi	Uganda	Kenya	Tanzania	Rwanda	Burundi
2010	5.56	10.98	5.49	2.67		1.27	2.07	1.08	2.00		3.36	0.29	0.35	0.67	
2011	5.26	10.60	5.75	2.44		1.23	2.22	1.18	1.95		3.15	0.25	0.33	0.70	
2012	5.09	9.26	5.86	2.62		1.22	2.16	1.22	1.92		3.16	0.25	0.29	0.75	
2013	5.16	9.31	6.10	2.69		1.24	1.96	1.21	1.97		3.19	0.28	0.30	0.76	
2014	5.47	10.00	6.36	2.88	1.16	1.27	2.16	1.32	2.12	0.49	3.24	0.28	0.33	0.81	0.53
2015	5.58	10.28	6.60	3.09	1.11	1.30	2.03	1.36	2.28	0.47	3.30	0.31	0.34	0.86	0.51
2016	4.94	10.58	6.74	3.21	1.09	1.26	1.89	1.22	2.33	0.46	3.26	0.29	0.30	0.89	0.50
2017	4.19	10.81	7.09	2.69	1.05	1.15	0.93	1.16	2.31	0.45	3.29	0.28	0.28	0.92	0.49
2018	3.96	10.22	7.27	2.69	0.95	1.11	1.09	1.19	2.08	0.40	3.13	0.29	0.27	0.97	0.45
2019	3.77	8.77	7.46	2.69	0.94	1.07	1.85	1.21	2.02	0.39	2.98	0.38	0.26	1.06	0.58

*Source: FAOSTAT (2022) . Note: *for pork, we also added the fat supply.*

Table 17: Uganda and EAC neighbour protein supply from beef and other meats (2010-2019)

Protein supply quantity by meat type (g/capita/year)															
	Beef					Mutton & goat					Pork (pig meat) *				
Year	Uganda	Kenya	Tanzania	Rwanda	Burundi	Uganda	Kenya	Tanzania	Rwanda	Burundi	Uganda	Kenya	Tanzania	Rwanda	Burundi
2010	810	1,602	799	391	-	190	299	157	281	-	457	413	229	222	-
2011	767	1,548	836	358	-	183	321	172	274	-	433	400	238	217	-
2012	745	1,351	850	383	--	183	314	179	270	--	426	364	241	221	--
2013	756	1,361	887	394	-	186	288	179	277	-	431	370	249	226	-
2014	799	1,460	927	420	168	190	314	193	296	69	444	394	263	240	84
2015	814	1,500	960	453	164	197	299	201	321	66	447	399	271	258	81
2016	723	1,548	978	471	161	190	281	179	325	66	426	401	264	260	83
2017	613	1,577	1033	383	153	172	135	168	321	62	407	409	259	246	81
2018	577	1,493	1055	394	139	168	157	175	292	58	389	392	270	248	74
2019	551	1,281	1084	394	139	161	263	175	285	55	372	375	274	252	81

*Source: FAOSTAT (2022)[33] . Note: *for pork, we also added the fat supply*

[33] *https://www.fao.org/faostat/en/#data/FBS*

3.7 THE COMPETITIVENESS OF THE BEEF INDUSTRY IN UGANDA

3.7.1 Beef industry competition, attractiveness and profitability assessment

Uganda's beef industry competitiveness can be analysed using Porter's Five Forces for measuring the industry competition intensity, attractiveness, and profitability with reference to other types of meat in the market. The five forces are competition in the industry, the potential of new entrants into the industry, the power of suppliers, the power of consumers, and the threat of substitute products.

The beef industry naturally faces competition with other types of meat including goat, sheep, pig, poultry, and rabbits. However, it was noted that beef constitutes the biggest percentage of meat produced compared to others and is projected to grow to 1.9 million MT by 2030, as indicated in table 18.

Table 18: Uganda's beef production (2015, 2020)

Type of meat (MT)				
Year	Beef	Goat/ Sheep	Pork	Poultry
2015	202,929	37,838	22,138	46,313
2020	360,000	39,775	139,195	63,647
2025 (projected)	823,593	90,996	318,444	145,609
2030 (projected)	1,884,181	208,176	728,524	333,118

Source: FAO (2019); IGAD, 2018. At a cattle offtake rate of 18% as estimated by IGAD, beef growth rates we estimated

Compared to its peers, Uganda is not as competitive as Tanzania or Kenya in the same region. For instance, in 2017 Tanzania attracted US$321 million in Foreign Direct investments to the agriculture sector and 22,895 jobs created, while Uganda attracted only US$137 million and 45,728 jobs created. The EAC report noted that for Tanzania, the performance of the livestock products sub-sector is very poor with negligible volume of meat exports, widespread consumption of unprocessed milk, and large presence of imported dairy products in the market. For Uganda, the report noted that competitiveness is low because the food processing industry is challenged by inadequate infrastructure for value addition including marketing, storage, and distribution [34].

Competitive advantage in any value chain may not be absolute but it nevertheless helps to guide the investment options a country may have. Regionally, Uganda enjoys the following:

1) The abundant feed resources enhanced by two rainy seasons (pastures and cereals) can enhance sustainable beef production at competitive costs.
2) Uganda's central and landlocked location in the region means it can easily export to many neighbouring countries that have a net deficit in beef such as South Sudan, Kenya, DRC, Tanzania, and Rwanda.
3) Uganda's national herd (over 12 million cattle) is a strong base for genetic improvement and increased productivity; and
4) The country's abundant alternative meat sources such as fish, pork, poultry, and small ruminants would free a significant amount of beef for the export market.

Beef constitutes the biggest percentage of the meat consumed in Uganda. The national per capita meat consumption (2015) was noted to be 12 kg of which beef constituted 6.5 kg (over 50%). With a projected population growth rate of 3.3% per annum, Ugandans' population is projected to increase to 59 million people by 2030 and 89 million people by 2050. Similarly, the projected demand for the beef domestic market is 475,503 MT by the year 2030, and 1,075,000 MT in the year 2050. This

[34] *(EAST AFRICAN COMMUNITY INDUSTRIALISATION STRATEGY 2012 - 2032).http://repository.eac.int/bitstream/handle/11671/542/Final_EAC_Industrial_Strategy_edited%20final-%20FINAL-17-04-2-12.pdf?sequence=1&isAllowed=y*

demonstrates that even if meat production from other animals increases, it will not significantly affect the demand for beef.

Another key aspect of Porter's analysis is potential entrants to the markets. If the importation of beef is not properly restricted under the guise of liberalization and free trade advocated by the Regional Trade protocols and WTO, the local beef industry will be negatively affected. Beef from reknown world beef exporters such as Brazil, India, and South Africa can easily flood the beef market in the country at much lower prices, thus adversely affecting the profitability of the local beef industry. This, therefore, calls for strengthening the taxation policy concerning the importation of beef.

Concerning the power of suppliers, the profitability of the beef industry is significantly dependent on suppliers of inputs and utilities along the beef value chain. Most of the inputs, especially drugs and acaricides, machinery, and equipment required to enhance commercial production and processing, are imported and their prices are high based on importation expenses. Similarly, the cost of electricity and water affects the profit margins significantly since these are supplied by monopolists.

The power of customers has a significant impact on the profitability of the beef industry. The domestic consumption of beef is curtailed by the low purchasing power (low effective demand) due to low income per capita especially in rural areas. As the beef industry strives to increase the quantity, quality, and safety of the products, they may not make significant profits if the consumers are unable to buy them at reasonable prices. Fortunately, the government is implementing various strategic programmes in various sectors of the economy (e.g., Tourism, Petroleum, Industrialization, PDM, and ICT) to enhance the social economic transformation of the population.

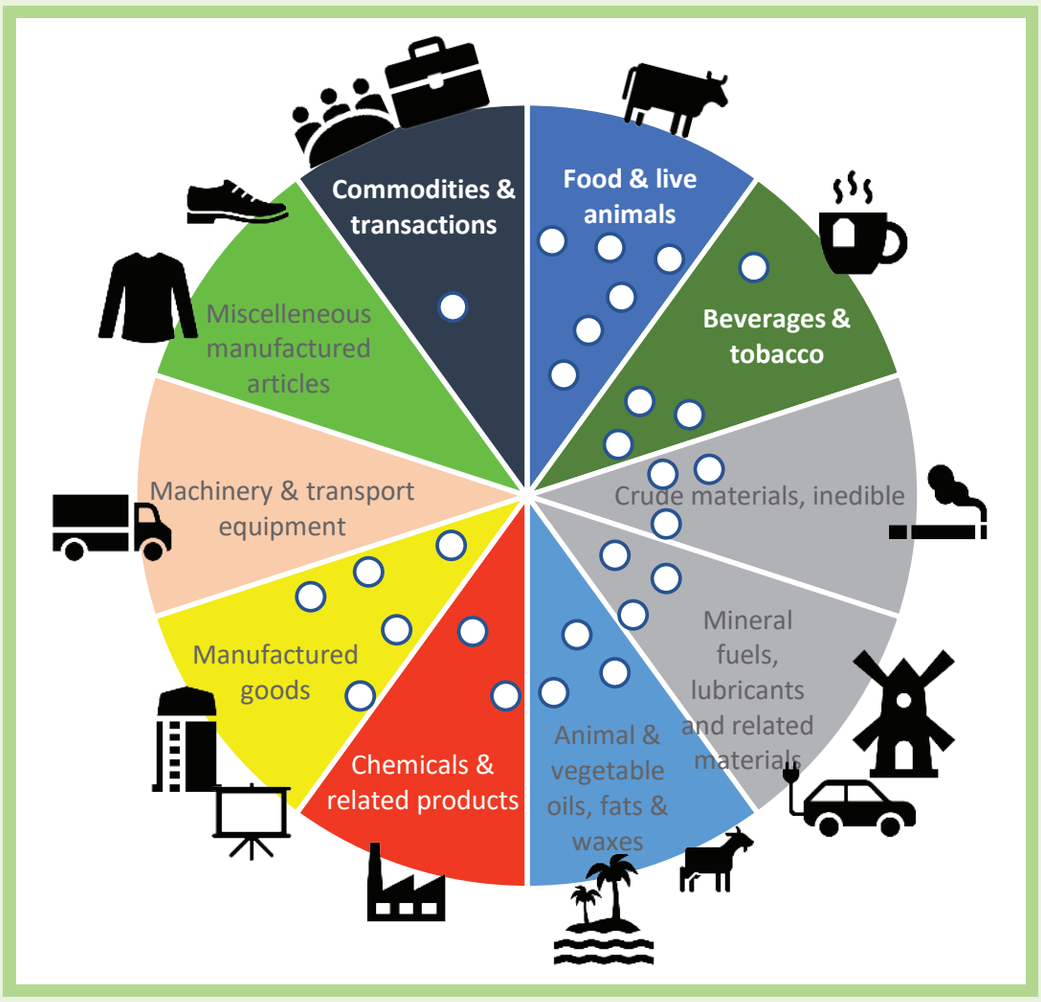
The substitutes for beef include other sources of animal protein (other types of meat) as well as other crop-based foods rich in protein. As stated earlier, the quantities of meat from other sources are very small and cannot substitute beef. Moreover, the price of goat and chicken meat is higher than that of beef, especially in urban areas. On the other hand, a sizable percentage of Uganda's population especially the Moslem (12%) and Seventh-day Adventists (2%) community (according to the 2016 National population census) are known not to eat pork.

3.8 REVEALED COMPARATIVE ADVANTAGE INDEX

The highest Revealed comparative advantage indices among Uganda's peers in the COMESA region were in Sudan, Uganda, Somalia, Eritrea, and Egypt . Uganda is a competitive producer and exporter of food and live animals with a diversified product profile since RCAs for beverages, on-fuel crude materials, manufacturing, and animal and vegetable oils are all above but below 17 out of 120 indices (Figure 14). This is mainly because Uganda has one of the best arable lands in Africa, suitable for production with minimum inputs unmatched by other countries.

[35] *UNCTADSTAT (2019). https://unctadstat.unctad.org/en/RcaRadar.html*

Figure 14: Uganda's Revealed Comparative Advantage (RCA) for various sectors



Source: UNCTADSTAT, 2021

The revealed comparative advantage for live animals, and meat shows that Kenya and Egypt have higher RCAs than Uganda and Tanzania in live animals and meat because of their location at the coast with all access to oceanic and sea resources[36]. Eritrea, Somalia, and Tunisia lead in terms of revealed comparative advantage for hides and skins. The Middle East has a big meat and hides and skins market, and the proximity to this market is a big competitive advantage for these countries. This is in addition to these countries having some of the largest animal ownership rates in Africa.

Eritrea, Ethiopia and Uganda and to a smaller extent Burundi and Kenya lead in terms of revealed comparative advantage for leather and wool among all COMESA member states mainly because these countries have some of the biggest cattle and small ruminant herds and the best hides and skins in Africa[37].

[36] *https://unctadstat.unctad.org/en/RcaRadar.html*
[37] *https://unctadstat.unctad.org/en/RcaRadar.html*

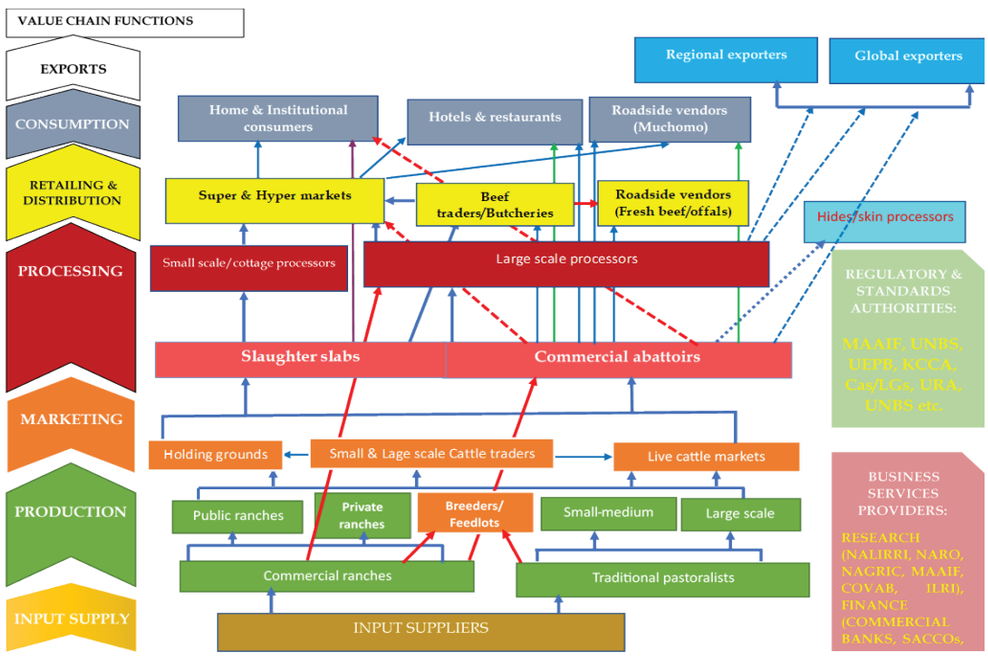
CHAPTER 4

STRUCTURE OF THE BEEF VALUE CHAIN IN UGANDA

4.1 UGANDA'S BEEF VALUE CHAIN ACTORS AND MAP

The beef value chain in Uganda has a number of actors from pre-production (input supply), production (small, medium and large-scale cattle keepers), marketing (live cattle and beef traders) as well as processors and consumers as presented in Figure 15. The value chain also has auxiliary actors such as regulators and business development service providers. In the subsections below, the characterization of the value chain actors is presented in detail.

Figure 15: Uganda's beef value chain map



Source: *Illustration based on producer, market surveys and key informant interviews, 2022*

4.1.1 Beef Value Chain Organization

Several various actors operate at every node of the value chain and span different interventions and inter-linkages that ensure profitable trade among all the actors. As already reviewed, there is also a wide number of regulatory and policy institutions that govern the value chain playing different roles inclusive of quality management, trade, and offering a conducive environment. The key value chain actors are enumerated in the subsequent sub-sections.

4.1.2 Input supply to the cattle keeperst

The inputs include acaricides, drugs, animal feeds, fodder, and pasture seeds, fencing materials, water and feeding troughs, equipment, and tools, among others. They have various demands relating to the working capital needs for the acquisition of stocks and meeting operational costs, storage, and trucking logistics as well as managing risks associated with working with cattle keepers who may be small, medium, or large scale. There is low use of inputs such as pasture seeds (many cattle keepers do not feed their cattle on hay or silage, except in feedlots and a few dairy farmers). Use of unimproved (local) cattle breeds is the norm among beef cattle keepers, although many have adopted improved breeds for dual-purpose cattle (milk and beef). Only 1%-8% of the small-medium cattle keepers kept crossbreeds, though in Central and Western Uganda, over 90% had some of their cattle as crossbreeds. The limited use of improved breeds is partly explained by lack of access, lack of awareness, unaffordability, and the prolonged droughts in the cattle corridor (that exacerbate the lack of feeds and increase the prevalence of parasites and diseases).

With imperfect and incomplete finance markets, credit-constrained cattle keepers find it difficult to purchase improved breeds or invest in other modern technologies such as cattle crushes and dip tanks unless channels of affordable credit are made available to them.

4.1.3 Production level (cattle keeping)

Cattle keepers are categorized as commercial ranchers or traditional pastoralists. The former is also further categorized as public/government ranches (these are mainly under the management of NAGRC&DB and or NALIRRI) or as private ranches (owned by individuals or companies. The latter (traditional pastoralists) are grouped based on size into the small-medium with 10-200 heads of cattle, owning between 12 and 100 acres of land, but able to graze their cattle on more land, averaging 88 acres, and large-scale (owning more than 200 head of cattle) grazing on 100-200 hectares of land. The main system of grazing and management is rangeland, although feedlots are under the intensive system where silage, hay, and other fodder are grown and fed to cattle in confined cubicles. It is estimated that up to 90% of the national herd is kept under pastoralism and mixed small-scale holder (agro-pastoral, semi-intensive) farming system. Commercial ranching and intensive (feedlot) production are limited to less than 10% of the national herd.

The only existing beef cooperative union, the Uganda Meat Producers Cooperatives Union, is owned by 34 grassroots primary cooperative societies located in the cattle corridor, bringing together approximately 2,617 farmers.

4.1.4 Research & development

Uganda's National Development Strategy under NDP III aims to improve production and productivity, improve Research, and ensure research technology dissemination and capacity Building through NARO, improve marketing and distribution, and promote value addition (agro industrialisation) and exports. This aims at creating a conducive environment for increasing production and productivity backed by good political will.

There is ongoing research targeting beef cattle in the country. This study found research interventions and programmes on the generation of improved breeds of cattle in terms of performance and dissemination to farmers to improve production, Agricultural Value Chain Development (AVCDP) to support the uptake of Artificial Insemination (AI), and farmer training /training to equip AI Technicians, provision of improved Agricultural technologies and agribusiness advisory services (ATAAS) through community breeding and Competitive grant schemes to support beef livestock breeding. Others are the new Embryo synchronization technologies at NALLIRI, the development of Anti-tick vaccines, and verification of their efficacy and conservation of indigenous cattle breeds like the Nganda and Zebu cattle genes by MUZARD and NAGRC & DB, among others.

4.1.5 Marketing of Live Cattle and Beef

The organization of live cattle marketing is divided into three levels, as depicted on the value chain map in Figure 15. In the first tier, small- to medium-sized cattle farmers sell their cattle to large- or local-scale traders, who then resell the cattle to abattoirs in cities. They frequently work under contracts since they buy from small traders and occasionally straight from the producers. They may provide funds to other traders to purchase on their behalf, who then transport the purchased animals to cattle markets and holding facilities (for sale or inspection prior to the issuing of a movement permit) by a qualified veterinary officer. Small traders frequently deal in small quantities and frequently purchase goods at the farm gate and local market.

Many times, cattle keepers move their cattle on foot to the cattle market for sale to traders, breeders, fatteners, or feedlot operators who buy them to keep for some time (usually months) before they sell them off, for breeding, or as bulls for ox-ploughing. Once the traders have aggregated enough cattle, they load them onto trucks and transport them to the abattoirs/slaughter slabs, where the cattle are kept for a few days before slaughter.

4.1.6 Cattle Slaughter, Beef Marketing and Processing

Cattle is slaughtered by professional persons and skinned to remove the hides. Once fresh beef is produced, it is weighed, and the owner sells it to several actors including butchers who also purchase fattened cattle from producers, farmers, and small traders to slaughter locally. The butchers sell the beef to individual consumers, hotels, and restaurants, small- and large-scale processors, roadside vendors, institutional consumers such as schools, hospitals and to hotels and restaurants. In Uganda, fresh beef is not commonly sold in super/hypermarkets except for frozen beef.The processors turn beef into minced meat and sausages, mainly. The study did not find any evidence of canned beef from Ugandan cattle on the domestic market.

In relation to the marketing structure of beef products, a group of associations have organized themselves to influence the supply and demand of the beef sector and they include: The Uganda National Beef Producers Association, Uganda National Farmers Federation, Uganda Livestock Industries and Uganda Manufacturers Association (UMA). The other main actors include Abattoir manager who ensures the smooth running of the abattoir; Transporters who deliver the slaughter animals at the abattoir; Abattoir workers who attend to the animals before slaughter by ensuring the welfare of the animal, providing water, and sometimes feeding; and Exporters who export beef and beef products. Egypt Uganda Food Security Co. Ltd exports mostly to Egypt and the Middle East. Regionally, South Sudan is the major destination for Ugandan meat products. The other export destinations for Uganda beef and beef products are Burundi, DRC, Kenya, Rwanda, and Tanzania.

Other beef processors and exporters include Uganda Meat Industries Ltd with Head Office in Kampala, but the factory is in Buruli; they

contract farmers to supply local beef cattle. There are also food retailers and producers. Fresh Cuts (U) Ltd is the Butchery and Deli retail chain, exports and wholesales meat products to hotels and restaurants. Pearl Meat Industries Ltd is a pioneering company in Uganda engaged in livestock products including meat, hides and skins; they cater for the wholesale market as well as export. Their modern abattoir was one of the first in Uganda. They partner with internationally recognized companies in the production and installation of slaughter systems.

Our interview with the Uganda Export Promotions Board (UEPB) revealed that the current untapped opportunities at each level of the beef value chain are in exporting beef to developed countries like the EU, Egypt and South Africa and the African Continental Free Trade Area, although Uganda's inability to export to the EU and South Africa is because Uganda is categorized as a risk country in terms of diseases and standards. Technologies that would help upgrade the standard of beef exports are technology for standardized animal slaughter, and beef transportation in line with acceptable global standards and best practices. The skill gaps are also in lack of specialised training on beef handling (slaughter, transporting) and market research to secure lucrative markets for beef, locally, regionally, and internationally. However, to unlock the potential of the beef value chain in Uganda at each node of the value chain, the UEPB key informant suggested deliberate investment and support towards interventions to streamline beef production and resurrection of the cooperative movement to build capacity of farmers to network in as far as sharing knowledge is concerned. Other bottlenecks include the requirement that tests on food to be exported to US must be done in outside labs, which makes exporting expensive; and lack of enforcement due to under-funding of the regulators.

[28] *"Sex of the cattle keeper" meant the sex of the owner of cattle, whether its managed by herdsman, the owner can be a man or woman. Cattle keeper is "owner of the farm/ cattle"*

Meat Processors process beef into other beef products such as sausages, minced meats, and deli meat. Small processors process for the local market. However, large processors such as Fresh Cuts Uganda Ltd and Uganda Meat Industry produce for both the domestic and export markets. Meat Inspectors certify the health status of the live animal before slaughter as well as the wholesomeness of the meat. Transportation is typically by trucks and lorries, which are not designed for cattle. Butchers purchase fattened cattle from producers, farmers, and small traders to slaughter at the local abattoir at a fee. They take away the beef for sale to individual consumers, hotels, and restaurants.

4.1.7 Domestic Beef Consumption

Consumers are the final users, and they mostly buy beef from the local butchery, but occasionally may buy directly from the abattoir under certain conditions. These are mostly households.

Hotels and Restaurants, especially large ones, sometimes buy live animals from farmers and traders; they slaughter the animals at the local abattoirs at a fee and serve the beef as meals to their customers. At times they may purchase the beef directly from the local butchery.

4.1.8 Cattle and Beef exports

Uganda exports live cattle mainly to Rwanda, DRC, and Burundi, with ITC (2022) showing that the country exported US$ 7 million worth of live cattle in 2020 and US$ 1.3 million in 2015. Much of Uganda's beef in frozen and chilled forms is exported to DRC, UAE, and South Sudan.

4.1.9 Small-medium cattle producers

The majority of the small-medium cattle keepers are males making up 93% of the pooled sample. The average age is about 48 years with Karamoja having slightly younger cattle keepers. However, although

Table 19: Characteristics of the small-medium cattle producers

		Percentage of small-medium producers by region					
Variable	**Detail**						
		Northern (n=75)	Eastern (n=40)	Central (n=76)	Western (n=129)	Karamoja (n=52)	Overall (n=372)
Sex of cattle keeper[1]	Male	90.67	80.00	96.05	93.02	100.00	92.74
	Female	9.33	20.00	3.95	6.98	0.00	7.26
Age of cattle keeper/ rancher	Years	46.99	50.58	48.80	48.49	41.63	47.52
Number of years as a cattle keeper	Farming experience	15.71	22.65	32.83	30.78	20.92	25.91
Number of years the farm has existed	Farm age	14.03	22.50	24.30	29.38	28.02	24.32
Herd size	Number of cattle owned by November 2022	22	19	67	53	20	41
Highest level of education completed	No formal education	6.67	12.50	27.63	10.08	65.38	20.97
	Some primary	20.00	37.50	30.26	20.16	23.08	24.46
	Completed primary	25.33	7.50	7.89	16.28	3.85	13.71
	Some secondary	18.67	27.50	11.84	22.48	3.85	17.47
	Completed secondary	13.33	10.00	10.53	10.85	3.85	10.22
	University	2.67	2.50	5.26	14.73	0.00	6.99
	Diploma	4.00	2.50	5.26	3.88	0.00	3.49
	Vocational training	9.33	0.00	1.32	1.55	0.00	2.69

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

Karamoja region had 100% male cattle keepers, Eastern Uganda had 20% of the cattle keepers as women, something that shows the difference in regional gender ownership of livestock (Table 19).

The sampled small-medium cattle keepers had an average of 26 years of cattle keeping experience with herd sizes of about 41 cattle, although Central and Western regions lead with bigger herd sizes averaging 67 and 53 cattle respectively. The Northern region had younger cattle farms and less experienced cattle keepers.

In terms of education levels, Karamoja region had the least educated cattle keepers with 65% of those sampled having no formal education at all, and 23% had not completed primary school. The Western region with 53% of the cattle keepers having reached secondary school and above, leads the regions followed by the Northern region at 48% and Eastern at 43% of the cattle keepers having above primary education (Table 19).

4.2 BREEDS OF CATTLE KEPT FOR BEEF IN UGANDA

Noting that small-medium cattle keepers keep more than one breed on the farms, the most dominant cattle breeds kept overall are cross breeds (52%), Nkaramoja (22%), Nganda/Ankole (16%). However, the cross breeds are mainly found in Central and Western Uganda where 91% and 95% of the sampled small-medium cattle keepers were keeping them, while Karamoja and Northern Uganda are mainly into local cattle keeping (Table 20). The main reason given by key informants and some farmers for keeping the crossbreeds were that they serve a dual purpose of milk and beef production.

It was also found out that the Brahman, Romagnola and Sahiwal cattle are used to cross breed with the local breeds to produce the crossbreeds and these have been widely given out in communities in Teso, Karamoja and Northern region under the Government restocking programmes according to the District Production and Marketing Officers (DPMOs) and District Veterinary Officers (DVOs) of Kitgum, Apac, and Amolator. The key message to note here is that there is need to promote cross breeds more aggressively in Karamoja, Northern, and Eastern regions where these have not been adopted by the cattle keepers. The DVO of Ntungamo during a key informant interview indicated that the main breeds kept by farmers are 35% Ankole, 30% Friesian, 10% Boran, 10% Jersey, 10% Guansey and 5% Buozimara.

FGD's with the cattle keepers corroborated well with the survey data in terms of breeds kept. In Western Uganda FGD participants mentioned breeds such as cross breed 1 and 2, a few Borans, long horned Ankole Cattle. One of the men appreciated *"But the Rushenyi Meat cooperative union in Ntungamo tried to do some Artificial Insemination on the farms especially using the Boran".* In Central Uganda, breeds such as Boran, Ankole Long Horned Cattle, Brahman, Sahiwal, Zebu. One FGD participant in Ntuusi, Sembabule said *"Even cross breeds, the long horned Ankole cattle and the Boran are kept here. One time we sold a cow of 700 Kg Live Body Weight, and cattle breeds like Brahman can weigh about 1,000 Kg if well fed".*

In Northern Uganda, Eastern and Karamoja regions, local breeds dominate. However, the main breeds mentioned were; in Apac, local (dyang Lango) and a few have Ankole (Gangi) and Dyang lango x Ankole crosses. One of the FGD participants in Kaabong was quoted as *"Predominantly we have the local Karamoja zebu and very few improved breeds introduced by government livestock intervention programs such as (sahiwal, and Borans)".*

Table 20: Cattle breeds kept by small-medium producers by region

Value of live cattle exports and imports (US$)							
Region	Local (Achol, Langi)	Ankole/ Nganda	Nkaramoja	Other locals	Brahman	Cross breeds	Pure exotic
Northern	79%	21%	0%	17%	0%	1%	1%
Eastern	8%	8%	73%	20%	0%	8%	0%
Central	7%	28%	3%	0%	12%	91%	0%
Western	0%	12%	0%	0%	2%	95%	1%
Karamoja	0%	4%	98%	0%	0%	0%	0%
Total	**18%**	**16%**	**22%**	**6%**	**3%**	**52%**	**1%**

Source: *Primary survey data, UDC beef value chain study, 2022*

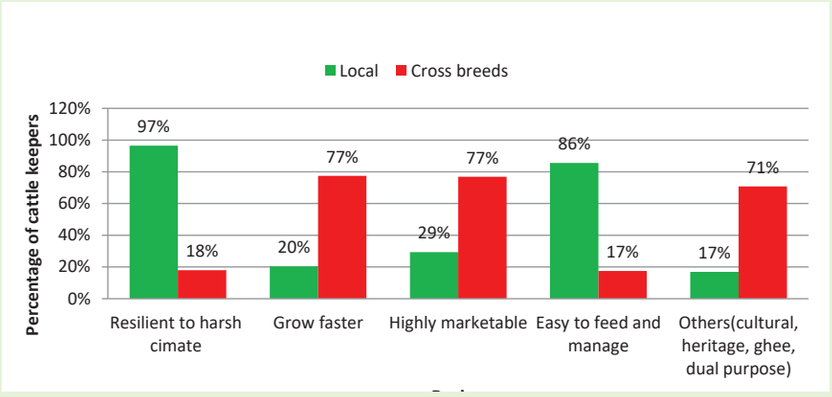
Photograph 1: Karamoja cattle grazing during onset of dry season

Photo credit: Internet

Photograph 2: Onset of dry season

The main reasons for the cattle keepers in the Northern and Karamoja regions concentrating on local breeds is their resilience to climate conditions (prolonged droughts that lead to scarcity of water and pastures) as reported by 97% of the sampled local cattle keepers in the regions. In this regard, 86% of the local cattle breed keepers indicated that they prefer the local breeds because they are easy to feed and manage while 29% of them indicated that they are easy to market. On the other hand, crossbreed cattle keepers mainly mentioned growing faster (77%), marketability (77%) and being dual purpose for milk and beef (Figure 16).

Figure 16: Main reasons for keeping the current cattle breeds



Source: Small-medium scale cattle keeper primary survey data, 2022.

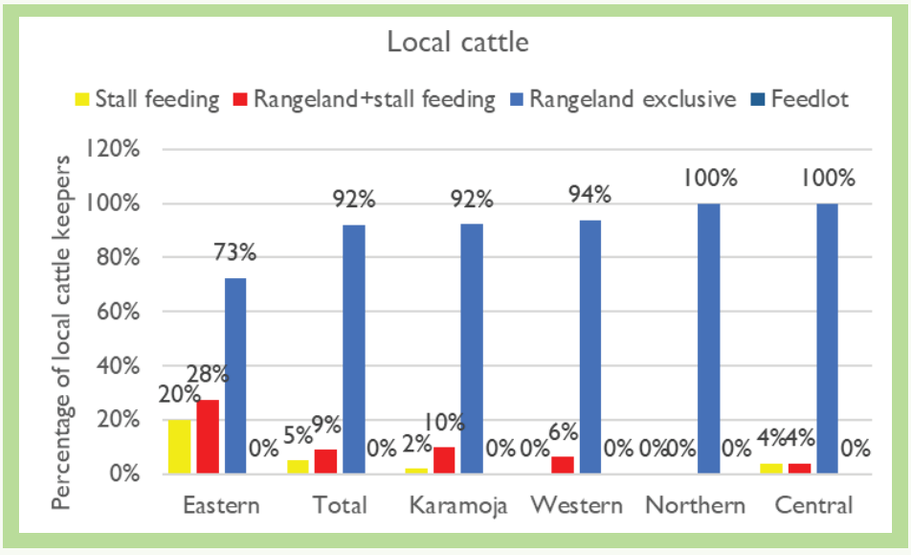
4.3 CATTLE PRODUCTION SYSTEMS AMONG SMALL-MEDIUM CATTLE KEEPERS

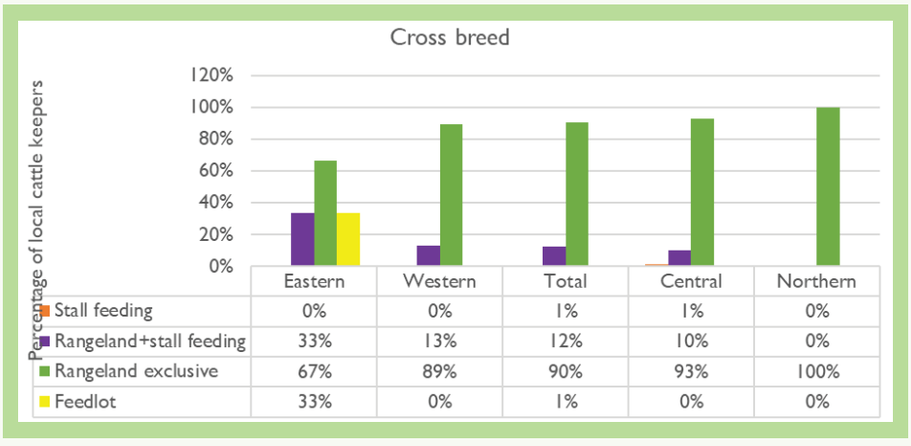
Local cattle keepers in all the regions of Uganda mainly keep their cattle under the rangeland extensive system (92%) where the animals are grazed on open and usually communal grazing fields and share watering points in valley tanks or water reservoirs. The Eastern region however has diversified systems with 73% of the cattle keepers operating under the rangeland exclusive in addition to 28% who do rangeland and stall feeding while 20% do stall feeding *(Figure 17)*. Cross breeds are mainly kept under the rangeland exclusive system (90%), rangeland and stall feeding (12%) and the 2% who practice both stall feeding and feedlot feeding.

In western Uganda, DVOs in key informant interviews indicated that the most common production systems are semi–intensive (60%) and rangeland although they were quoted as saying

> *"some farmers are adopting some added pastures and paddocking, under the semi Intensive system".*

Figure 17: Cattle production systems by breed and region among the small-medium cattle keepers





	Eastern	Western	Total	Central	Northern
Stall feeding	0%	0%	1%	1%	0%
Rangeland+stall feeding	33%	13%	12%	10%	0%
Rangeland exclusive	67%	89%	90%	93%	100%
Feedlot	33%	0%	1%	0%	0%

Source: *Primary survey data, UDC beef value chain study, 2022*

4.3.1 Herd composition and structure on small-medium farms

The average herd size on small-medium farms that are for beef exclusively was found to be 74 cattle of which 28% were calves, 26% were heifers (13% in calf), 24% are cows, 10% are bulls while 12% are steers[39].

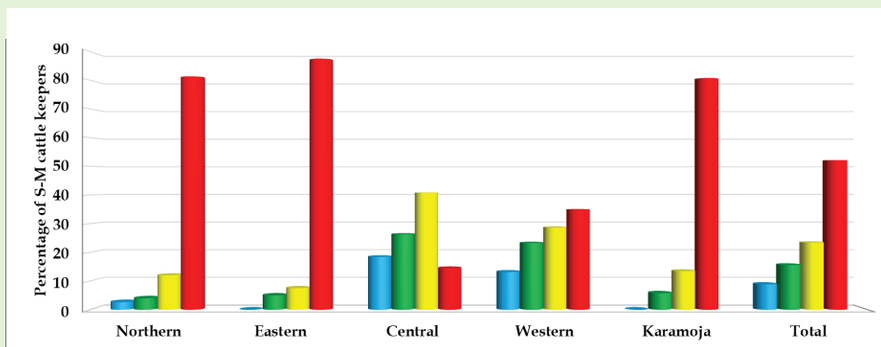
However, the herd composition of dual-purpose farms is skewed towards having more cows (30%) and heifers (24%) as well as female calves (15%) (Table 22). About 52% of the mall-medium cattle producers own less than 25 cattle while 23% own between 25 and 50 cattle while only 16% have 50-100 cattle (Figure 18).

Table 21: Cattle herd composition on small-medium farms

	Exclusively for beef			
Cattle grouping	Mean	% Mean Composition	Mean	% Mean composition
Male calves (Bulls)	8	11%	6	9%
Female calves	13	17%	10	15%
Non pregnant heifers	9	13%	9	13%
Pregnant heifers (In calf)	10	13%	8	11%
Lactating cows	9	13%	10	15%
Dry cows	8	11%	10	15%
Breeding bulls[40]	2	3%	3	4%
Other bulls	5	7%	5	7%
Steers[41]	9	12%	6	9%
	74	100%	66	100%

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

Figure 18: Percentage of small-medium scale cattle keepers by herd structure



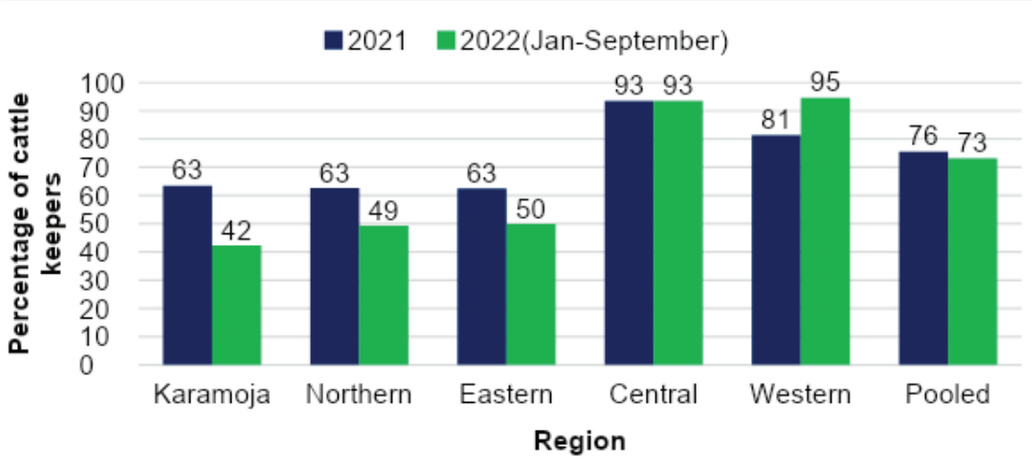
	Northern	Eastern	Central	Western	Karamoja	Total
100-200	3	0	18	13	0	9
51-100	4	5	26	23	6	16
26-50	12	8	41	29	13	23
<=25	81	88	14	35	81	52

[39] *Steers are juvenile female cows*
[40] *Breeding bulls are mature bulls for mating purposes on the farm*
[39] *Steers are juvenile female cows*

4.3.2 Cattle sales by small-medium scale producers

Overall, 76% of the small and medium scale cattle keepers sold some cattle in 2021, more of these in Central region (93%) and 81% in Western Uganda. By October 2022, 73% had sold some cattle of whom 93% were in Central and 95% were in Western Uganda (Figure 19). These findings show that some households, especially in Karamoja, North and Eastern Uganda are not commercially oriented, which was explained by reasons of keeping cattle as a security/safety net for hard times, or cultural and heritage purposes but not for money.

Figure 19: Percentage of small-medium scale cattle keepers who sold cattle in 2021 and 2022



Source: *Small-medium scale cattle keeper primary survey data, 2022*

In the last two years, 90% of the small-medium producers had sold some cattle, the fewest being in Northern region (73%) and Eastern region (75%). The average number of cattle sold is about 12 in the two years, with the Central producers selling more at 23 cattle compared to 3 in the Eastern and Karamoja areas (Table 22). About 63% of the producers sell cattle aged 2 years (Figure 20).

90%

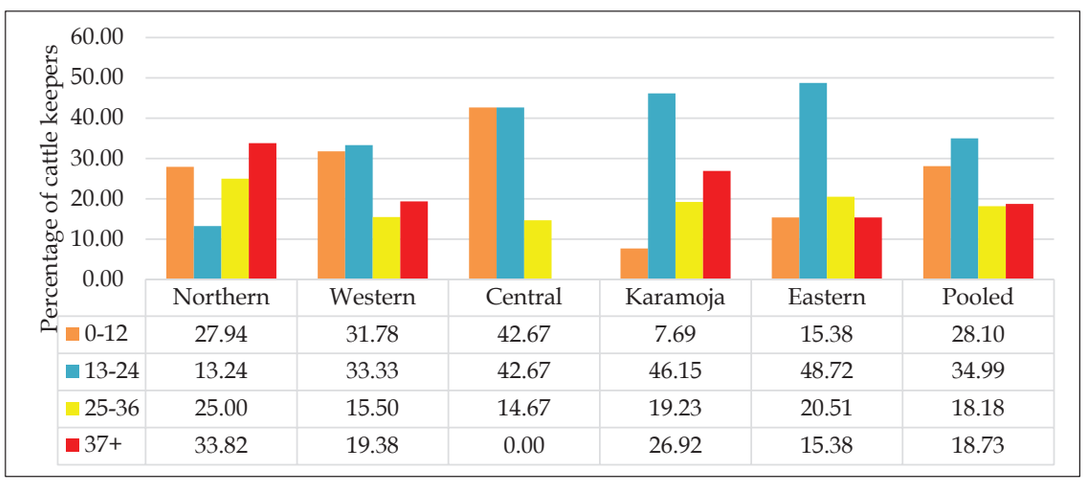
of the small-medium producers had sold some cattle, the fewest being in Northern region (73%) and Eastern region (75%).

Table 22: Cattle numbers sold by small-medium producers in last two years

	Northern	Eastern	Central	Western	Karamoja	Total
Small-medium producer sold cattle in 2 years	73%	75%	100%	99%	87%	90%
Total number sold in two years	6	3	23	12	3	12
Number sold per category						
Bull calves	6	2	11	9	2	8
Female calves	2	3	7	5	2	4
Bulls for slaughter	1	1	22	9	2	11
Steers	1	2	6	3	2	4
Breeding bull (s)	2	1	7	4	2	4
Heifers (6 – 15 months)	3	1	8	6	1	6
Culled cows	10	3	11	6	2	6
Breeding cows	2	2	5	3	2	3

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

Figure 20: Percentage of small-medium farms by age of cattle sold



	Northern	Western	Central	Karamoja	Eastern	Pooled
0-12	27.94	31.78	42.67	7.69	15.38	28.10
13-24	13.24	33.33	42.67	46.15	48.72	34.99
25-36	25.00	15.50	14.67	19.23	20.51	18.18
37+	33.82	19.38	0.00	26.92	15.38	18.73

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

The average weight of cattle sold on small-medium farms is about 140 kg although higher weights are found in Northern Uganda (165 kg), Western (148 kg) and Central (142 kg). These weights were confirmed by most of the DPMOs that were interviewed during key informant interviews; although they also agreed that these are lower than potential attainable weights. The majority of small-medium farms (40%) sell cattle with weights ranging between 30 kg and 100 kg, followed by 33% who sell between 100kg and 150 kg. Only 27% of the farms sold cattle weighing 150-450 kg (Table 23). At district level, three districts had the largest percentage of cattle keepers selling large animals weighing 150-450 kg including Amolator (55%), Kitgum (48%) and Ntungamo (42%), whereby the FGDs revealed that these districts have good pastures and farms have low stocking rates. Disaggregation by breed of cattle indicated no significant difference although cross breeds weighed about 138 kg in contrast to local breeds at 134 kg (See annex 1,Table 104).

Table 23: Average weight of cattle from small-medium scale farms by location

District	Mean weight (Kg) of cattle sold	% Of cattle keepers by range weight sold		
		30-100 Kg	101-150 Kg	151-450Kg
Amolatar	245	27.27	18.18	54.55
Apac	139	51.22	21.95	26.83
Bukedea	100	57.14	42.86	0.00
Kaabong	115	53.85	38.46	7.69
Katakwi	133	28.57	57.14	14.29
Kirihura	145	37.14	31.43	31.43
Kitgum	176	26.09	26.09	47.83
Kotido	111	60.00	33.33	6.67
Kyankwanzi	140	30.00	55.00	15.00
Mbarara	144	29.55	38.64	31.82
Nakapiripirit	100	66.67	16.67	16.67
Nakasogola	128	35.00	50.00	15.00
Ntungamo	154	32.00	26.00	42.00
Sembabule	151	33.33	36.11	30.56
Serere	114	58.33	33.33	8.33
Total	141	39.78	33.33	26.88
Region	Mean weight (Kg)			
Northern	165	40.00	22.67	37.33
Eastern	116	47.50	45.00	7.50
Central	142	32.89	44.74	22.37
Western	148	32.56	31.78	35.66
Karamoja	107	61.54	26.92	11.54

Source: *Small-medium scale cattle keeper primary survey data, 2022*

Overall, each small-medium scale cattle farm supplies about 913 kg of beef annually with central Uganda leading in supply with 1,716 kg followed by Western Uganda at 958 kg. The average price of beef supplied by small-medium scale farms is 13,700 shillings per kilogramme although Western and Eastern Uganda led with the highest price of 15,000 shillings per kg (Table 25). Among the sampled districts, Katakwi led in beef supply per farm, with 2,125 kg annually followed by Sembabule, Nakasongola and Kiruhura districts, all in Central and Western region. A disaggregation by breed indicated that crossbreeds fetch significantly ($p<0.01$) higher beef prices from the farm at 14,200 UGX/kg than local breeds at 12,800 UGX/kg (See annex 1,Table 105).

Table 24: Quantity and price of cattle on small-medium scale farms by region

Annual mean beef supply (Kg)	Average beef price per Kg (UGX/Kg) on farm	
District		
Katakwi	255.91	15,303.50
Kirihura	1,130.94	15,263.29
Ntungamo	996.03	15,200.62
Serere	169.00	15,119.05
Kitgum	252.42	15,059.54
Mbarara	768.71	14,472.41
Bukedea	165.70	14,138.40
Amolatar	699.93	14,119.64
Nakasogola	1,285.88	13,652.99
Kyankwanzi	2,124.70	13,524.79
Kaabong	102.50	13,346.44
Sembabule	1,692.23	12,974.75
Apac	293.57	12,370.92
Kotido	318.50	10,662.68
Nakapiripirit	289.30	10,466.63
Region	Mean	Mean
Western	958.48	15,084.28
Eastern	213.74	15,027.40
Northern	342.71	13,349.10
Central	1,716.42	13,282.60
Karamoja	252.86	11,179.20
Total	**913.11**	**13,689.41**

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

Overall, about 80% of the small-medium scale cattle farms sell their cattle at the farm gate, but the results show that the cattle keepers also sell to multiple other points such as organized cattle markets where 47% of them sell, 3% sell in informal livestock markets while 3% transport the cattle to the abattoir/slaughter yard. The highest proportion of farm gate sellers are found in Northern Uganda (97%), Western region (88%) and Central region (83%). In the Eastern region, more than 90% of the small-medium scale cattle keepers sell to organized cattle markets (Table 25).

80%

of the small-medium scale cattle farms sell their cattle at the farm gate.

Table 25: Main cattle selling points among small-medium scale farms by region

	Percentage of cattle keepers							
	Farm gate		Organized cattle market		Informal livestock market		Transport to abattoir/ slaughter yard	
Region	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Northern	97.33	2.67	24.00	76.00	1.33	98.67	0.00	100.00
Eastern	67.50	32.50	90.00	10.00	0.00	100.00	0.00	100.00
Central	82.89	17.11	30.26	69.74	11.84	88.16	6.58	93.42
Western	87.60	12.40	34.88	65.12	1.55	98.45	6.20	93.80
Karamoja	40.38	59.62	100.00	0.00	0.00	100.00	0.00	100.00
Total	**79.84**	**20.16**	**46.77**	**53.23**	**3.23**	**96.77**	**3.49**	**96.51**

Source:Small-medium scale cattle keeper primary survey data, 2022.

The top three marketing channels for small-medium cattle keepers are local traders (87%), large scale traders (33%) and butchers (27%) although 18% of the small-medium scale cattle keepers sell cattle especially steers and breeding bulls to fellow farmers. Butchers are more dominant as cattle buyers in Northern Uganda while fatteners are only found in Central and Western Uganda (Table 26).

Table 26: Main cattle buyers on small-medium scale farms by region

Percentage of small-medium cattle keepers						
	Northern	**Eastern**	**Central**	**Western**	**Karamoja**	**Total**
Cattle buyers						
Local trader [42]	83%	95%	83%	95%	73%	87%
Large scale traders[43]	13%	58%	26%	22%	77%	33%
Butchers	59%	8%	16%	29%	10%	27%
Fellow farmers	45%	13%	5%	10%	21%	18%
Fatteners[44]	4%	0%	11%	8%	0%	6%
Breeders	0%	3%	4%	0%	**0%**	1%
Processors	0%	3%	1%	0%	0%	1%
Farmer associations	0%	3%	0%	0%	0%	0%
Consumers[45]	0%	3%	0%	0%	0%	0%

Source: Small-medium scale cattle keeper primary survey data, 2022.

4.3.3 Cattle prices received by small-medium cattle keepers

Modal prices for small-medium cattle keepers

Generally, improved breed cattle (cattle that is either pure exotic or cross breed) fetch higher prices than the local breeds. For instance, a local cow costs UGX1, 129,000, the modal price in the markets while an improved/cross breed cow costs UGX 1,562,000 representing over 38% difference. A local weaner costs UGX 992,000 compared to UGX 1,428,000 for an improved weaner representing a 44% difference. By region, the Northern and Western regions receive the highest modal prices followed by the central region (Table 27).

local cow costs
UGX 1, 129,000
an improved/cross breed cow costs
UGX 1,562,000

[42] *Local traders are small scale cattle traders who usually buy 1-10 cows per market day*
[43] *Local traders are small scale cattle traders who usually buy 1-10 cows per market day*
[44] *Large scale cattle traders are those who can buy 10-50 cattle per market day and they usually fill a truck or cooperate with a few others to fill a truck.*
[45] *Fatteners buy cattle and withhold them for some time as they feed them aggressively to gain more weigh and sell them off usually in 3-6 months.*
[46] *These can be households (who buy beef when cattle keepers slaughter on farm or at a trading centre) or individuals buying for weddings and introductions or restaurants)*

4.3.4 Average prices for small-medium cattle keepers

Generally, improved breed cattle (cattle that is either pure exotic or cross breed) fetch higher prices than the local breeds. For instance, a local cow costs UGX1, 129,000, the modal price in the markets while an improved/cross breed cow costs UGX 1,562,000 representing over 38% difference. A local weaner costs UGX 992,000 compared to UGX 1,428,000 for an improved weaner representing a 44% difference. By region, the Northern and Western regions receive the highest modal prices followed by the central region (Table 27).

In Central Uganda in the districts of Sembabule, Kyankwanzi and Nakasongola, the DVOs as key informants indicated that the small-medium scale cattle keepers sell cattle between UGX 1,200,000 and UGX 1,800,000 while the large-scale cattle keepers sell between UGX 1,500,000 and UGX 2,000,000. In Northern Uganda, DVOs indicated that small-medium producer prices range between UGX 800,000 and UGX 1,500,000 per cow while on large scale farms the prices are UGX 1,000,000 – UGX 2,500,000. In the Eastern region the prices range between UGX 900,000 and UGX 1,500,000 per cow.

In Ntungamo, a bull weighing 120 kg can be sold at UGX 1,300,000. In Sembabule, cattle keepers indicated that the prices are determined by traders but the lowest is UGX 700, 000. In Nakasongola, a lady who attended the FGD was quoted saying *"A trader can even buy a 120 kg cow at UGX 800,000 that is how they exploit us". Another man complained about weights that "in the past, we used to have weigh bridges, the cattle were always weighed and you would know the weight of the cattle before negotiating with the trader, this gave you an upper hand in bargaining. But now traders are using eyes for weight estimation, a cow may be 120 Kg but a trader may tell you that the cow is 100 Kg, you have no option apart from accepting. So as a farmer, we are suffering"*

In Northern Uganda the prices on small-medium farms range between UGX 1,000,000 – UGX 2,500,000 and on larger farms the prices are between UGX 1,500,000 and UGX 3,000,000. This key informant information shows variations in prices across regions which was attributed to a number of factors including, size of cattle sold, remoteness from the cattle markets and power of negotiation. In Northern Uganda, prices vary by purpose of the animal sold. FGD participants gave some examples; *"Prices vary depending on what type of animal the buyer wants, if it's for dowry, or raising by a fellow farmer it differs from one meant for slaughter. Culled cows that can be slaughtered go from UGX 1,000,000 to UGX 2,000,000, depending on the weight"* In Karamoja, farmers said *"Animal prices are determined according to weight (slaughter weight) and cattle farmer has more power to determine price"* In Teso, farmers said that they have more pose on prices and were quoted as; *"Bulls (120-130Kgs) are sold at 1,400,000/ and a Cow (80-90kgs) at 1,000,000/ Kept for 3 years".*

Given the results that indicated that improved breeds fetch higher prices, the key message here is that it pays to invest in improved cattle breeds, a case in point being a local breed cow in Western Uganda costs UGX 1,238,000, lower that an improved one at UGX 1,735,000 as the modal price (Table 29). The second key finding in Table 29 is that younger female cows (Steers and weaners) fetch high prices, some as high as older cows, an indication that starting and growing breeding farms for such age groups of cattle can be profitable with a target to supply the other farmers.

Table 27: Modal cattle prices on small-medium farms in last two years by region

Modal prices (UGX/animal) in last two years										
Region	Local Bulls	Improved bulls	Local female calf	Improved female calf	Local cow	Improved cow	Local steer	Improved steer	Local weaner	Improved weaner
Northern	1,403,448	1,764,722	1,298,833	3,269,444	1,128,000	1,638,214	1,052,632	2,000,000	523,864	1,249,333
Western	1,053,797	1,291,967	1,658,228	2,161,983	1,238,462	1,734,583	1,322,297	1,630,288	1,384,615	1,516,525
Central	871,250	1,133,514	1,448,889	1,846,000	1,434,426	1,445,070	1,129,630	1,367,241	1,177,419	1,464,189
Karamoja	1,312,500	2,100,000	662,727	1,613,636	642,857	836,364	1,088,889	1,290,000	542,692	900,000
Eastern	1,224,242	2,721,429	730,303	1,014,286	707,813	1,050,000	840,357	1,255,000	612,308	1,154,545
Total	**1,140,963**	**1,425,019**	**1,290,819**	**2,053,766**	**1,129,139**	**1,561,605**	**1,147,426**	**1,520,321**	**991,864**	**1,428,017**

Table 28: Average cattle prices on small-medium scale farms

	Northern		Eastern		Central		Western		Karamoja		Total	
Cattle type	Mean (UGX)	SD	Mean (UGX)	SD	Mean (UGX)	SD	Mean (UGX)	SD	Mean (UGX)	SD	Mean (UGX)	SD
Bull calves	1,133,333.00	606,785.30	985,833.30	676,588.50	811,290.30	373,209.00	742,307.70	265,386.30	817,500.00	303,678.20	859,465.60	439,293.70
Female calves	650,000.00	149,071.20	583,857.10	157,345.10	1,060,526.00	396,014.50	1,100,000.00	424,264.10	625,454.50	255,983.00	869,131.10	393,953.10
Steers	850,000.00	517,204.00	993,333.30	536,780.50	1,435,556.00	478,406.90	1,468,000.00	1,127,948.00	920,000.00	349,285.00	1,311,552.00	843,392.90
Breeding bulls	1,433,333.00	1,193,035.00	1,180,455.00	302,476.90	1,455,000.00	742,589.80	1,625,000.00	638,226.70	978,333.30	366,246.10	1,314,464.00	640,363.70
Heifers	**630,000.00**	**142,427.90**	434,000.00	110,815.20	1,102,564.00	335,203.90	1,445,349.00	524,496.80	407,045.50	111,673.70	1,072,987.00	535,700.50
(6-15 months)	**2,018,667.00**	**2,001,663.00**	**700,000.00**	**.**	**1,963,333.00**	**2,144,035.00**	**1,811,321.00**	**481,847.60**	**400,000.00**	**.**	**1,862,800.00**	**1,441,716.00**
Culled cows [46]	**600,000.00**	**.**	**966,666.70**	**152,752.50**	**1,683,333.00**	**329,438.00**	**1,853,659.00**	**398,181.80**	**613,000.00**	**78,322.69**	**1,588,082.00**	**565,028.70**
Breeding cows	**1,900,000.00**	**1,475,230.00**	**1,000,000.00**	**.**	**1,857,143.00**	**2,747,033.00**	**1,263,636.00**	**545,018.80**	**1,200,000.00**	**.**	**1,677,273.00**	**1,557,557.00**
Culled bulls [47]	**1,900,000.00**	**1,475,230.00**	**1,000,000.00**	**.**	**1,857,143.00**	**2,747,033.00**	**1,263,636.00**	**545,018.80**	**1,200,000.00**	**.**	**1,677,273.00**	**1,557,557.00**

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

[46] *Cows that have come to the end of their reproductive purpose. They are sold off due to age or health complications.*
[47] *Bulls that have come to the end of their reproductive cycle. They are sold off due to age or health complications or aggressive behaviour.*

4.3.5 Premium prices for small-medium cattle keepers

Overall, 17% of the sampled small-medium cattle keepers indicated that there are premium price buyers in the cattle markets, more so in Eastern Uganda (58%) and Karamoja (42%). The low percentage of farmers getting premium prices is an indication that majority of farmers sell low quality and common types of cattle that don't attract such premiums. The main determinants of premium prices are cattle's body condition (92%), weight (83%), age of the cattle (62%) and season of sale (whether it is festive season, or dry/wet season) (Table 30). Cattle traders and DVOs during key informant interviews indicated that traders, consumers and processors prefer younger animals (between one and two years) with tender beef and the body should be healthy by the appearance of the skin. There is usually high demand for cattle during Christmas, Eid al fitr, eid ul adha and Easter festive seasons and usually farmers are paid higher. However, during the dry season the animals lack pastures and water and they lose body condition, fetching lower prices.

Table 29: Premium prices and determinants on small-medium scale farms

Percentage of cattle keepers						
	Northern	**Eastern**	**Central**	**Western**	**Karamoja**	**Total**
Are there price premiums[48]? (Yes)	15%	58%	8%	1%	42%	17%
Premium determinants						
Age of cattle	73%	74%	33%	0%	55%	62%
Weight of cattle	18%	96%	100%	0%	100%	83%
Body condition	73%	100%	67%	100%	100%	92%
Breed	36%	35%	0%	0%	32%	30%
Cow status (in calf/not)	45%	30%	0%	0%	45%	35%
Breeding/not breeding type	9%	9%	0%	0%	14%	10%
Season of sale	36%	35%	17%	100%	45%	38%

Source: Small-medium scale cattle keeper primary survey data, 2022.

4.4 CHARACTERISTICS OF LARGE-SCALE CATTLE PRODUCERS

According to the information availed from the Uganda Meat Producers Cooperative Union Ltd, the number of commercial beef farmers is small, consisting of 119 ranchers and 2,651 farmers organized under this organization. Major positive changes are however happening in the industry although still highly dependent on traditional extensive grazing systems with low-input, low output characteristics, there is a move towards more intensive feedlot systems, improved pastures and silage making albeit at a slow pace. Small companies like Robran holdings are taking a lead in transforming production systems into high yield feedlot and silage fed beef production. Yields are highest during the rainy season with poor supply consistency. Old and culled animals form the bulk of the meat consumed in Uganda thus poor-quality beef supply.

Large scale cattle keepers who own cattle herds with 200 or more cattle are

predominantly male (89%) aged 56 years and generally well educated since 67% of them had completed University and 22% had diplomas. Although 22% of the large-scale cattle keepers operate under the rangeland system, 44% also have adopted semi-intensive systems such as stall feeding and 56% have paddocked their grazing land. Although 6%-22% of the large-scale producers keep local breeds, 52% keep cross breeds while the rest indicated they keep the pure improved breeds (Sahiwal, Brahman etc.). The choice of the breeds is guided by market demand (89%), faster growth rates (56%), disease and parasite resistance (44%) and other reasons such as preserving cultural heritage of the local breeds (44%) (Table 31).

4.4.1 Feedlot operators

The only feedlot operator captured in central Uganda was in Sembabule district, who, had 100 cattle and was a youth aged 30 years and a university graduate. The feedlot operated under the Semi-intensive system with 44% of the cattle being cross breeds purchased from farms in Sembabule, Lyantonde, Kyankwanzi and other neighbouring districts (Table 30). The feeds are mainly maize and nappier (elephant grass) silage grown on the farm.

Table 30: Characteristics of the large-scale producers and feedlot operators

Percentage of producers			
Variable	**Details**	**large-scale producers (n=10)**	**Feedlot operators (n=1)**
Sex of cattle keeper	Male	90.00	100.00
	Female	10.00	0.00
Age of cattle keeper/rancher		53.40	30.00
Highest level of education completed	Completed primary	10.00	0.00
	University	70.00	100
	Diploma	20.00	0.00
Herd size	Mean	1,512	150
	Min	390	150
	Max	5,040	150
Systems used in cattle keeping	Rangeland	20%	0%
	Semi-intensive	50%	0%
	Paddocks	50%	100%
Breeds of cattle kept for beef	Local breeds	6%-22%	16%-22%
	Cross breeds (between locals, and Sahiwal, Brahman etc.)	52%	44%
Reasons for keeping the above breeds	Faster growers	56%	100%
	High feed conversion	33%	100%
	High demand	89%	100%
	Disease and parasite resistant	44%	0%
	Others (e.g.; For cultural heritage)	44%	0%
Sold cattle in 2021	Yes	80%	100%
Sold cattle in 2022	Yes	70%	100%

Source: *Primary survey data, UDC beef value chain study, 2022*

[48] *A premium price for cattle is a high price paid for certain age groups or breeds or types of cattle that are of high quality, unusual, or hard to get in the market.*

4.4.2 Herd composition and structure on large scale farms and ranches

Large scale farms have majority of their cattle as adult females (31%) and steers and heifers (32%) for reproduction and expansion of the herd. The farm sales are mainly from culled cows (11%) and calves (17%), mainly the male calves sold to other farmers or fatteners. However, the feedlot held 100% adult males (Bulls – 6 months and above). Just like the large scale, the ranches also hold a large proportion of their herd as adult females (Cows) (51%) and calves (22%) (Table 31).

At the point of sale, local cattle are sold at a younger age compared to improved cattle. For instance, large scale producers sell local cattle at about 39 months (Min=9; Max=100) which is about 3 years while improved cattle are sold at about 45 months (Min=12; Max=100 months) which is about 4 years. The reason for the difference in age of sale is that improved cattle is mainly kept for dual purposes-beef and milk, hence farmers tend to keep them for long to gain from the milk for cows, while for bulls they want to gain from the breeding function. At about 39 months old, local cattle is sold into the market at about 172Kg while for improved cattle, at 45 months, the animals are sold weighing about 206Kg (Table 32).

Table 31: Age groups and type of cattle on large-scale farms and feedlots

Cattle grouping	Extensive/large scale		Overall	
	Number Per year	% Of total herd	Number Per year	% Of total herd
Calves	161	18%	161	18%
Heifers (6-15 months)	136	15%	136	15%
Adult females (Cows)	307	34%	307	34%
Adult males (Bulls – 6 months and above)	89	10%	90	10%
Steers[49]	118	13%	118	13%
Culled cows	93	10%	93	10%

Source: Primary survey data, UDC beef value chain study, 2022

Table 32: Cattle age and weight at time of sale on large-scale farms and feedlots

		Local cattle		Improved cattle	
Farmer type	0	Marketing age (months)	Marketing weight (Kg)	Marketing age (months)	Marketing weight(Kg)
Feedlot	Mean	0%	136	15%	136
	Min	0%	307	34%	307
	Max	100%	89	10%	90
Large scale	Mean	39	172	45	206
	Min	9	98	12	99
	Max	100	320	99	350
Total	Mean	37	181	45	206
	Min	9	98	12	99
	Max	99	320	99	350

Source: *Primary survey data, UDC beef value chain study, 2022*

4.4.3 Cattle sales by large scale producers and feedlots

In the last two years prior to the beef value chain study, a large-scale farmer sampled had sold about 252 cattle, which is about 125 annually while a feedlot sold about 110 cattle, giving an average of 55 cattle annually. Of the sales, 31% were culled cows, 12% were bulls for slaughter and 13% were steers (Table 34).

Table 33: Number of cattle sold on large-scale farms

Number sold (2020-2022)		
Large scale		
Cattle type/age group	**Mean**	**Percentage of sales**
Bull calves	11	4%
Female calves	22	9%
Bulls for slaughter	30	12%
Steers	33	13%
Bulls for breeding	28	11%
Heifers	26	10%
Culled cows	77	31%
Breeding cows	24	10%
Total	**252**	

For the season of September 2021-September 2022, the prices ranged between UGX 912,500 and UGX 3,300,000 per animal depending on the type and age. Findings showed that female calves fetched a price thrice as high as bull calves while breeding bulls fetched a slightly higher price than bulls for slaughter. Similarly, heifers and breeding cows fetched higher prices than other cows, such as culled cows (Table 34).

Table 34: Average cattle prices on large-scale farms and feedlots

	Mean	Std. Dev.	Min	Max
Cattle type				
Bull calves	912,500	123,744	825,000	1,000,000
Female calves	2,750,000	1,767,767	1,500,000	4,000,000
Bulls for slaughter	1,825,000	565,464	1,000,000	2,500,000
Steers	825,000	954,594	150,000	1,500,000
Bulls for breeding	2,050,000	2,024,022	400,000	5,000,000
Heifers	3,300,000	2,719,068	700,000	7,000,000
Culled cows	1,775,000	1,189,888	400,000	3,000,000
Breeding cows	3,100,000	2,687,006	1,200,000	5,000,000

Source: Large scale cattle keeper primary survey data, 2022.

4.4.4 Estimated beef supply from large scale cattle farms and prices

When the cattle sold were converted into beef weights, results indicated that a large-scale farm supplies about 25.9MT of beef annually at a unit price of about UGX 8,400 per kg. Among the sampled districts, Nakasongola, Sembabule, Pader and Kyankwanzi producers supply the largest amounts of beef annually while highest prices are attained in Apac, Serere and Nakasongola, partly due to their location on the export routes to South Sudan and Kenya but also proximity to big towns (now new cities of Soroti and Lira) (Table 35).

[49] *Steers are juvenile female cows.*

Table 35: Average beef quantities and prices on large-scale farms and feedlots

Cattle grouping	Feedlot operator	Beef price (UGX/Kg)
Amolator	980.00	6,122.85
Apac	784.00	13,265.31
Kyankwanzi	15,800.00	5,126.58
Nakasongola	113,850.00	11,124.59
Ntungamo	2,500.00	10,000.00
Pader	16,156.00	7,431.97
Sembabule	46,095.00	5,856.36
Serere	520.00	11,346.15
Total	**25,893.60**	**8,356.22**

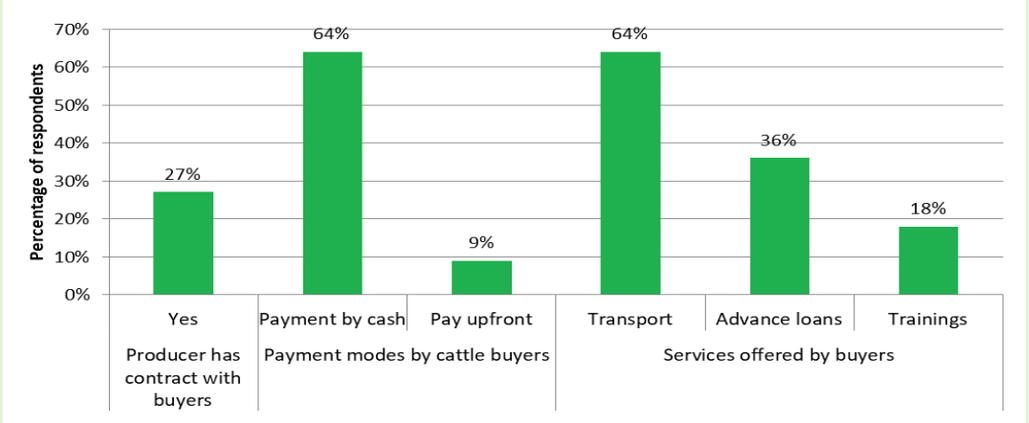
Source: Large scale cattle keeper primary survey data, 2022.

4.4.5 Relationships and linkages for the large-scale producers

Only 27% of the large-scale producers indicated that they have contracts with cattle buyers they sell to. This means that 73% of the large-scale producers sell their cattle to whoever comes with money. In terms of payment, 64% of the buyers pay cash on picking the animals from the farm or at the cattle market, while 9% of the producers indicated they are paid upfront by buyers before cattle is picked from the farm. The main services that producers get from buyers are transport (64%), advance loans (36%) and trainings from buyers (18%) (Figure 21).

There is a high level of trust between large scale producers and their cattle buyers to the extent that 64% of them indicated that in their relationship, they trust each other. However, 27% of them indicated that in case conflicts arise, there are mediators who come in to resolve the conflicts (Figure 22).

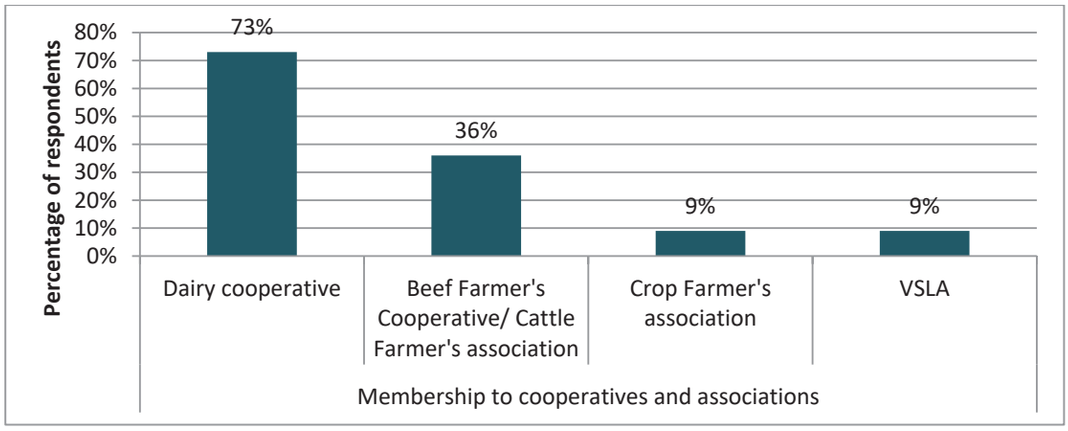
Figure 21: Contractual relationships, services and payment between cattle buyers and large-scale producers



Source: Large scale cattle keeper primary survey data, 2022.

Given the fact that majority of the large-scale cattle keepers deal in dual purpose cattle-for milk and beef, 73% of them belong to the dairy cooperatives while 36% belong to a beef cooperative/cattle farmers' association and few of them belong to VSLAs/SACCOs (Figure 23). During FGDs, farmers indicated that being in the dairy cooperative benefits them by earning the daily incomes from milk as well as accessing inputs and services such as trainings, veterinary services, and mass cattle vaccination.

Figure 22: Large-scale producers' membership to cooperatives/associations



Source: *Large scale cattle keeper primary survey data, 2022.*

4.5 SLAUGHTER AND BEEF MARKETING AND CONSUMPTION

4.5.1 Cattle traders, beef traders and processors

The downstream beef value chain is dominated by men given than there was no woman live cattle or beef trader, except one beef processor (Table 36). The majority of these value chain actors (61%) have at least some secondary or completed secondary education while 24% are at primary school level of whom 7% completed primary school (Table 36).

Table 36: Downstream beef value chain actors

	Frequency			Percentage		
Value chain Actor	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Live cattle trader	10	0	10	100	0	100
Beef trader	4	0	4	100	0	100
Beef processor	4	1	5	80	20	100
Supermarket	1	0	1	100	0	100
Butchery	21	0	21	100	0	100
Total	**40**	**1**	**41**	**98**	**2**	**100**

Source: live cattle traders, beef traders, butchers and processors survey data, 2022.

Table 37: Downstream beef value chain actors' education level

	Frequency	Percent
Actors' education level		
Some primary	7	17.07
Completed primary	3	7.32
Some secondary	18	43.9
Completed secondary	7	17.07
University	2	4.88
Diploma	1	2.44
Vocational training	3	7.32

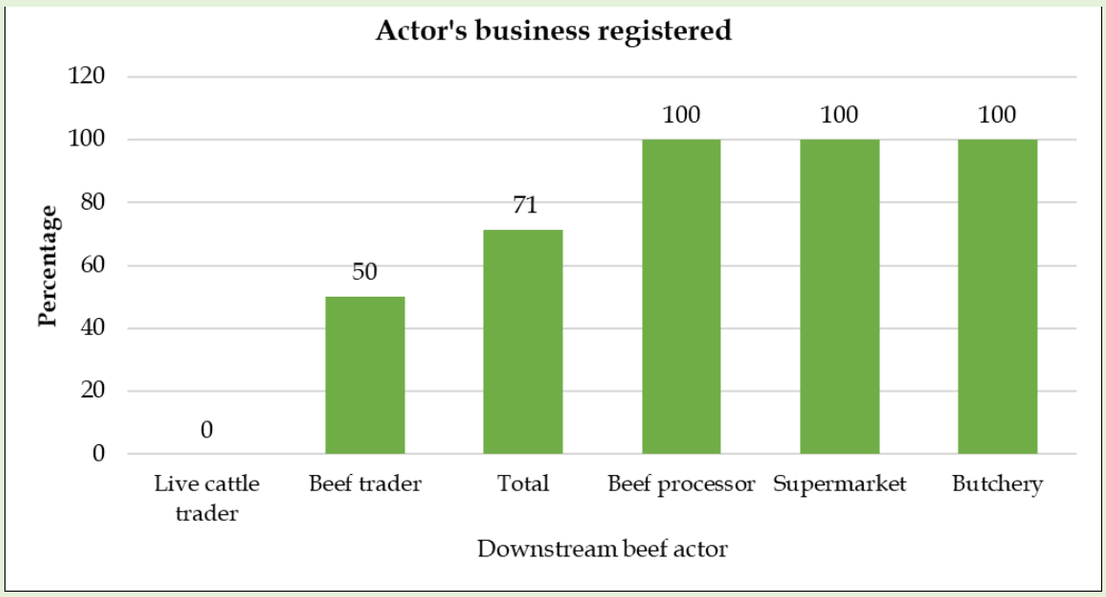
Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

Business registration is considered a way of formalization of the business activity that results in better regulation and payment of taxes. Overall, 71% of the downstream beef value chain businesses sampled were registered although fewer formal businesses were found among beef traders (50%) and live cattle traders (0%) (Figure 24).

71% of the downstream beef value chain businesses were registered

50% of beef traders operate formal businesses

Figure 23: Status of business registration among beef value chain actors



Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

4.5.2 Sources and types of cattle for cattle traders

The live cattle traders mainly source cattle from cattle keepers, assemblers in cattle markets and fellow traders. The butchers have the most diversified sources of live cattle and beef given that some of them buy live cattle and slaughter while others buy fresh beef. Processors get beef from traders and slaughterhouses/abattoirs (Table 38).

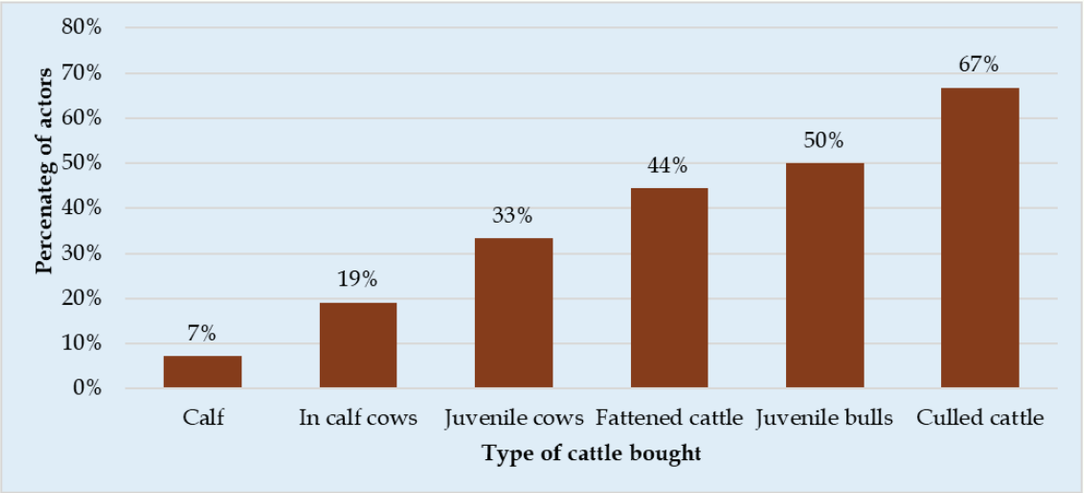
Culled cattle are the leading type of cattle bought (these are either old animals or those with defects) bought by 67% of live cattle actors followed by juvenile bulls (50%) and fattened cattle (44%) and juvenile cows (33%) (Figure 25). The main sources of beef for butcheries and processors are the abattoirs (84%) and beef distributors who transport to the premises of butchers and processors (16%) (Figure 26).

Table 38: Sampled downstream beef value chain actors' sources of live cattle and beef

	Percentage of actors				
Actor	Cattle keepers	Feedlots	Collectors/ Assemblers/agents	Traders	Others (Slaughter houses/abattoirs)
Live cattle trader	100%	0%	10%	50%	0%
Butchers	36%	5%	9%	32%	36%
Beef trader	0%	0%	0%	0%	25%
Beef processor	0%	0%	0%	20%	20%
Total	**43%**	**2%**	**7%**	**31%**	**24%**

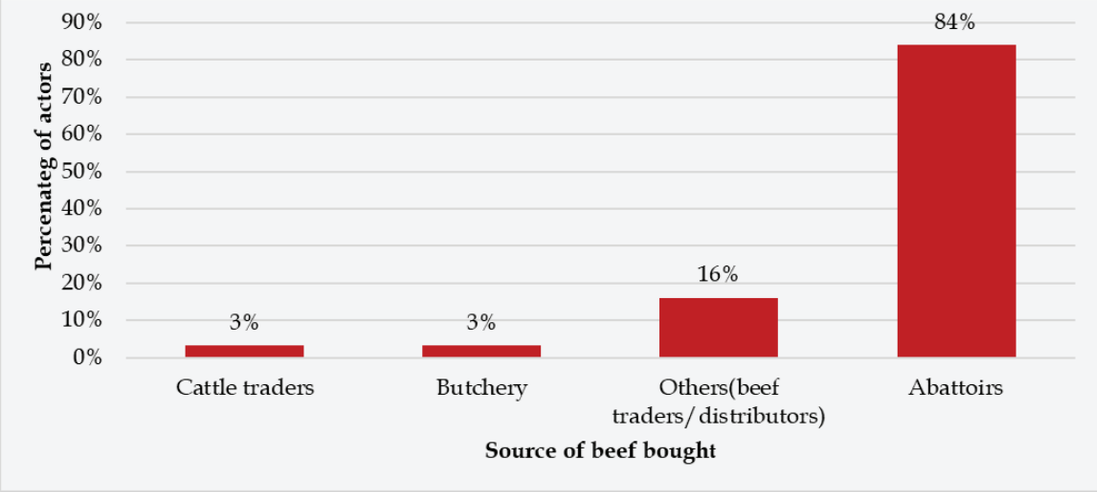
Source: live cattle traders, beef traders, butchers and processors survey data, 2022.

Figure 24: Type of cattle bought by beef value chain actors



Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

Figure 25: Sources of beef for beef traders, butchers and processors



Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

4.5.3 Beef prices by actor and sources

From cattle keepers, live cattle traders and butcheries buy cattle whose average equivalent price per kilogramme (if cattle weight is converted into beef equivalent) of beef is UGX 9,300 and UGX 9,400 respectively. However, butcheries access beef from feedlots/fatteners at a lower price of UGX 7,650 per kg. Beef processors access beef from abattoirs at a lower price than from butcheries (Table 39).

Table 39: Downstream beef value chain actors' prices for beef by sources

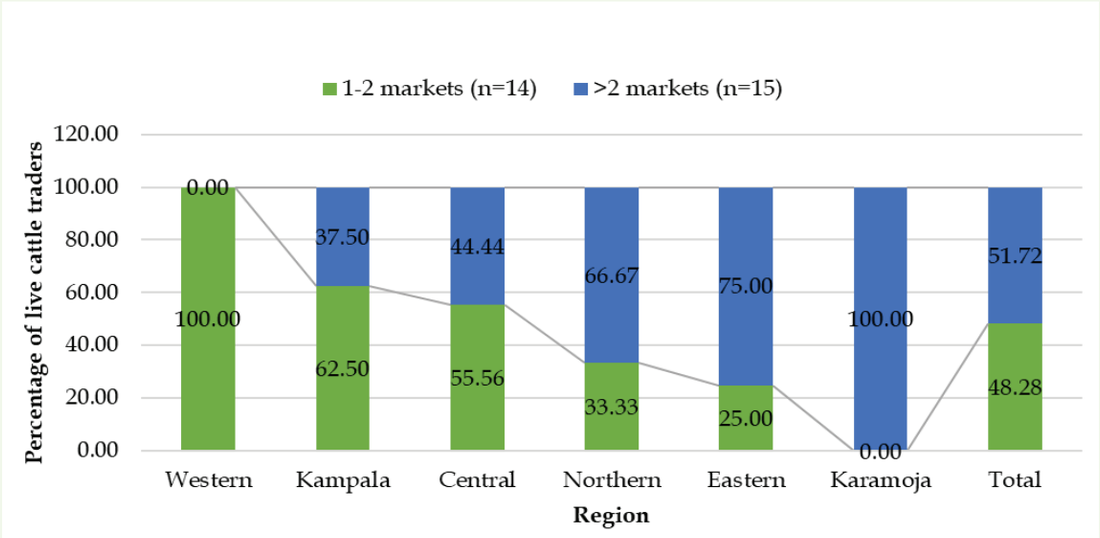
Average beef price (UGX/Kg) by source						
	Source of beef/live cattle					
Actor	**Cattle keeper**	**Feedlot/ fattener**	**Assemblers/ agents**	**Traders/ Markets/Abattoir**	**Distributor**	**Butchery**
Live cattle trader	9,300	.	9,800	10,830		
Butchery	9,400	7,650	9,200	8,200	11,200	
Beef trader	-	0%		9,500		
Beef processor	100			11,700		18,000
Supermarket	-				11,000	

Source: *live cattle traders, beef traders, butchers and processors survey data, 2022. Note: For live cattle traders the prices are a conversion of the cattle int beef equivalent using the given live weigts.*

4.5.4 Number of cattle markets traded in

The number of markets operated in is a fair indicator that traders move longer distances to look for live cattle and an indicator of the higher transaction costs incurred while sourcing and aggregating the animals which may be reflected in higher prices of cattle at the abattoir and beef prices at consumption levels. Findings showed that overall, 52% of live cattle traders operate in 1-2 cattle markets while the rest (48%) operate in more than two markets. In Karamoja, all (100%), in Eastern Uganda (75%) and Northern region (67%) of the traders operate in more than two cattle markets (Figure 27).

Figure 26: Percentage of live cattle traders by number of markets operated in and region



Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

4.5.5 Means of transporting cattle from markets by region

Transporting cattle on foot is more common in Karamoja and Eastern Uganda where 100% and 75% of the sampled traders respectively indicated they use this means. In Central and Western Uganda, 50% of the traders use pickups for shorter distances while 30% and 50% of the traders respectively use trucks/lorries for longer distances (Figure 28). The majority (58%) of beef buyers use motorcycles (bodaboda) installed with meat boxes to transport beef from abattoirs/ slaughterhouses to their premises. Only 10% and 6% of the beef buyers respectively use specialized trucks and pickup trucks in beef transportation (Figure 29).

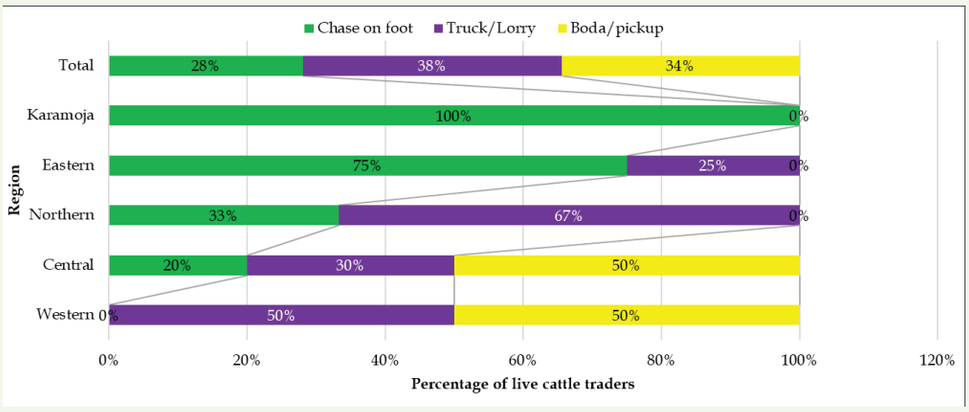
100% of the traders in Karamoja transport cattle on foot

50% of traders in Central and Western Uganda use pickups for shorter distances

50% of the traders in Central and Western Uganda use trucks/lorries for longer distances

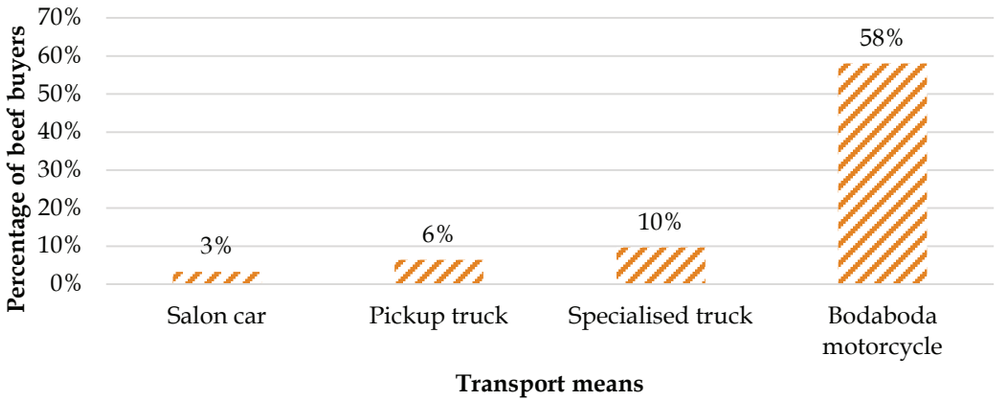
58% of beef buyers use motorcycles (bodaboda) installed with meat boxes to transport beef from abattoirs/slaughter houses to their premises.

Figure 27: Percentage of live cattle traders by means of transport used and region



Source: live cattle traders, beef traders, butchers and processors survey data, 2022.

Figure 28: Percentage of beef buyers by means of transport used



Source: *live cattle traders, beef traders, butchers, and processors survey data, 2022.*

The capacity of the transport means is still low. The boda bodas that are used by 58% of beef buyers can only transport 108kg per trip, an indication of the small scale at which most of the actors operate (Table 40). However, unrefrigerated motorcycles/ vehicles are not the best way to transport beef since it is recommended that for beef to safely reach the final destination, it must stay refrigerated throughout the trip and to avoid contaminating beef during transportation, it is advisable that proper clothing, personal hygiene habits, and wounds on people handling the product are taken care of, which is not the case with Boda bodas in Uganda[51]. This is an indication that beef is transported in improper ways that expose it to contamination, posing a risk to consumer health.

[50] *https://emeraldtransportationsolutions.com/a-guide-to-transporting-meat-products/.*

[51] *https://www.ams.usda.gov/sites/default/files/media/FSIS%20Safety%20and%20Security%20Guidelines%20for%20the%20Transportation%20and%20Distribution%20of%20Meat%2C%20Poultry%2C%20and%20Egg%20Products.pdf*

[52] *https://www.agriterra.org/assets/uploads/15820/Livestock%20market%20study.pdf*

Table 40: Beef actors' average transport means capacity

	Mean Kgs transported per trip	Min	Max
Specialized truck	300	300	300
Pickup	133	40	400
Bodaboda motorcycle	108	40	225
Salon car	116	100	200

Source: live cattle traders, beef traders, butchers and processors survey data, 2022.

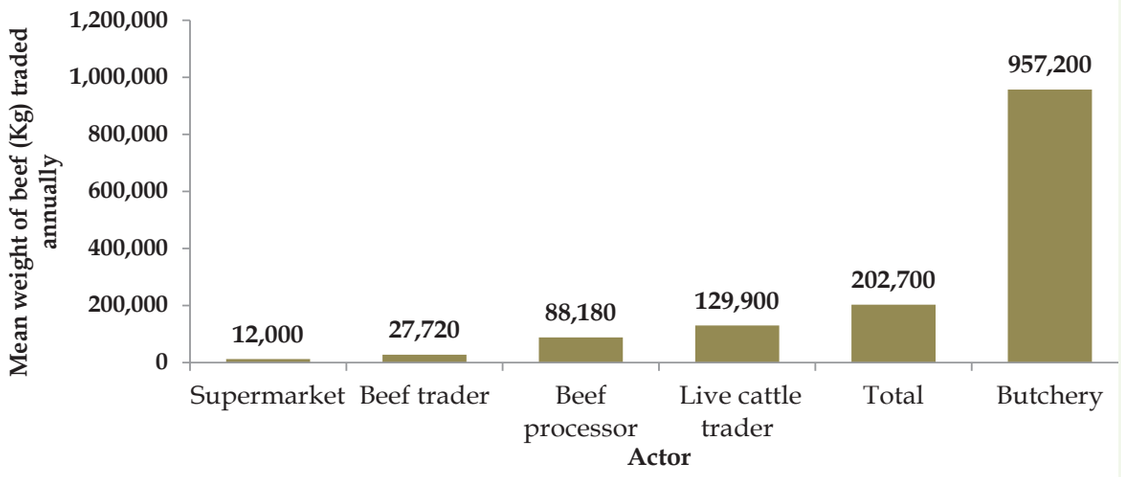
4.5.6 Volume of beef traded

The beef market is characterized by 'mainstream' and 'premium' segments: At the retail level, the mainstream market in Uganda is to the greatest extent serviced by the wide network of roadside and market stall butcheries who are estimated at between 5,000-10,000 in number and account for 75-80% of all beef sales in the country[52].

Live cattle traders and some butchers deal in live animals but when these are converted into beef weights, butcheries are found to aggregate the largest quantities of beef totaling 957,200kg (957MT) annually while live cattle traders aggregated cattle equivalent to 129,900kg each, annually. Other beef value chain actors such as beef traders, processors and supermarkets aggregate about a combined 128MT of beef annually (Figure 30).

By region, Kampala actors aggregated the largest amounts of beef amounting to about 1.4 Million MT of beef annually, followed by Northern region at 202 MT, Central region (less Kampala) at 944MT and Western region at 153MT (Table 41).

Figure 29: Downstream beef value chain actors' amount of beef traded



Source: live cattle traders, beef traders, butchers and processors survey data, 2022.

Table 41: Amount of beef traded by downstream beef value chain actors by region

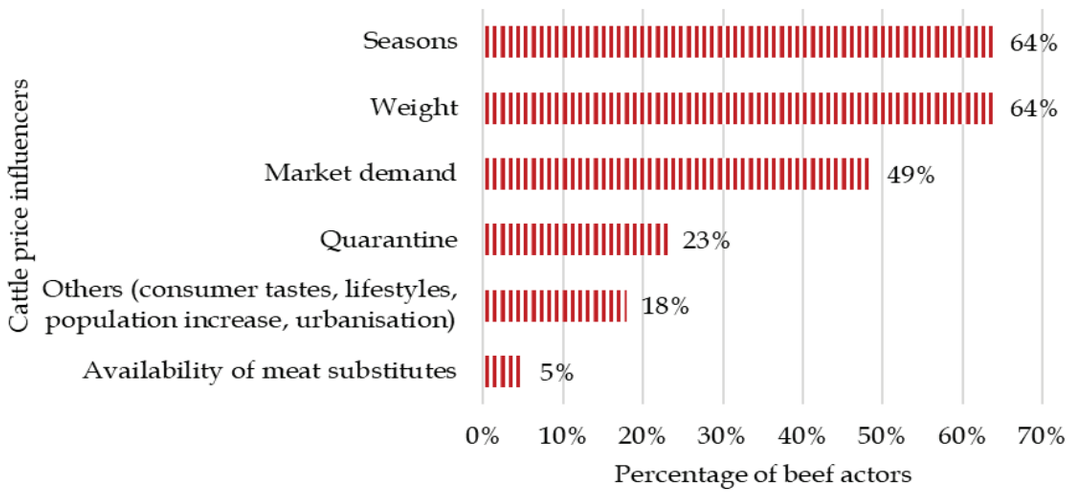
Region	Beef conversion from live cattle[39] (Kg)	Fresh beef (Kg)	Aggregated (Kg)
Central	920,250	23,673	943,923
Western	115,200	37,440	152,640
Eastern	111,000	11,988	122,988
Northern	193,200	9,012	202,212
Karamoja	26,100	6,588	32,688
Kampala	1,323,000	62,335	1,385,335

Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

4.5.7 Drivers of prices for beef value chain actors downstream

Seasonal supply fluctuations and related changes in cattle weight were mentioned by 64% of cattle and beef value chain actors as the leading influencers of cattle prices. Market demand, which is also partly related to seasons was also mentioned by 49% of the actors, while 23% indicated that quarantines that disrupt cattle supply also influence prices with prices hiking in seasons when large areas of the cattle corridor are cordoned off mainly due to outbreaks of foot and mouth disease (FMD) (Figure 31)

Figure 30: Main drivers of cattle and beef prices



Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

[53] *This is for actors who trade in live cattle but not fresh beef*

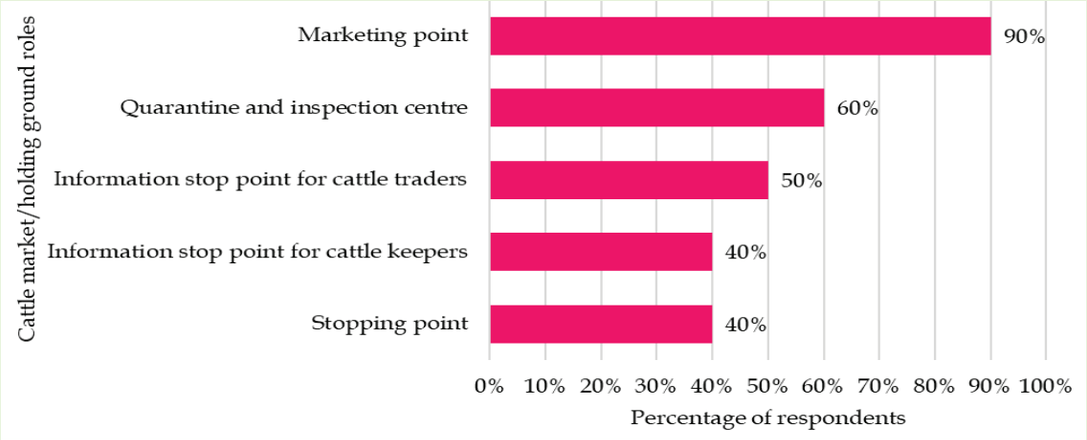
4.6 CATTLE MARKETS AND HOLDING GROUNDS

Photograph 3: Cattle Market/holding grounds infrastructure under construction in Karamoja.
Photo credit: @sebatta from RPLRP/MAAIF project

4.6.1 Characteristics of cattle markets

Cattle markets and holding grounds play a big role in aggregating cattle from various areas so that traders from urban areas find them at a central location. This in addition reduces the transaction costs of looking after the cattle from farm to farm, making these markets a crucial part of the beef value chain. Interviews with the Cattle markets and holding grounds managers indicated that 90% of these markets act as marketing points, 60% as quarantine and animal health inspection centres, 40%-50% as information points and 40% as stopping points for traders with cattle in transit (Figure 32). Ten markets were sampled in this study from the various regions where Northern Uganda had three markets, while there were two in Karamoja, two in Western, two in the Central and one in Eastern Uganda. Each cattle market/holding ground is served with cattle from about four districts. For example, the biggest cattle market at Amach in Lira is served by the five districts of Amolator, Apac, Alebtong, Oyam, and Otuke.

Figure 31: Roles of cattle markets and holding grounds



Photograph 4: Loading cattle at the Bukedea cattle market Photo credit: @sebatta

4.6.2 Number of actors and cattle in markets/holding grounds

All the 10 sampled cattle markets had cattle keepers bringing and selling their live cattle there to traders. Brokers/agents were found operating in 8/10 markets while some of the markets found in Kotido, Nakapiripirit and Lira(30%) had large scale traders, and 70% of the markets also had butchers who buy cattle for slaughter in the neighbouring district towns.

The actors make 6-8 trips a month buying the cattle from the markets. The cattle keepers deliver about 714,200 heads of cattle annually in the 10 sampled cattle markets of which 603,800 (85%) are off taken by live cattle traders. Others are farmers buying cattle for cultivation (oxen) (Table 42).

Table 42: Number of actors and cattle handled in the sampled cattle markets

	Do they Exist (yes %)	Number of actors on a market day	Average number of cattle handled per market day per actor	Total number of cattle for entire market per day	Annual number of cattle handled by the 10 markets	Annual number of cattle handled by the 10 markets
Cattle keepers	100%	120	8	960	6	714,240
Live cattle traders	100%	74	21	1,547	6	603,800
Brokers/agents	80%	51	20	1,035	7	548,700
Live cattle exporters[54]	30%	2	35	58	4	18,700
Transporters	80%	17	24	414	7	223,560
Butchers	70%	16	19	297	8	179,980
Farmers buying cattle for cultivation (oxen)	20%	40	40	1,600	1	128,000

Source: *Cattle market interviews for the beef value chain survey, 2022*

[54] *These were found in Kotido, Nakapiripirit and Lira*

4.6.3 Value chain governors in cattle markets

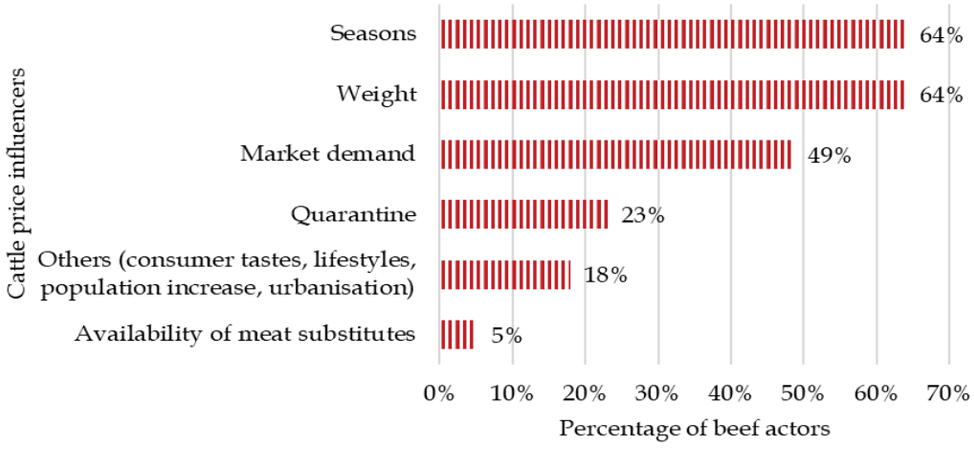
Cattle keepers were the most common market governors followed by live cattle traders and then brokers/agents. The cattle keepers were said to govern the value chain in cattle market level because they have knowledge of their cattle more in terms of value, health status, among others, and hence cannot be easily manipulated by traders. At the same time, given that they are the starting point in the chain, traders heed to their demands more. The traders were said to have the money and hence provide the market for cattle, in that way they always have some negotiating power assisted by brokers. In fact, 7/10 markets had cattle keepers being said to be price setters, while 6/10 markets had the same being said for cattle traders. In 2/10 markets, the brokers were said to be price setters (Figure 34). The three (3) key parameters that are commonly used to determine the VC Governor(s) include:

Who determines what is to be produced: Given the fact that majority of the cattle producers deal in dual-purpose cattle (milk and beef), traders indicated that they have no power to influence the quality of cattle produced. Farmers will choose as and when to sell off their cattle and the types to sell (culled or juvenile bulls).

Which actor determines how it is to be produced including the technology to be used? Cattle keepers choose which breeds to keep and under what system guides by the resources at hand and scale. For instance, small-medium cattle keepers indicated that they preferred the dual-purpose cattle due to its advantages of milk cash and many do not produce for a target market. The large-scale ranchers on the other hand in some cases indicated that they target certain markets such as processors, and hence the buyer dictates the size, age and condition of cattle supplied.

Which actor determines how much is to be produced, and when?. generally, small-medium cattle keepers control their production, selling as and when they feel they have needs for cash or herd restructuring (e.g. reducing number of bulls or culling off old cattle) (here small-medium cattle keepers are governors). Large scale producers who supply specific markets such as the processors on the other hand may have contracts to supply certain quantities at specific times (here processors are governors).

Figure 32: Price setters in sampled markets



Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

4.6.4 Cattle keeper-buyer relationships

In 8/10 sampled markets, cattle farmers are paid cash by traders on the market day. Only 1/10 markets indicated that sellers have a written contract while in 2/10 markets, the sellers have verbal agreements to sell to certain cattle buyers. Apart from 1/10 markets where cattle buyers offer loans/ deferred payments to cattle keepers, in most cases the buyers transport the animals themselves and incur the costs. There was evidence of seller-buyer trust among 4/10 markets even though in 3/10 markets there were mechanisms for conflict mediation and resolution (Table 43).

Table 43: Cattle seller-buyer relationships in the sampled cattle markets

Relationship aspects between cattle keepers and traders/buyers	Frequency	Percent
Payment terms		
Buyer pays cash	8	88.89
Sometimes he takes on credit	1	11.11
Contracts		
Have a written contract with the buyer	1	11.11
No contract at all	6	66.67
Have an unwritten contract with buyer	2	22.22
Services		
Buyer transports the cattle	**8**	**88.89**
Buyer offers loans/differed payments	**1**	**11.11**
Conflict resolution		
They trust each other well	**4**	**44.44**
They have had conflicts before	**1**	**11.11**
They have mediators when we get conflict	**3**	**33.33**
Market management handles conflicts	**1**	**11.11**

Source: *Cattle market interviews for the beef value chain survey, 2022*

4.7 BEEF AND BEEF PRODUCTS CONSUMERS

Overall, 59% of the consumer respondents were females although Karamoja, Eastern and Central regions had higher percentages of females compared to males (Table 44).

Table 44: Percentage of consumer respondents by sex and region

Sex of respondents		
Sub-Region	Male (n=20)	Female (n=29)
Central (Incl. Kampala and Wakiso)	42.42	57.58
Western	60.00	40.00
Eastern	25.00	75.00
Northern	50.00	50.00
Karamoja	0.00	100.00
Total	**40.82**	**59.18**

Source: *Beef consumer interviews for the beef value chain survey, 2022*

4.7.1 Beef and beef products consumed

Fresh beef leads as a beef product consumed among 100% of all sampled beef consumers. Home consumers also popularly consume offals (72%), and Muchomo (roasted beef) (33%) with only 17% consuming sausages and 6% consuming minced meat. Offals were also popular among hotels/restaurants with 43% serving them for breakfast in a mix with matooke (cooked banana and offals). Sausages were more common among 33% of the roadside food vendors (Table 45).

Table 45: Type of beef consumers sampled by region

Percentage of beef consumers			
Region	**Home consumers**	**Hotel/ Restaurant**	**Roadside food vendor**
Central (Incl. Kampala and Wakiso)	79%	27%	6%
Western	20%	60%	20%
Eastern	100%	0%	0%
Northern	75%	25%	0%
Karamoja	67%	33%	0%
Total	**73%**	**29%**	**6%**

Source: *Beef consumer interviews for the beef value chain survey, 2022*

The home consumers access most of their beef and beef products from the butchery, supermarket and street food vendors. Hotels and restaurants access beef and beef products mainly from the abattoir and supermarkets, while roadside food vendors access from a variety of sources including the butchery, abattoir and supermarkets (Table 46).

Table 46: Sources of beef and beef products consumed

Sources	Percentage of consumers		
Fresh beef	**Home Consumers**	**Hotel/ restaurant**	**Roadside food vendor**
Butchery	79%	2%	28%
Abattoir	20%	40%	40%
Street food vendor	100%	0%	0%
Total	**73%**	**6%**	**29%**
Sausages			
Super markets	33%	33%	33%
Liver, tongue and lungs	6%	0%	0%
Street food vendor	100%	0%	20%
Total	**75%**	**13%**	**25%**
Muchomo			
Butchery	60%	0%	40%
Street food vendor	88%	13%	13%
Total	**80%**	**7%**	**20%**
Offals			
Butchery	83%	3%	17%
Abattoir	67%	0%	33%
Total	**81%**	**3%**	**19%**

Source: *Beef consumer interviews for the beef value chain survey, 2022*

4.7.2 Quantity and prices of beef and beef products for consumers

Fresh beef is the most consumed beef product among the sampled beef consumers with a restaurant/hotel consuming an average of about 176kg per month at 16,500 Uganda shilling/kg while home consumers consume about 23kg per month at 16,000 Uganda shillings each. Surprisingly, roadside vendors buy more beef monthly at 252kg though at a lower price of about UGX 12,200 per kg (Table 47).

Table 47: Quantities of beef and beef products consumed

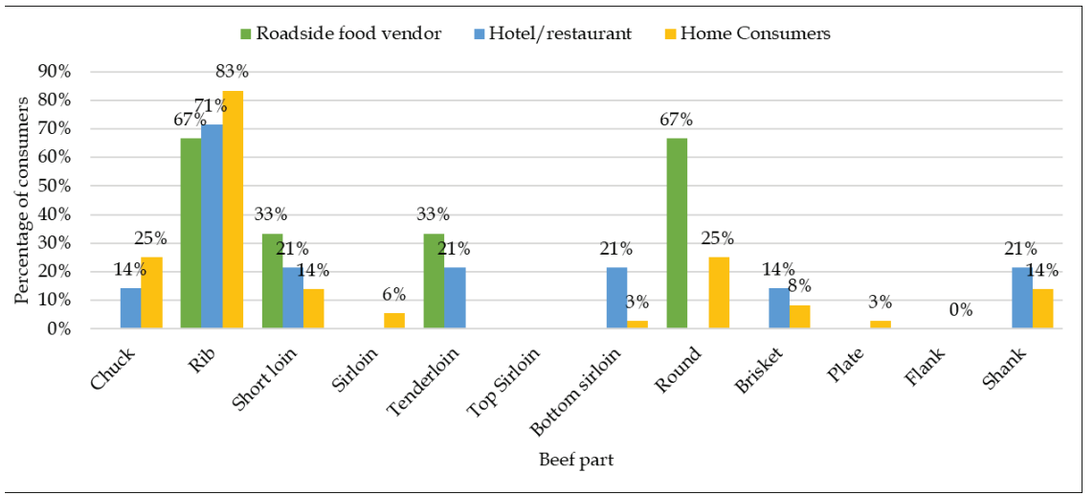
	Mean monthly purchases and unit prices		
Region	**Home consumers**	**Hotel/ Restaurant**	**Roadside food vendor**
Fresh beef			
Quantity (Kg)	176	23	252
Price (UGX/Kg)	16,500	16,000	12,200
Sausages			
Quantity (Kg)	18	10	1
Price (UGX/Kg)	11,500	10,334	12,000
Minced meat			
Quantity (Kg)	.	16	.
Price (UGX/Kg)	.	21,500	.
Muchomo			
Quantity(Kg)	15	5	1
Price (UGX/Kg)	13,000	10,000	6,000
Molokoni			
Quantity (Kg)	1	3	.
Price (UGX/Kg)	20,000	16,700	.
Offals			
Quantity(Kg)	42	5	1
Price (UGX/Kg)	8,600	9,500	8,000

Source: *Beef consumer interviews for the beef value chain survey, 2022*

4.7.3 Preference and quality of beef by consumers

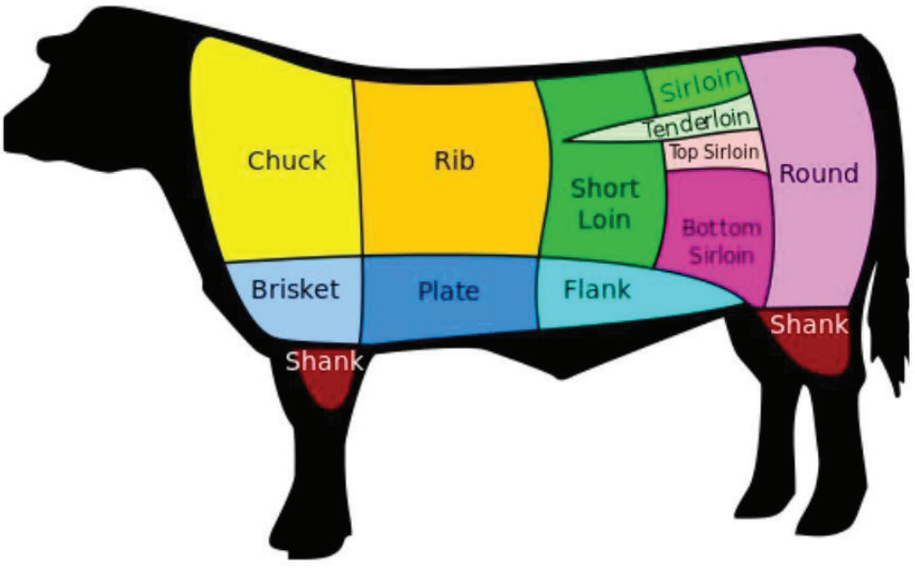
Overall, the rib followed by the short loin are the most preferred parts of beef. However, hotels, restaurants and roadside vendors also prefer the tenderloin, round and shank because of their boneless beef. Among home consumers, 71% indicated they prefer the rib, 21% the tenderloin, bottom sirloin, and the shank (Figure 35).

Figure 33: Main preferred parts of beef by consumers



Source: *Beef consumer interviews for the beef value chain survey, 2022*

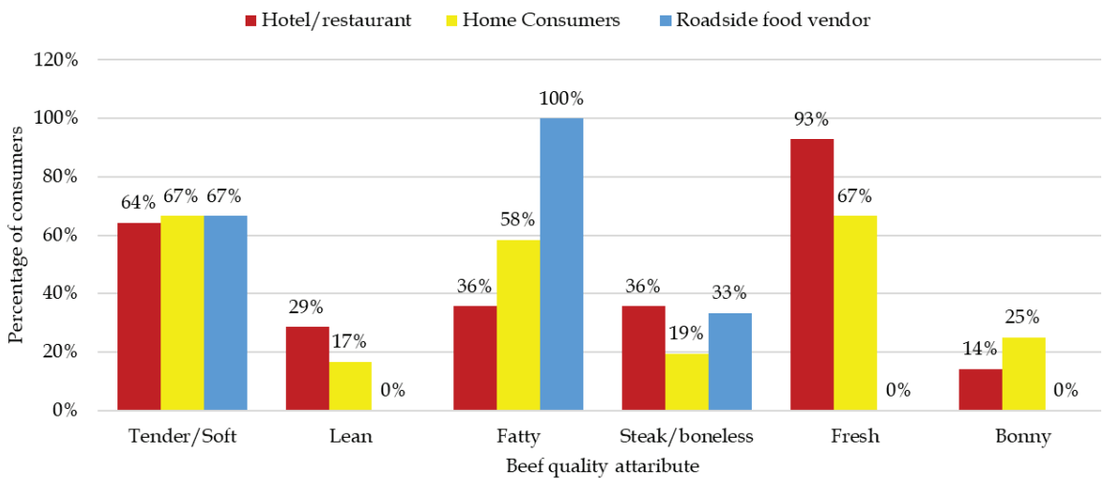
Figure 34 Commonly preferred beef cuts



There is a general agreement on beef quality attributes among the various consumers that tender, fatty and fresh beef embodies what they define as quality beef. Although 36% of the hotels and restaurants and 33% of the roadside vendors also consider steak/ boneless beef as quality beef, only19% of the home consumers do (Figure 36).

36% consider steak/ boneless beef as quality beef

Figure 35: Main beef quality attributes among beef consumers



Source: *Beef consumer interviews for the beef value chain survey, 2022*

Consumers made a number of suggestions on how beef quality on the Ugandan market could be enhanced. The following are their views;

- Cattle keepers should adopt improved breeds as well as ensure proper feeding of their animals.
- There should be routine inspection of hygiene of butcheries as well as the butchers themselves to ensure butchers are healthy and fit to handle beef
- Good hygienic conditions should be ensured in the abattoirs and slaughter houses
- The butcheries should have proper cold storage facilities to keep left over beef fresh.
- Regular inspection at place of origin should be done on cattle to ensure only healthy animals are transported to the abattoir
- The abattoirs should install modern slaughter technologies to ensure proper carcass handling before beef is sold to abattoirs and consumers.
- Cattle traders should adopt proper transportation systems that ensure animals are not stressed in transit.

4.7.4 Consumer challenges

The most mentioned challenges among beef consumers in Uganda were high beef prices that also fluctuate with seasons, poor/ cheating weighing systems at butcheries, unhygienic conditions in which beef is handled from abattoirs, transportation up to the butcheries where there are no proper storage facilities and where sometimes they buy beef which is not fresh or spoilt.

4.8 FINANCIAL INSTITUTIONS & THEIR ROLE IN THE BEEF VALUE CHAIN

There is a wide range of providers of financial services in Uganda that beef value chain actors have access to. Farmers can get access to financing from a SACCO (sometimes via their cooperative) or microfinance institutions. Cooperatives can have access to financing from microfinance institutions and those who qualify can get a loan from commercial banks or other financial institutions. Even though lending conditions of the commercial banks are not the most attractive, given that commercial bank rates range between 16% and 40%, according to Bank of Uganda (BOU, 2022)[55] , compared to SACCOs that charge an average of 15% in interest per annum[56], a conclusion can be made that at least access to short-term finance for every link in the value chain is generally available (through both formal and informal financing), albeit with limitations.

A significant gap still exists in the offer of long-term financing between microfinance institutions. At the lower end of the spectrum, they concentrate on loans of less than UGX 2.6 million and the relatively large-scale commercial banks at the other end that are reluctant to lend to SMEs in the agriculture sector. In both cases, the high interest rates that go as high as 40% for commercial banks and 18%-36% for Microfinance Institutions (MFIs)[57] are often prohibitive for long-term investments. Equity funds, by providing long-term equity finance, contribute to addressing this funding gap. However, most of the existing funding is focused on large deals and target companies at the bank-friendly end of the spectrum.

There are several challenges at farm level to improve farm management aspects. With these improvements, much more profit can be made, and many farmers can become a stronger link in the value chain. Cooperatives can help in achieving this goal. A preferred bank like Centenary should be able to assess the risks involved in livestock projects and come up with a suitable debt offer but currently their loan cap is UGX 4 billion. Larger projects will need to be financed by larger banks such as Stanbic and ABSA; and if the project is sizable, multilaterals such as IFC may be interested to provide long-term project financing.

Donor funds from entities like aBi, UDB and others may be available to improve the "bankability" of the project. Answering the key question of this chapter; there are indeed several possibilities in agri-finance to increase the potential of the livestock sector especially with regard to long-term investment financing. The potential of the livestock sector in Uganda can be improved especially by the development of knowledge and management at the supply side. The most important aspect is to develop a reliable demand and supply side of the market.

Across the board, the level of access to finance in the livestock sector seems to be acceptable when it comes to short-term loans (Table 48). Most SACCOs and banks, such as Centenary Bank, Post Bank and others offer loan products to finance short-term working capital to smallholder livestock farmers and cooperatives.

[55] *https://www.bou.or.ug/bou/bouwebsite/bouwebsitecontent/Supervision/Banking_Charges/Supervision/banking_charges/2022/All/Commercial-Bank-Charges-as-at-April-01-2022.pdf*

[56] *https://www.uccfs.co.ug/index.php/products-services/loans*

However, when it comes to investment financing, most banks and SACCOs are not able or willing to serve small farmers. This is mainly due to the risks associated with farming, including the livestock sector. The value chain in the livestock sector is not yet well developed which makes it harder for banks to predict cash flows necessary to repay long-term loans. Besides, the collateral situation in most cases will not meet the bank's requirements. A guarantee fund that is easily accessible could stimulate long-term lending to the agricultural sector by sharing part of the risk with the bank. However, it seems that the ACF is more successful in stimulating investment financing to processors than farmers. The best option to improve access to financing by the sector is to improve the integration in the value chain.

Modern value chains require traceability creating shorter chains with farmers and processors working closer together. An integrated value chain enables banks to develop value chain financing (VCF). VCF refers to financing farmers based on forward linkages with reputable off-takers (rather than focusing on the credit risk of the individual farmer alone). For example, investments by beef cattle farmers could be financed subject to: (i) off-take contracts with processors, (ii) veterinary assistance provided by the processor, (iii) provision of good genetic materials for breeding (iv) provision of feed by the processor, and (v) a tri-partite agreement between the banks.

4.8.1 Sources of credit by region

Only 17% of the small-medium cattle keepers access credit for farm investment, the highest being in Eastern region (33%), Central (25%) and Western region (18%) and the lowest being in Karamoja and Northern regions (8%). All the large-scale producers (100%) had accessed some credit to invest in their farms in the last one year. None of this access credit was from a commercial bank but VSLAs, SACCOs and cooperatives (for the Central and Western region producers) (Table 48).

Table 48: percentage of small-medium producers accessing credit

Membership organizations	Average number of cattle handled per market day per actor					
	Northern	Eastern	Central	Western	Karamoja	Total
Large scale cattle keeper accessed credit for cattle farm investment	100%	120	8	960	6	714,240
Small-medium cattle keeper accessed credit for cattle farm investment	100%	74	21	1,547	6	603,800
Sources of credit						
VSLA	80%	51	20	1,035	7	548,700
SACCO	30%	2	35	58	4	18,700
Cattle producer cooperative	80%	17	24	414	7	223,560
Cattle farmer association	70%	16	19	297	8	179,980
Beef producer cooperative	20%	40	40	1,600	1	128,000
Crop farmer association						

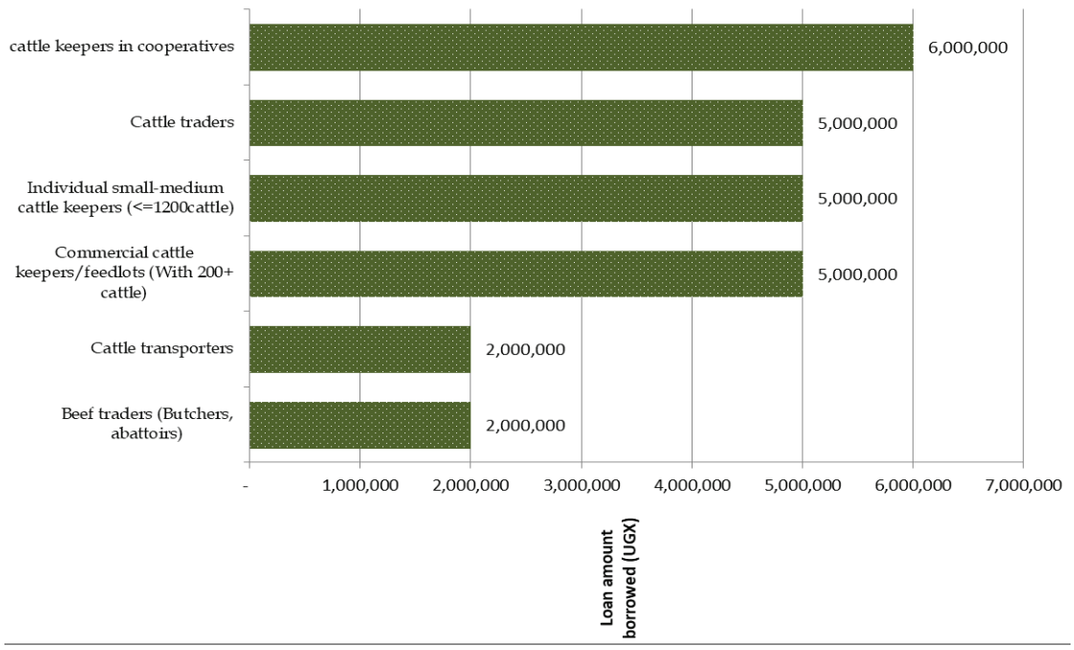
Source: *small-medium cattle producers interviews for the beef value chain survey, 2022*

[57] *https://www.bou.or.ug/bou/bouwebsite/bouwebsitecontent/Supervision/Banking_Charges/Supervision/banking_charges/2021/All/Credit-Institutions-Charges-February-2021.pdf*

4.8.2 Financial products and services to beef VC actors

There are mainly two financial products and services that financial institutions extend to beef value chain actors.These are cash loans and trainings to enable investments that increase returns to the actors and competitiveness of the chain. Financial institution key informants indicated that about 55%-70% of the borrowers are small-medium cattle keepers while others such as cattle traders and butchers make up 30%-45% of the borrowers. Key informant interviews with financial institutions indicated that cattle keepers organized in cooperatives get higher amounts of about UGX 6 million per member while traders, commercial, small and medium producers get about UGX 5 million each. Cattle transporters and beef traders get the lowest amounts (Figure 37).

Figure 36: Loan products accessed by beef value chain actors

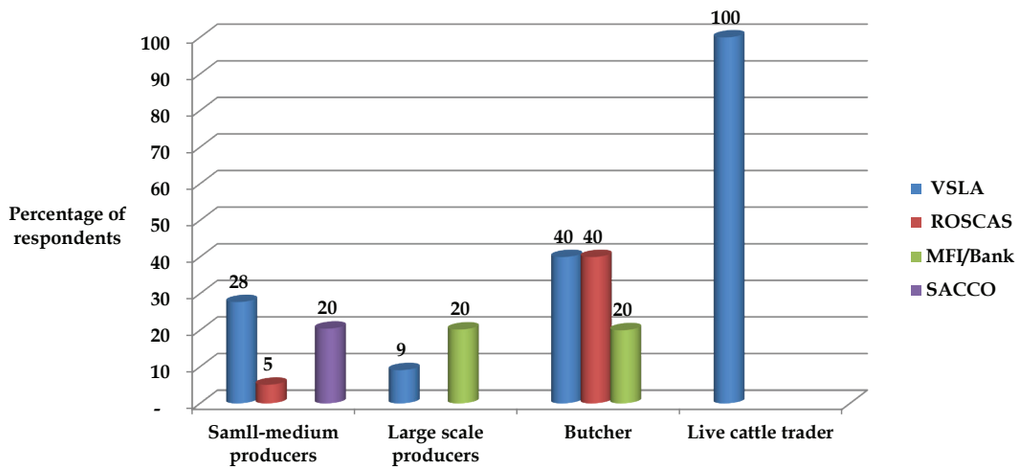


Source: *Key informant interviews with financial institutions*

4.8.3 Providers of financial products and services at the different VC nodes

Except for the large-scale producers and butchers who access financial products from the MFIs and banks (formal financial institutions), other actors mainly access these products from informal financial institutions such as VSLAs, ROSCAs and SACCOs (Figure 38). This means that the majority of actors cannot access substantial amounts of credit to enable them to expand their businesses faster since it is known that these informal institutions operate small loan portfolios.

Figure 37: Sources of financial products for beef value chain actors



Source: *Survey data from cattle producers and live cattle and beef traders*

4.8.4 Terms and conditions of financing

The interest rates ranged between 10% and 25% for different lenders and depending on period of the loan. Collateral in form of land titles or land purchase agreements and vehicle logbooks were mentioned as the main collateral securities required to access loans. However, the loan officers interviewed pointed out that lack of collateral security is a key impediment to many of the actors accessing loans.

4.8.5 Financial service providers' willingness to finance beef VC investments

The financial service providers expressed willingness to fund the beef value chain. However, they pointed out areas that need to be addressed to ensure smooth flow of credit to the beef value chain actors as follows:

- Government and private sector need to invest more in beef products -- to upgrade the value chain and thus make it more profitable;
- Reduce Central Bank Rate, to reduce the cost of lending money;
- Government should create modern markets for beef traders to reduce fragmented operations and help banks/ MFIs and SACCOs access borrowers easily to reduce administrative costs of loans.
- Encourage teamwork and collaboration of various financial institutions for instance, banks can work with SACCOs and VSLAs to reach their members. Big Financial institutions should work hand in hand with small ones for the betterment of the beef chain.

4.8.6 Relationships between financial providers with beef VC actors

The relationship is not as strong given that some actors fail to pay off loans while others fail to access them altogether (due

to lack of financial literacy and risks) and their collateral such as houses, and land are taken by banks. This scares off many actors from seeking financial products through formal financial institutions. The financial institutions, however, are non-discriminatory in gender and type of beef business. One of the loans officers in Nakasongola was quoted saying "*We have no gender considerations; we give loans to all gender categories so long as you are among our target individuals and have all the requirements".*

4.8.7 Constraints faced by beef VC financial providers in facilitating value chain financing

During key informant interviews, the financial service providers to the beef value chain actors pointed out a number of constraints to financing the value chains as follows:

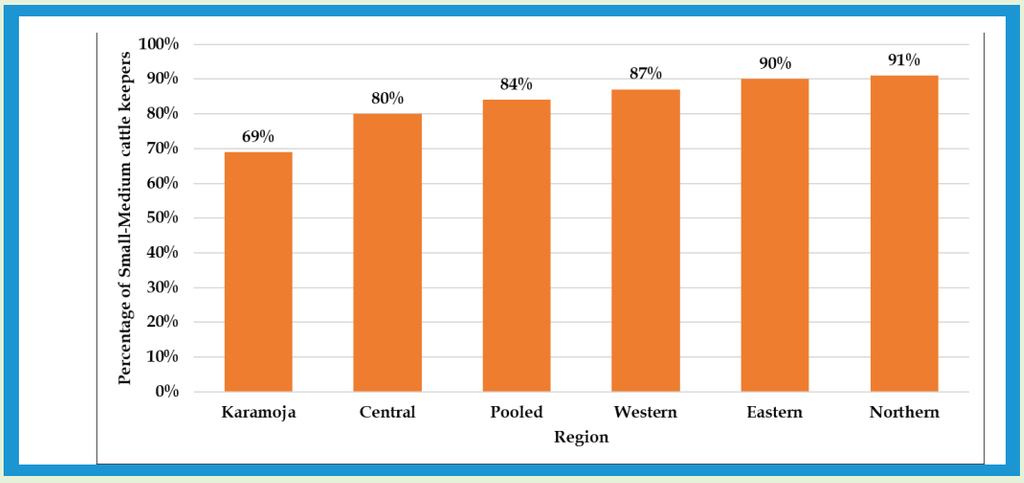
- Lack of collateral/security by actors/ borrowers
- Lack of collateral/security by actors/ borrowers;
- Lack of financial knowledge;
- Some fear loans due to unfavourable interest rates;
- Lack of outreach to rural areas by banks and MFIs;

4.8.8 Access to extension services and Government support

Overall, 84% of the small-medium producers have access to extension services, with the Northern, Eastern and Western regions leading with over 85% of the producers accessing extension services (Figure 39). NGOs are the biggest providers of extension services with 76% of the producers having got these services followed by media (42%) and Government (40%). Karamoja and Northern Uganda have the least access to extension services (Table 51). The large-scale producers access extension services from Government (district Vet officers) and other large agencies such as NAGRC & DB, MAAIF, NAADS, NALIRRI, and ranches such as ASWA ranch (Table 51).

Over 70% of the producers indicated that they find it easy to access the extension services especially on aspects such as pasture production, cattle feeding, disease and parasite management (Table 52).

Figure 38: Percentage of small-medium cattle producers accessing extension services



Source: *Survey data from small-medium cattle producers, 2022*

Table 49: Sources of extension services for small-medium producers

Modal prices (UGX/animal) in last two years							
Region	**Government**	**Cooperative/ association**	**Private firms**	**Media**	**Non-official agency such as private vets**	**Traders**	**NGO**
Western	40%	21%	7%	36%	4%	47%	84%
Eastern	45%	3%	0%	35%	10%	68%	83%
Northern	48%	4%	4%	84%	5%	29%	72%
Central	37%	25%	11%	28%	4%	29%	67%
Karamoja	25%	0%	0%	21%	0%	23%	65%
Total	**40%**	**13%**	**5%**	**42%**	**4%**	**38%**	**76%**

Source: *Survey data from small-medium cattle producers, 2022*

Table 50: Sources of extension services for large scale producers

Extension service providers	Frequency
Local Government production departments/ DVO	3
NAGRC & DB, MAAIF, NAADS, NALIRRI, ASWA ranch	4
Ntungamo dairy farmers coop Union	1
None	3
Total	**11**

Source: *Survey data from large scale cattle producers, 2022*

Table 51: Ease of access to extension services for small-medium producers

Percentage of small-medium producers			
	Cattle feeding and management	**Disease and parasite management**	**Pasture production**
Very easy	46.46	42.52	38.40
Easy	27.78	35.55	25.60
Moderately easy	15.15	16.94	25.60
difficult	3.54	3.99	3.20
Extremely difficult	7.07	1.00	7.20
Total	**100**	**100**	**100**

Source: *Survey data from small-medium cattle producers, 2022*

4.8.9 Relevancy of the extension services accessed

Overall, 84% of all small-medium cattle keepers found the extension services given relevant to their needs. The Northern and Eastern regions lead in terms of cattle keepers appreciating extension services as relevant with over 90% of respondents accessing extension services. The Central and Western regions have 80%-88% of their cattle keepers receiving relevant extension information while Karamoja lags with 67% (Table 54). Only 7% of the cattle keepers paid for the extension services, most of them in Central (15%) and Western (8%) regions. Key informant interviews with DVOs and other Vets who offer the extension services indicated that these payments are in form of fuel facilitation to reach the farms when farmers make emergency calls.

Table 52: Relevance and cost of extension services by small-medium scale producers

Percentage of small-medium producers respondents				
	Extension was relevant to needs		Paid for extension services	
Region	No	Yes	No	Yes
Northern	9.33	90.67	100	0
Eastern	10	90	94.44	5.56
Central	19.74	80.26	85.25	14.75
Western	11.63	88.37	92.11	7.89
Karamoja	32.69	67.31	94.44	5.56
Total	**15.59**	**84.41**	**93.02**	**6.98**

Source: *Small-medium cattle producer survey, 2022.*

4.8.10 Veterinary services and input provision

In Uganda, the veterinary services are decentralized and partially privatized. Clinical services, breeding and spraying for tick control are privatized, while Vaccination against epidemic diseases, Quarantine and Tsetse fly control are retained by the Department of Animal Health which has 3 Divisions namely: Animal Disease Control Division, Veterinary Diagnostics and Epidemiology Division and Veterinary Regulation and Enforcement Division under the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF).Table 53 shows the other actors in disease control and surveillance and their roles.

Other regulatory actors include;

Uganda Veterinary Board (UVB): one of its mandates is to ensure that animal health services are offered by qualified, registered and licensed veterinary professionals under their regulatory supervision. Registration of veterinarian and Para-veterinarians and their premises of practice also falls under their mandate.

Uganda Veterinary Association (UAV) is a legally registered professional association. Its main objective is engagement in community development programs; animal welfare; policy advocacy; promotion of professional standards and welfare of its members.

4.8.11 Access to agro-inputs

The most common inputs that cattle keepers use are the acaricides for spaying of mainly ticks and mange and drugs for disease treatment which are usually administered by Veterinary doctors or animal health practitioners, both public and private. In fact, Figure 17 shows that over 90% of the cattle producers buy and use acaricides and drugs. The main diseases treated are East Coast Fever, anaplasmosis and Heart Water, according to Veterinary officers interviewed as key informants. Veterinary officers indicated that the main challenges in treating these diseases are that some parasites (causing ECF) are picking resistance; and it is now a challenge because farmers have changed to different classes of drugs very often mainly because of the different ingredient strengths in the drugs. For Anaplasmosis: it is mostly the challenge of overdosing; most farmers are not following the right preventive measures.

Farmers mainly access inputs (particularly drugs and acaricides) from the veterinary drug shops in the nearby towns. The sampled vet drug shops indicated that they stock Anthelminthic drugs such as Albafas 10% (5 Litres), Levamisole, Albendazole, Ivermectin, Dabendazole, Alfabas and Levafas Diamond. Arachnidicides ("Drugs against ticks and mites) include Duo Dip (100 mls), Norotrax(250 Mls), Narratrix, Sangatrax,

Table 53: Actors and roles in disease control and surveillance

Actor	Role played
Health professionals (Veterinarians, Para-veterinarians and Community Animal Health Workers).	As the government Veterinarian who issues permits and is responsible for Disease control in his area.
District Veterinary Officer	As the government Veterinarian who issues permits and is responsible for Disease control in his area.
Private veterinarians	Deals with field clinical cases. Veterinary services are privatized and are readily available throughout the country, though relatively expensive.
Retailers of Veterinary Pharmaceuticals	Sell veterinary medicines and drugs.
The Community Animal Health Workers (CAHWs)	operate at community levels and as such they are usually the first people consulted by the farmers.
Livestock Owners	These make decisions on how to treat and by whom and they control the money required for treatment when an animal falls sick.
Herdsmen	mostly children of the livestock keeping household. They are always in contact with the animals and often are the first to notice when an animal falls sick.
NGOs	Contribute to the training of CAHWs; provision of Extension services through Pastoral field services; and donating animals (Send a Cow).
Pharmaceutical companies	These manufacture veterinary medicines and drugs.
Veterinary Drug shops	sell the medicines and drugs to farmers when animals are sick.
Diagnostic Labs	These do the testing of samples and confirmation of provisional diagnosis.

Noro Trax, Afapor, Taktic (100 Mls), Milbitraz and Taktic (100 Mls). Antibiotics include, Bufachem (50), Pen strep (40). Vitamins/ Iron Supplements include Vet Kal B12., and Prime Lick. The interviewed Vet drug shop attendants indicated that the cattle keepers give feedback on complaints about ineffective acaricides for the control of ticks (Complaints by Customers that acaricides are not working). They also indicated that the most counterfeited drugs on the market are Noro-Traz and Alamacln-30.

4.8.12 How agro dealers interact with other beef VC actors

The veterinary drug dealers indicated that they offer several services to cattle keepers apart from selling them the drugs and vaccines. These other services are in many cases free, and they include:

- Offer some farmers credit after some agreement;
- We engage in bulk purchases for our drug shops (to avoid running out of drugs and take advantage of economies of scale) and even sell products at both wholesale and retail prices;
- Transport products to farmers we work with closely/ Transport to customers who buy in bulk;

» Advise customers to use other types of drugs rather than using one brand;

» Offer discount to bulk buyers.

4.8.13 Good Practices in veterinary drug handling

The first practice is to employ qualified personnel to handle the drugs and advise the cattle keepers. Veterinary drug shops had attendants who are specialized in animal production and management, veterinary medicine, animal husbandry and production. Many of the attendants were fully trained Veterinarians or Para-veterinarians.

The second practice is storage of drugs. Class A and B drug shops store drugs on pelleted floors and refrigerators in case of vaccines.

The third practice involves the inspection of the drug shops. The drug shop attendants indicated that they are inspected quarterly by District supervisors and the National Drug Authority (NDA) for expiry and qualification to sell certain drugs depending on whether they are class A or class B drug shops.

4.8.14 Formal, informal trading and counterfeit inputs

Many of the veterinary drug shops are formally registered, although there are also informal ones. One of the drug shop attendants in Teso said" *there are also informal drug sellers-mainly hawkers, but I always sensitize the customers to avoid buying from the untrained hawkers".*

On counterfeits, many of the drug shop attendants agreed that these exist and some mentioned drugs such as Oxy 10% and Duodip as the most counterfeited drugs on the market. However, many were not comfortable talking about counterfeits from statements made such as; *"I have not experienced any such situation of counterfeiters" or "Professionally I am not supposed to mention which drugs are counterfeits".*

4.9 POTENTIAL INTERVENTIONS FOR VALUE CHAIN UPGRADING

The key informants especially at district and market levels gave suggestions for interventions that can help in value chain upgrading from one beef value chain level to another.

4.9.1 Production level upgrading interventions

» Improving breeding at farm level-Adopt fast maturing beef cattle breeds such as Brahman and Romagnola

» Zoning farmers that have met certain standards, it attracts other farmers.

» Adopt intensive and semi-intensive production systems through pasture establishment, paddocking and control carrying capacity, feed preservation and supplementation. In Amolator, one of the Veterinary officers said

> *"Pasture utilisation and management is poor because of communal grazing (rangeland). However, few farmers are gradually adopting pasture establishment and conservation technology".*

» Water Reservation and clean water supply. One of the DVOs in Northern Uganda (Apac) was quoted saying

> *"most of the cattle keepers do not have their own water sources/ reservoirs like dams or boreholes on the farms but they depend on swamps and the lake".*

» Strengthen disease control and prevention- establishment of cattle dip for tick control and vaccination against diseases and parasites. In addition, some

DVOs advised that there is need for construction/restoration of community dips and/or permanent crushes to control ticks and other parasites as well as supply of quality drugs.

» Encourage collective action among beef cattle keepers- organizing farmers into beef producer groups such as beef farmers cooperatives. These will help build capacity of livestock farmers through training in best animal production practice and ease access to markets and inputs.

4.9.2 Market level (cattle markets) upgrading interventions

» Enforce non-compliance standards and use incentives to lure the market actors to adopt new technologies.

» Traceability is key in the export market- Cattle Tracing system.

» Fencing of the cattle markets and putting in place animal handling facilities such as holding grounds, water points and isolation points.

4.9.3 Transport level upgrading interventions

» Adopt standards with checks for transit-animal health and welfare standards compliance, for example transport beef animals with *rubber bolds, hangers* on *cages fixed* on trucks or in crates in a closed truck.

» Have different holding grounds in different areas to control conformity.

» Adopt frozen trucks to transport beef.

» Sensitization and training of actors at this level about animal transportation.

4.9.4 Abattoir level upgrading interventions

» Adopt and conform to standards including export and processing certification

» Institute a system for beef inspection and certification.

» Automate the processing system

» Adopt the mobile Abattoir concept. Mobile abattoirs could travel between farms where the livestock could be slaughtered and carcasses dressed. This could give many rural farmers options as they could still send animals off to a central cutting plant, butcher their own product on site or share resources with other local farmers.

» Improve waste management-To make useful high value products from abattoir waste such as biodiesel, biogas, and bio-oil production as renewable biofuels and the potential of each technology in producing electricity, bio-oil and bio-diesel.

» Improve infrastructure including cold storage, fencing of the abattoir and installation of electricity and water- i.e., construction of modern abattoir facilities, to enhance the operations even at night to increase capacity by extending working hours

4.9.5 Processing level upgrading interventions

» Have and conform to high quality standards and beef certification processes

» Adopt nucleus/Block farm approaches/ contract farming to organise small-medium farmers into beef bulk marketing cooperatives.

» Quality assurance through providing modernized machinery to process quality beef.

» Improve packaging and Branding.

» Establish regional beef/meat processing plants in regions that have good cattle supply

CHAPTER 5

ASSESSMENT OF THE BEEF VALUE CHAIN ACTORS

5.1 RELATIONSHIPS AND LINKAGES AMONG VALUE CHAIN ACTORS

5.1.1 Small-medium scale farms producers

Almost all the small-medium cattle keepers sampled indicated that they are paid cash on spot while selling cattle to the buyers while 10%-12% of the cattle keepers sell on credit to local and large-scale traders. Only 5%-7% of the small-medium scale cattle keepers get paid for the cattle before the buyers pick them up, while 1%-3% are paid via mobile money. Of all sampled small-medium cattle keepers, 7%-16% have a written contract with local and large-scale traders to supply cattle. Verbal contracts exist between 20% of the small-medium scale cattle keepers and local traders as well as 26% with butchers and only 8% have such a relationship with large-scale traders (Table 54).

Table 54: Relationships between cattle buyers and small-medium farms

Percentage of small-medium cattle keepers who sell to buyer							
	Payment terms				Contractual relationships		
Variable	Cash	Takes on credit	Sends money before picking	Pays by mobile money	Have a written contract	No contract	Unwritten/ verbal contract
Local traders	99%	12%	7%	2%	7%	73%	20%
Large scale trader	100%	10%	7%	3%	16%	75%	8%
Butchers	100%	2%	5%	1%	1%	73%	26%
Fellow farmers	99%	0%	0%	1%	1%	94%	6%

***Source**: Small-medium scale cattle keeper primary survey data, 2022.*

5.1.2 The main opportunities that the small-medium scale producers have, as mentioned during FGDs, include:

The main opportunities that the small-medium scale producers have as mentioned during FGDs are;

» Availability of a large market for beef and an expanding export market with great potential. Uganda's population is about 44 million with a growing per capita beef consumption which provides a domestic

market in addition to a growing export demand especially in South Sudan, DRC, and the Middle East.

- Good quality cattle breed available at community levels. Through NAGRC & DB and Government restocking programmes, cattle keepers indicated that now the improved breeds are available in communities, though breeding and scaling up which takes time but, in the medium term, the benefits will soon be realised.
- Cattle keeping is now done as a business that offers employment opportunities for the actors. Many farmers now see cattle keeping as a business that generates income from beef cattle and milk sold.
- There is increased demand for animal/ cattle stock sold as breeding animals. There was evidence that in the cattle markets, some farmers come to buy good breed cattle to expand their herds.
- In many parts of the country, the road network is improving. According to the 2021/22 report, 5,880km of the national road network is paved against the target of the National Development Plan III (NDP-III) of 7,500 kilometres of the national road network [58].
- There is an expanding network of power/electricity through the Rural Electrification Programme, which will bring beef processing and export markets closer. Uganda's Power Generation is mainly diversified across Four (4) different sources, Hydro (1,023.59 MW), Thermal (100 MW), cogeneration (63.9 MW) and grid-connected Solar (60 MW). The total installed generation capacity has grown from 60 MW in 1954, 400 MW in 2000 to 1,237 MW as of October 2020[59].
- Training institutions are available that are training skilled veterinary personnel to offer more extension services.

5.1.3 Production challenges for small-medium scale producers

The leading challenges for small-medium scale producers are rampant diseases and parasites, mentioned by 87% of the sampled producers, which is linked to the high costs of treatment and acaricides. The other challenges are prolonged dry spells that make pasture and water scarce, as given by 85% of the producers sampled; feed scarcity mentioned by 51%; counterfeit drugs (35%) and poor cattle breeds (35%) (Table 55). Although these challenges are universal to all regions, some are more prevalent in Karamoja, Eastern and Western Uganda.

The main challenges, as noted by cattle keepers in Central and Western regions, included: diseases and parasites such as East Coast Fever (known as Amakeebe); Foot and mouth Disease (known as Kipumpuli); lumpy Skin disease; Ticks; Tsetse flies; mange and worms were said to be the most common parasite. Many of these diseases are tick-borne and are treated mainly through spraying drugs that farmers mentioned as Curatex, Coppertex, Spona, Milbitrax, and Noro- traz.

One of the farmers in Ntusi Sembabule was quoted saying

> *"Ticks are the major causes of diseases, they can even cause more than 10 different diseases for example there is one called Amakeebe, even kasanku, all these are caused by ticks. For kasanku disease, the cattle defecate hard faeces or at times fails pass faeces and then it dies. All these are caused by ticks. You find that a cow cannot see well, and it urinates blood".*

[58] *https://www.unra.go.ug/news/ugat60-from-hoed-paths-to-flyovers-the-journey-of-ugandas-road-network*

[59] *https://www.era.go.ug/index.php/sector-overview/uganda-electricity-sector*

In Northern Uganda farmers mentioned the commonest diseases as foot and mouth disease, 'awira wic", put kom dyang, and swelling around the neck.

The farmers indicated that the reasons why Foot and Mouth Disease (FMD) outbreaks are rampant every year in Western Uganda, were captured from farmers as quoted; "This is because cattle are brought from different regions, such as Tanzania, Isingiro or even DRC but because sick cattle are brought in the disease breaks out. In addition, wild animals from nearby National parks also spread diseases". In Serere district, a key informant said

> *"Some of the drugs and acaricides are highly costly for most cattle keepers yet they are not the most effective for disease and tick control".*

Key informants such as the DVOs in western, Eastern, Northern/Karamoja and Central Uganda mentioned East Coast Fever, Anaplamosis, Babesiosis, Foot and Mouth Disease (FMD), lumpy skin disease and black quarter. In Northern and Eastern Uganda, key informants also mentioned Trypanosomiasis, given that these regions have a lot of Tsetse flies that cause this disease. The DVOs advised that Government should increase availability of FMD Vaccines.

Table 55: Small-medium scale producers' production challenges

	Percentage of small-medium cattle keepers					
	Northern	**Eastern**	**Central**	**Western**	**Karamoja**	**Total**
Challenges						
Rampant diseases and Parasites	89%	65%	87%	94%	83%	87%
Prolonged dry spells	64%	90%	93%	88%	96%	85%
Scarcity of feeds	20%	93%	58%	34%	96%	51%
Counterfeit drugs	27%	3%	43%	59%	0%	35%
Poor breeds	41%	53%	12%	9%	50%	27%
Shortage of extension services	24%	43%	18%	13%	50%	25%
Lack of water infrastructure	13%	45%	32%	2%	58%	23%
Others (limited grazing land, bush fires, insecurity/ theft, labour scarcity etc.)	19%	3%	13%	13%	8%	12%

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

5.1.4 Marketing challenges for small-medium scale producers

Once the small-medium scale producers are ready to sell their cattle, they also face several challenges. Leading among these are low prices mentioned by 97% of the small-medium scale producers; limited access to better markets by 44% (better markets were described as those whose infrastructure in terms of holding grounds and other facilities are in place as well as those that pay a good price compared to when farmers sell at the farm gate to justify travelling to the market); and long distances (how far the markets are from farm) to markets (37%). Other challenges in market access are low and in many cases lack of capacity for value addition on farms; limited access to market information; and delayed payments for credit sales; irregular markets; quarantines; and unpredictable prices (Table 56).

Table 56: Small-medium scale producers' cattle marketing challenges

Percentage of small-medium cattle keepers						
	Northern	Eastern	Central	Western	Karamoja	Total
Challenges						
Low prices	96%	93%	99%	98%	94%	97%
Limited access to better markets	85%	80%	18%	14%	65%	44%
Long distances to markets	45%	85%	17%	13%	77%	37%
Lack of capacity for value addition	33%	58%	18%	20%	56%	31%
Limited access to market information	13%	33%	18%	26%	42%	25%
Others (Delayed payments for credit sales, irregular markets, quarantines, unpredictable prices)	1%	3%	13%	8%	0%	6%

5.1.5 Willingness to produce and sell more cattle for beef

There is a high level of willingness among small-medium scale producers to produce more beef by keeping more cattle or increasing productivity given that 74% of the producers are willing. The will to produce more is highest in Western (92%) and Central region (79%). The main factors to enable the transformation from the current levels of production include: adoption of improved breeds stated by 65% of the producers; increasing herd size by 47%; and accessing finance for investment into the farm by 35%; although they also need to see a rise in prices by 31% of the producers (Table 57).

Table 57: Percentage of small-medium scale producers willing to produce more

Percentage of small-medium cattle keepers						
	Northern	Eastern	Central	Western	Karamoja	Total
Would you like to produce and sell more cattle/ beef?						
Yes %	65.33	60.00	78.95	92.25	48.08	74.46
No%	34.67	40.00	21.05	7.75	51.92	25.54
What needs to be done to increase production						
Adoption of improved breeds	56%	50%	72%	81%	40%	65%
Increase herd size	32%	48%	51%	53%	42%	47%
Reduce age of cattle sold	0%	8%	0%	2%	4%	2%
Increased prices	41%	28%	33%	27%	23%	31%
Improved transport	8%	13%	5%	4%	12%	7%
Access more finance	28%	40%	36%	41%	29%	35%
Others (Improved pastures, reduce counterfeit drugs, expand land, increased access to water)	9%	0%	16%	19%	0%	12%

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

5.1.6 Land Ownership on small-medium scale farms

Overall, 97% of the small-medium scale cattle keepers own land, each with an average of 45 acres, whereas in Central and Western region, producers have more land each with about 97 acres and 62 acres respectively. Results showed that much of the land used for grazing cattle is not owned by the small-medium scale cattle keepers. For instance, cattle keepers' access 58 acres on average that they do not own, and this is common in the Northern and Central regions.

Land utilization among the small-medium scale cattle keepers is skewed towards cattle grazing (88 acres); followed by some crop growing (7 acres); and the rest for tree planting with little used for pasture production. In terms of land tenure, freehold and communal systems are common in all regions, but the central region has a diversity of systems including lease, mailo and tenancy (Table 58).

Table 58: Land ownership by small-medium scale cattle keepers

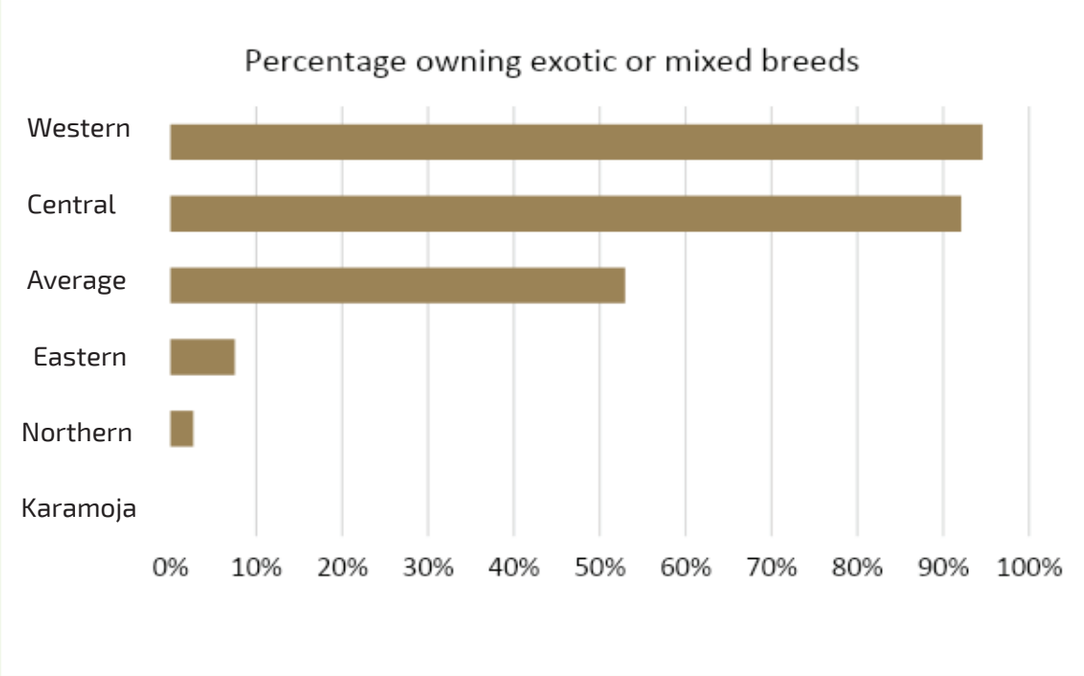
Land ownership, tenure and size among small-medium producers						
	Northern	**Eastern**	**Central**	**Western**	**Karamoja**	**Average**
Owns land (Yes)	95%	100%	97%	96%	96%	97%
Land size						
Land owned (acres)	11.37	11.70	96.53	61.55	4.67	45.36
Land used but not owned (acres)	193.46	7.74	63.16	9.77	19.79	58.27
Land used for grazing (acres)	178.38	6.56	143.41	61.26	10.45	88.18
Land used for crops (acres)	13.56	6.63	5.95	6.10	3.95	7.30
Land used for pasture production (acres)	-	0.25	0.22	0.27	0.02	0.17
Land used for forestry (acres)	0.09	0.45	1.86	1.10	0.02	0.84
Land for homestead (acres)	0.39	0.16	0.29	13%	0.20	0.22
Land tenure						
Freehold	45%	40%	57%	86%	29%	59%
Leasehold	1%	0%	30%	5%	0%	8%
Mailo land	0%	0%	16%	5%	0%	5%
Tenant	1%	3%	4%	5%	0%	3%
Communal	73%	78%	0%	2%	81%	35%

***Source**: Small-medium scale cattle keeper primary survey data, 2022.*

5.2 GOOD AGRICULTURAL PRACTICES (GAPS) ON SMALL-MEDIUM SCALE FARMS

The percentage of farmers who keep improved or mixed breeds as a good practice was 53% of the producers with none from Karamoja. In the Central and Western regions, over 90% of the producers had at least cattle whose breed is improved (Figure 40). There was poor performance when it comes to cattle feeding, with only 3% of the small-medium scale cattle keepers conserving feeds and 6% supplementing feeds, indicating that rangeland extensive grazing is the norm in cattle feeding which in part explains the low beef productivity levels.

Figure 39 Percentage of small-medium scale farmers with exotic or mixed breeds



Source: *Small-medium scale cattle keeper primary survey data, 2022.*

5.3 FARMER ORGANIZATIONS MODELS AMONG SMALL-MEDIUM SCALE CATTLE KEEPERS

Beef cattle farmers are not strongly coalesced around well organized and vibrant associations or cooperatives. According to key informants, such as the DVO of Sembabule, Kitgum and Kyankwanzi, this is because many of them keep dual-purpose cattle (for beef and milk), yet dairy farmers -- given the perishable nature of milk -- have formed strong cooperatives and SACCOs. The second reason given was that many cattle keepers do not regularly sell their cattle; they keep them for long and only sell out of need such as school fees, sickness, death, and social. This means beef producers are overshadowed and swallowed by the dairy cooperatives. However, findings showed that they have other organizations under which they associate, mainly for savings and credit purposes. For instance, 28% of the small-medium scale cattle keepers belonged to a VSLA; 20% belonged to a SACCO; yet only 3% belonged to a beef cooperative as indicated in Table 59.

Table 59: Membership to organizations by small-medium scale cattle keepers

Percentage of small-medium cattle keepers						
Membership organizations	**Northern**	**Eastern**	**Central**	**Western**	**Karamoja**	**Total**
VSLA	29.33	35.00	28.95	23.26	28.85	27.69
SACCO	4.00	0.00	26.32	41.09	0.00	20.43
Cattle producer cooperative	0.00	2.50	27.63	35.66	0.00	18.28
Cattle farmer association	2.67	0.00	11.84	11.63	0.00	6.99
Beef producer cooperative	0.00	0.00	5.26	6.98	0.00	3.49
Crop farmer association	2.67	0.00	3.95	5.43	0.00	3.23

Source: *Small-medium scale cattle keeper primary survey data, 2022.*

5.4 GENDER DYNAMICS IN OWNERSHIP AND CONTROL OF RESOURCES

Generally, women in Central, Western and Karamoja regions have less control and power over decisions on land, cattle, and incomes from cattle sales than in Northern and Eastern Uganda. However, in Karamoja, 46% of the respondents indicated that women have control over other livestock such as goats and sheep; and 63% indicated that women participate in decisions regarding incomes from cattle; while only 29% have control over cattle ownership (Table 60). More women/females, regardless of whether they are youth or old indicated that they are involved in making decisions on land, livestock, and incomes. Table 63 shows that 74% of the women and 100% of female youth who own cattle make decisions on selling it and fewer women indicated that they decide on other livestock. Key informants at district level in western Uganda indicated that women are involved in milk processing for ghee, while others are involved in early morning herding; and others said,

> *"women to some extent have a say on the cattle sales, others sell the cows and are able to use the money for personal use".*

FGD participants in Ntungamo said,

> *"Most of our children are at school, some of them are in boarding schools, they rarely interact with cattle farming and some of them have even lost interest, but for women, they play a major role of looking after the calves".*

Others said,

> "Even w*ithin our Union, we have some females who are part and are active farmers, we also have youths who are on board, we have about 8 women who are engaged in the program* and even some youths".

One of the men said,

> "Women *are now part of the family, we make de*cisions together, I cannot sell my cow without consulting or informing my wife."

In Sembabule, the DVO who was a key

informant indicated that,

> "Both women *and men participate in cattle keeping but men do make most of the decisions apar*t from families headed by women who make their own decisions".

He added that,

> "In the absence of husbands, it is common for wives to make decisions at farm level".

In Nakasongola one of the FGD participating men said

> "Yes, the women stay home making sure that calves are enclosed, properly handled, and given water while the men in the evening, move out for etertainment. Our children also assist the women but some of the children are in boarding schools, they only help during holidays."

In Northern Uganda, FGD participants mentioned that the main roles of women are grazing the animals, fetching water for cattle and sometimes they are involved in decision making on which animal to sell. The main benefits for women from sale of cattle are

> "getting milk for their children and beef if once in a while cattle is slaughtered, or pay their bride price during marriage ceremonies. Others are paying school fees for their school going children and buying for them basic needs by the men".

In Teso region, FGD participants said,

> "Youth participate in grazing animals and spraying - Women participate in watering animals".

In Karamoja, FGD participants commented on the role of women in cattle keeping as

> "Women's role in raising cattle is not much, their role is mostly on processing and selling of cattle products like milk, butter, and ghee. Youth play a great role in supporting the adult males through activities such as grazing, milking, and spraying among others. The children do not engage in much heavy activities, but they support in milking and processing of cattle products".

On gender equity in terms of benefits, they said

> "At household level, women access income from the sell of cattle and their products, this boosts household nutrition. Women also get paid dowry with cattle which contribute to increased assets for their families of origin. The youth get supported through education, bride price payments and start-up capital for small retail businesses while children benefit nutritionally from the meat and milk".

Table 60: Women decision making on small-medium scale farms by region

	Percentage of small-medium cattle keepers					
Decision item	**Northern (n=75)**	**Eastern (n=40)**	**Central (n=76)**	**Western (n=129)**	**Karamoja (n=52)**	**Average (n=372)**
Land	64%	53%	11%	15%	29%	30%
Cattle ownership	68%	50%	14%	13%	29%	31%
Other livestock	68%	53%	16%	16%	46%	34%
Cattle selling	85%	50%	12%	19%	35%	37%
Cattle income	91%	58%	17%	24%	63%	45%
Household workloads	91%	58%	13%	22%	67%	44%

Source : Small-medium scale cattle keeper primary survey data, 2022

Table 61: Women participation in decision making on small-medium farms by age

	Percentage of respondents								
	Youth (n=84)			**Old (n=288)**			**Overall (n=372)**		
Decision item	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Average**
Land	25%	67%	26%	28%	67%	31%	27%	67%	30%
Cattle ownership	26%	67%	27%	28%	67%	32%	28%	67%	31%
Other livestock	31%	33%	31%	33%	67%	35%	32%	63%	34%
Cattle selling	37%	100%	39%	33%	71%	36%	34%	74%	37%
Cattle income	48%	100%	50%	41%	71%	44%	43%	74%	45%
Household workloads	52%	100%	54%	39%	71%	41%	42%	74%	44%

Source:*Small-medium scale cattle keeper primary survey data, 2022.*

5.5 GENDER AND CATTLE OWNERSHIP AND INCOMES

Results indicated that small-medium youthful cattle keepers owned slightly more cattle than the older ones, while males owned more than females regardless of their age. Among the older cattle keepers, men sold significantly ($p<0.05$) more cattle than women and earned significantly higher as well (Table 62). Results in Table 65 confirmed that youth and women in Northern and Eastern Uganda owned cattle unlike in Karamoja.

Table 62: Number of cattle owned, sold and incomes earned by men and women

Region	Number of cattle sold and owned					
	Number of cattle owned		Number of cattle sold		Annual income from cattle (UGX)	
	Youth (<=35 years)	Old	cattle sold	Youth (<=35 years)	Old	Youth (<=35 years)
Male	49	41	13	12	6,978,000	7,455,600
Female	20	33	2	4	957,600	2,746,820
Total	48	40	13	11	6,740,600	7,039,540
P-value	0.31	0.30	0.41	0.04	0.30	0.02
Karamoja	3	3	0	17	22	0

Source:*Small-medium scale cattle keeper primary survey data, 2022.*

Table 63: Number of cattle owned, sold by region

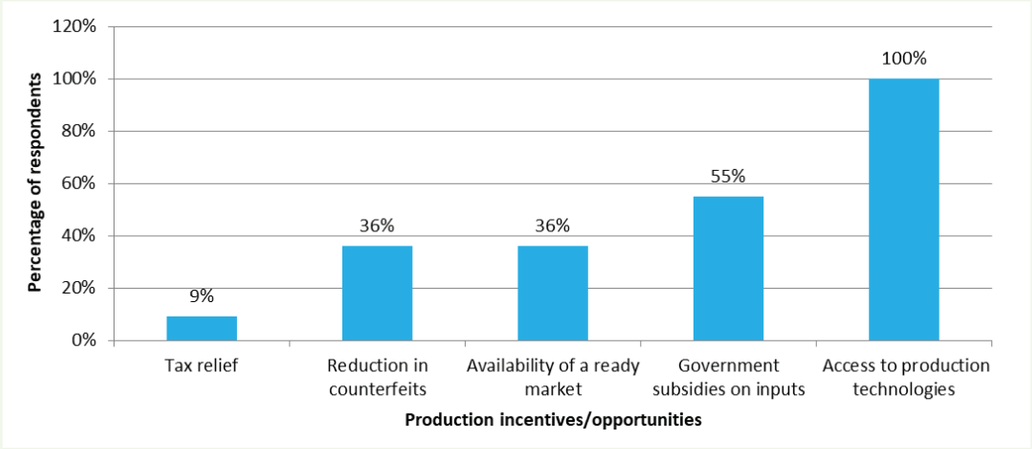
Region	Number of cattle sold and owned in last two years							
		SOLD				OWNED		
		Male		Female		Male		Female
	Youth	Old	Youth	Old	Youth	Old	Youth	Old
Northern	2	7	2	2	15	26	12	19
Eastern	2	3	3	2	14	20	37	16
Central	35	21	0	7	96	61	0	36
Western	13	13	0	6	63	50	0	52
Karamoja	3	3	0	0	17	22	0	0

Source: Small-medium scale cattle keeper primary survey data, 2022.

5.5.1 Relationships, opportunities and challenges for large-scale producers

According to the district key informants, opportunities large-scale producers have are availability of the domestic beef market with growing demand, potential for the export market as well as improved infrastructure networks especially highways. In addition, there is growing prioritization of beef in Government planning and programming for example NDPIII program and the agro-industrialization agenda, where government seeks to inject more resources into the livestock sector and beef sub-sector. In fact, 100% of the producers indicated that they see opportunities in access to improved technologies such as breeds promoted by MAAIF under NAGRC & DB, while 55% mentioned opportunities in Government subsidies on inputs (Figure 40).

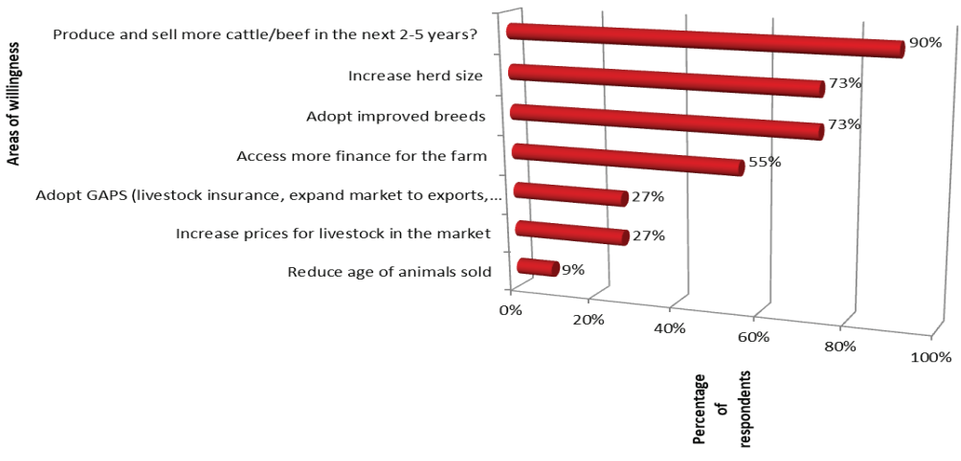
Figure 40: Large-scale producers' cattle production incentives/ opportunities



Source: *Large-scale cattle keeper primary survey data, 2022.*

About 90% of the large-scale producers are willing to increase beef cattle production despite various limitations. Seventy-three per cent (73%) indicated that to do so they need to adopt improved cattle breeds and increase herd sizes, while 55% want increased access to finance, and 27% want to see prices increase as an incentive (Figure 42).

Figure 41: Willingness of large-scale producers to produce more



Source:Large-scale cattle keeper primary survey data, 2022.

5.5.2 Large-scale producer production challenges

The leading production challenges are diseases and parasites (73%), prolonged droughts (64%) that lead to shortage of pastures and water, leading to scarcity of feeds (36%), and adulterated drugs on the Ugandan market (27%) (Figure 43).

Key informant interviews with veterinary drug sellers indicated that low drug efficacy is a serious problem. For instance, a drug seller in Kiruhura district, Ms. Lorna, was quoted saying,

> *"Farmers complain about acaricides resistance, so I continue telling them to use other drugs".*

Edmond, another veterinary drug seller was quoted advising that to solve the issue of ineffective drugs,

> *"GOU and private sector need to invest more in acaricides and tick research".*

One of the DVOs in Ntugamo was also quoted saying,

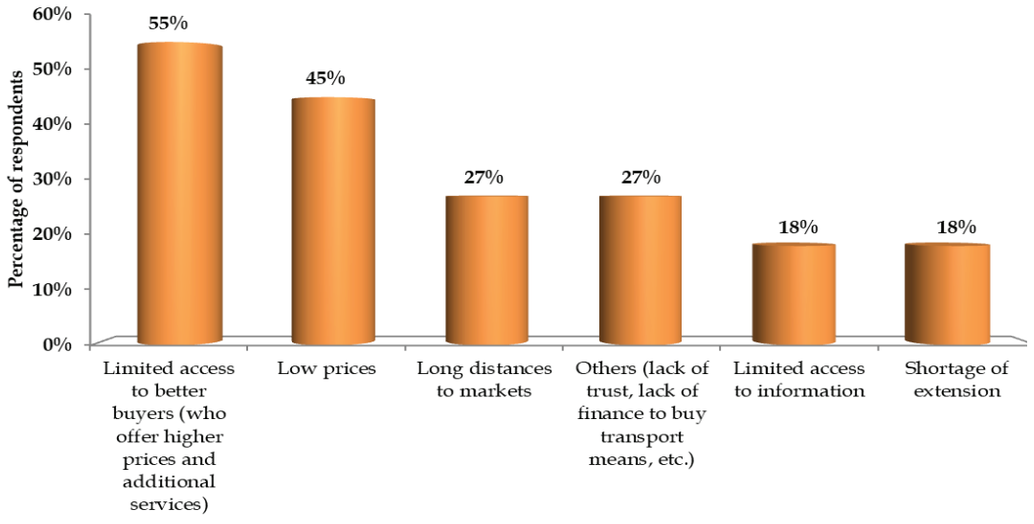
> *"Some parasites are picking resistance; it is now a challenge because farmers have over-changed different classes of drugs".*

5.5.3 Large-scale producer marketing challenges

The key marketing challenges for the large-scale producers are limited access to better buyers/markets (55%), low prices (45%), and long distances to markets (27%) (Figure 42). During FGDs, members of Nabiswera Meat Cooperative in Nakasongola were quoted saying,

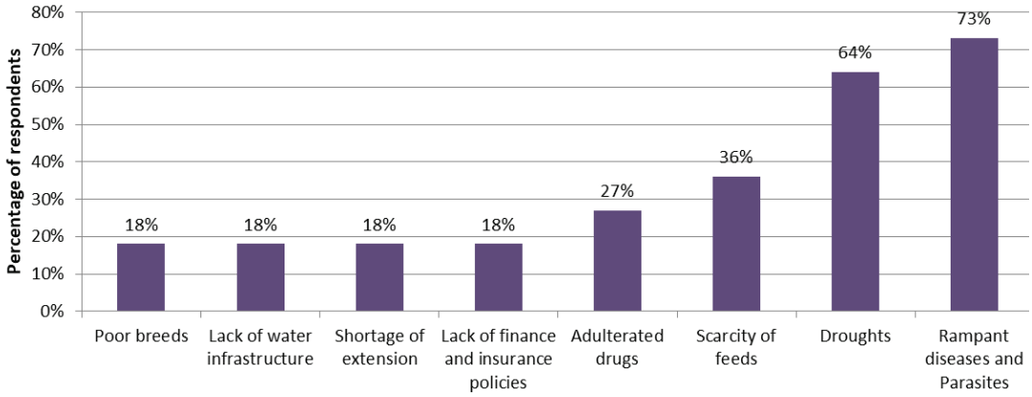
> *"We came together as a cooperative to get better markets for our products, but our voice is not yet strong though and our main market is still domestic, yet we would like to access export markets too. You just meet a cattle buyer, or you call them and negotiate for a given product price".*

Figure 42: Large-scale producers' cattle marketing challenges



Source: *Large scale cattle keeper primary survey data, 2022.*

Figure 43: Large-scale producers' production challenges



Source: *Large scale cattle keeper primary survey data, 2022.*

Table 64: Large-scale producers' potential on farm investments

Investment item	Percentage of producers who see this as a required investment	Average amount needed
Tractor for mechanisation	73%	190,000,000
Truck for transport	36%	185,000,000
Cattle spray race	36%	38,300,000
Watering troughs	45%	22,000,000
Plant more pastures and legumes	73%	21,300,000
Value addition equipment for cattle slaughter	36%	13,800,000
Cattle sheds	36%	8,000,000
Establishing pastures	73%	6,938,000
Cattle dip	27%	6,818,200
Establishing legumes	27%	1,667,000

Source: *Large scale cattle keeper primary survey data, 2022.*

5.6 RELATIONSHIPS AND LINKAGES AMONG BEEF TRADERS AND PROCESSORS

5.6.1 Contractual relationships within the beef value chain

Only 5% of the value chain actors on the downstream have written contracts, 12% among butchers. The statistics from respondents also indicated that 8% of the actors have verbal agreements with customers. None of the live cattle traders and the supermarket had a contract with buyers (Table 65).

5% of the value chain actors on the downstream have written contracts

8% of the actors have verbal agreements with customers

Table 65: Percentage of downstream beef value chain actors with contracts

	Percentage of actors					
	Live cattle trader	**Beef trader**	**Beef processor**	**Supermarket**	**Butcher**	**Total**
I have a written contract	65.33	60.00	78.95	92.25	48.08	74.46
I have a verbal contract	34.67	40.00	21.05	7.75	51.92	25.54
Total	**100**	**100**	**100**	**100**	**100**	**100**

Source: *Live cattle traders, beef traders, butchers, and processors survey data, 2022.*

5.6.2 Membership to trader organizations

Only 19% of the actors belong to a group and these mainly deal in live cattle (30%) and butcher (23%). Of these, 63% belong to VSLAs where they save and borrow (indicated by 88% who said they benefit by getting cash loans) while 25% belong to Rotating Savings and Credit Associations (ROSCAs) (Table 66). These findings show that many of the beef value chain actors on the downstream operate as individuals with a few belonging to loosen groups such as VSLAs, many of whom are even new members since the average time as a member to the groups was found to be only 7 months and maximum 18 months.

19% of the actors belong to a group and these mainly deal in live cattle (30%) and butcher (23%).

63% belong to VSLAs where they save and borrow (indicated by 88% who said they benefit by getting cash loans)

25% belong to Rotating Savings and Credit Associations (ROSCAs)

Table 66: Percentage of downstream beef value chain actors in groups

Actor belongs to a group/association, %		
Value chain Actor	**Yes**	**No**
Live cattle trader	30	70
Beef trader	0	100
Beef processor	0	100
Supermarket	0	100
Butchery	22.73	77.27
Total	**19.05**	**80.95**

Type of informal group	**Frequency**	**Percent**
Unregistered VSLA	5	62.5
Unregistered ROSCAS	2	25
Butcher's association	1	12.5
Total	**8**	**100**
		Mean
Number of months as members	8	7 (Min 1, Max 18)
Main benefits from group		
Get cash loans	7	87.50
For social support	1	12.50

Source: *Live cattle traders, beef traders, butchers, and processors survey data, 2022.*

5.7 OPPORTUNITIES, CONSTRAINTS AND CHALLENGES IN THE BEEF VALUE CHAIN

5.7.1 Beef trading, processing and distribution nodes

The live cattle traders mentioned access to technologies by farmers such as AI and other production technologies for improved farm-level production as the main opportunities in addition to increasing demand, social networks, and increased access to lucrative markets such as the South Sudan and DRC beef markets. Among processors, 40% mentioned tax relief and subsidies (here actors are given tax exemptions on imported material inputs while others are subsidized on import duty. Examples are deduction of 2% income tax for employers that employ PWDs, investment in processing agricultural products[60]) as well as 60% mentioning increasing demand and increased access to lucrative markets (Table 67).

Table 67: Main opportunities for beef value chain actors

	Percentage of actors				
	Subsidies	Tax relief	Access to technologies	Reduced counterfeits	Others (Increasing demand, social networks, increased access to lucrative markets etc.)
Live cattle trader	20%	20%	40%	20%	30%
Beef trader	0%	50%	0%	0%	50%
Beef processor	40%	40%	0%	0%	60%
Supermarket	0%	0%	0%	0%	100%
Butchery	16%	32%	16%	0%	58%
Total	**18%**	**31%**	**18%**	**5%**	**51%**

Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

5.7.2 Constraints and challenges at the downstream of the beef value chain

The live cattle traders mentioned access to technologies by farmers such as AI and other production technologies for improved farm-level production as the main opportunities in addition to increasing demand, social networks, and increased access to lucrative markets such as the South Sudan and DRC beef markets. Among processors, 40% mentioned tax relief and subsidies (here actors are given tax exemptions on imported material inputs while others are subsidized on import duty. Examples are deduction of 2% income tax for employers that employ PWDs, investment in processing agricultural products) as well as 60% mentioning increasing demand and increased access to lucrative markets (Table 67).

40% mentioned tax relief and subsidies (here actors are given tax exemptions on imported material inputs while others are subsidized on import duty.

60% mentioned increasing demand and increased access to lucrative markets

[60] *https://thetaxman.ura.go.ug/a-guide-ontax-incentives-available-to-the-investors-in-uganda/*

Table 68: Downstream beef value chain actors' challenges

Actor challenges	Percentage of respondents					
	Live cattle trader	Beef trader	Beef processor	Supermarket	Butchery	Total
High cattle prices	40%	0%	0%	0%	27%	24%
Poor road infrastructure	70%	25%	20%	0%	23%	33%
Limited access to electricity	0%	0%	20%	0%	5%	5%
High fuel prices	20%	0%	20%	0%	27%	21%
Frequent quarantines	20%	0%	20%	100%	32%	26%
Poor quality cattle	60%	25%	20%	0%	32%	36%
Others (e.g. bribery, lack of better transport means, seasonality, etc.)	30%	75%	20%	0%	14%	24%
High taxes	10%	0%	40%	0%	50%	33%

Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

5.8 POTENTIAL DOWNSTREAM BEEF VALUE CHAIN ACTOR INVESTMENTS

The actors were asked to mention and value the key investments they would want to make to upgrade their beef business operations. Live cattle traders and butcheries would like to invest in better transportation means for live cattle and beef. Butcheries also desire to invest in holding grounds to keep their stock before slaughter and slaughter slabs. Beef processors indicated that they would desire to invest in equipment and machinery, cold facilities, and buildings (Table 69).

Table 69: Key desired investments for beef value chain actors

	Possible investments (UGX)					
	Live cattle trader	Beef trader	Beef processor	Supermarket	Butchery	Total
Transport truck	85,000,000	.	.	.	28,800,000	48,900,000
Holding ground	.	.	.	.	36,700,000	36,700,000
Slaughter slab	.	.	.	.	25,200,000	25,200,000
Equipment and machinery	.	4,000,000	58,700,000	30,000,000	13,000,000	23,300,000
Cold storage facility	.	1,133,000	38,300,000	.	7,508,000	11,400,000
Building structure	.	5,000,000	260,000,000	45,000,000	9,817,000	43,000,000
Others	.	.	150,000,000	.	1,000,000	50,700,000

Source: *Live cattle traders, beef traders, butchers, and processors survey data, 2022.*

59 BEEF PRODUCTS AND BY-PRODUCTS AND PRICING

Fresh beef that is used for production of processed products is the main raw material for beef processors. Kampala city is the seat of many of the processors and the sample comprised many from Kampala. In Kampala, a processor uses about 10.8MT of fresh beef monthly (though this ranges between 1.4MT and 21MT). Outside Kampala, in other urban areas of Central Uganda such as Wakiso, a processor uses 1.7MT of fresh beef monthly (ranging between 1.2MT and 2.2MT) (Table 70).

Table 70: Quantity of beef used for processing per month by processors

Sub region	Mean (Kg) per month	SD	Min	Max
Central	1,700	710	1,200	2,200
Kampala	10,800	9,810	1,440	21,000
Total	**7,168**	**8,550**	**1,200**	**21,000**

Source: *Live cattle traders, beef traders, butchers, and processors survey data, 2022.*

Apart from beef traders/butcheries who deal in fresh beef from the abattoir /slaughter house, processors and supermarkets deal in chopped beef (60%), sausages (40%) and other products such as minced meat (40%) (Table 71). The largest quantities produced monthly are for minced meats at an average of 12,400kg per processor followed by sausages at 1,515kg. Deep processed beef fetches the highest price at UGX 21,000 per kilogramme followed by chopped beef at 16,500 UGX/kg.

Table 71: Key beef products from processors

Products	% Of Processors	Quantities & Prices	
Chopped beef	60%	Quantity (Kg) per month	1,090
		Price (UGX/Kg)	16,500
Deep processing	20%	Quantity (Kg)	100
		Price (UGX/Kg)	21,000
Sausages	40%	Quantity (Kg)	1,515
		Price (UGX/Kg)	10,500
Deli meats	5%	Quantity (Kg)	12,400
		Price (UGX/Kg)	11,500
Others (e.g., minced meat)	40%	Quantity (Kg)	1,090
		Price (UGX/Kg)	16,500

Source: *live cattle traders, beef traders, butchers, and processors survey data, 2022.*

Results indicated that beef processors who slaughter live cattle get about 13.4MT of beef from slaughtered cattle while those who purchase fresh beef use about 6.8MT in Central and 19.1MT in Kampala. These quantities only represent 47% and 68% of full operating capacity in Central and Kampala respectively (Table 72). These findings point to the fact that there is still room for more beef processing among the current processors. The processors during interviews indicated that the high cost of processing leads to expensive products that stifles demand for such products and consumers resort to consuming mainly fresh beef. On whether it is worth UDC investing in establishment of new meat processing facilities; from a market standpoint, establishing a new factory operating at a lower cost (say using more solar than the expensive hydro power) would lower the price of processed products and encourage consumers to switch from fresh beef to processed products.

Table 72: Beef processors monthly capacity utilization

Sub region	Mean (Kg) per month	Fresh beef (Kg)/month	% Operating capacity
Central	13,440	6,840	46.67
Kampala		19,067	67.67
Total	13,440	12,953	57.17

***Source**: Live cattle traders, beef traders, butchers, and processors survey data, 2022.*

5.10 TYPES OF BEEF CUTS

The most common beef cuts are the rib, round, and shank among processors, supermarkets,and butcheries. However, the chuck is popular among 53% of the butcheries while the flank, short plate and brisket is common among 24% of the butcheries (Table 73). Other butchers however indicated that many of their consumers do not demand a particular cut when buying beef.

Table 73: Beef cuts supplied by actors

	Percentage of respondents		
	Beef processor	Supermarket	Butchery
Beef cut types			
Rib	20%	100%	71%
Chuck	0%	0%	53%
Round	40%	100%	47%
Shank	100%	0%	41%
Loin	0%	0%	29%
Flank	0%	0%	24%
Short plate	20%	0%	24%
Brisket	0%	0%	24%

***Source:** Live cattle traders, beef traders, butchers, and processors survey data, 2022.*

Photograph 5:Types of cuts illustrated

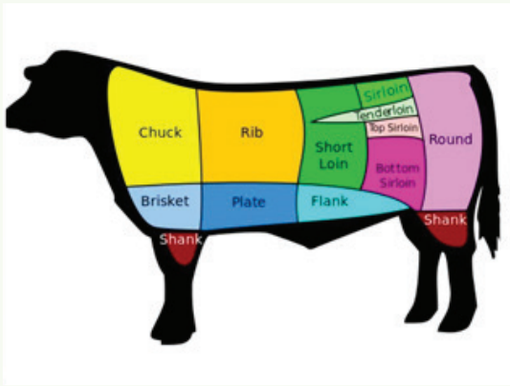


***Photo credit**: Internet*

5.11 BEEF QUALITY ATTRIBUTES BY ACTOR

The most used attributes to tell quality beef are freshness (59%), tenderness (51%) and fattiness (38%). Among processors, tenderness, leanness, and freshness are the key attributes while for butchers, tenderness (53%) and fattiness (65%) and freshness (71%) are the main attributes (Table 74). These results were also confirmed by many of the DVOs who participated in key informant interviews as the key attributes they observe when doing meat/beef inspection at abattoirs or butcheries.

Table 74: Beef quality attributes by actors

	Beef quality attributes						
	Tender/ soft	Lean	Fatty	Steak/ boneless	Fresh (bright red)	Bonny	Others (cattle skin, size etc.)
Live cattle trader	10%	0%	0%	0%	0%	0%	90%
Beef trader	75%	75%	25%	0%	100%	25%	0%
Beef processor	100%	60%	20%	20%	100%	0%	0%
Supermarket	100%	0%	100%	0%	100%	0%	0%
Butchery	53%	18%	65%	12%	71%	18%	24%
Total	**51%**	**24%**	**38%**	**8%**	**59%**	**11%**	**35%**

Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

5.12 Beef standards and regulatory compliance

Although the actors indicated that they do not operate under any written standards, 80% of those who deal in live cattle mentioned that they do quality inspection on farm before buying the cattle. They indicated that they check on the cattle health as well as using observation to check for beef quality of the animals. About 72% of the actors who deal in beef indicated that their buyers outline beef quality standards for the supplies while 40% indicated that such set standards by buyers affect their sales in case they do not comply (Figure 43).

5.13 CATTLE MARKETS-TECHNOLOGIES, CONSTRAINTS

5.13.1 Level of technology and skills among downstream beef value chain actors

There are fair percentages (20%) of beef processors and butchers using essential technologies/equipment such as hand saws, blade skinners and boning hooks. However there is a huge lack of skills in handling animals especially in the abattoir such as during slaughter, stunning, early post-mortem handling and boning. Of the sampled cattle traders, 70% indicated that they are skilled in carcass handling (Table 75). These results point to a capacity gap that needs to be addressed to maintain the integrity of beef and beef products.

Table 75: Percentage of downstream value chain actors and technologies used

Technology/skill	Live cattle trader	Beef trader	Beef processor	Supermarket	Butcher	Total
Carcass treatment	70%	25%	20%	0%	0%	24%
Hand saws	0%	0%	20%	0%	29%	16%
Broad-blade skinners	0%	0%	20%	0%	24%	14%
Steels and sharpeners	10%	0%	20%	0%	18%	14%
Trolleys	0%	25%	0%	100%	18%	14%
boning hooks	0%	0%	20%	100%	12%	11%
Loading/offloading	0%	25%	0%	0%	6%	5%
Skinning	0%	0%	0%	0%	12%	5%
Spray applicator	10%	0%	0%	0%	0%	3%
Gambrels/ gambrel elevator (used to hoist the carcass off the ground)	0%	25%	0%	0%	0%	3%
Chilling tank	0%	0%	20%	0%	0%	3%
Slaughtering/Killing	0%	0%	0%	0%	6%	3%
stunning	10%	0%	0%	0%	0%	3%

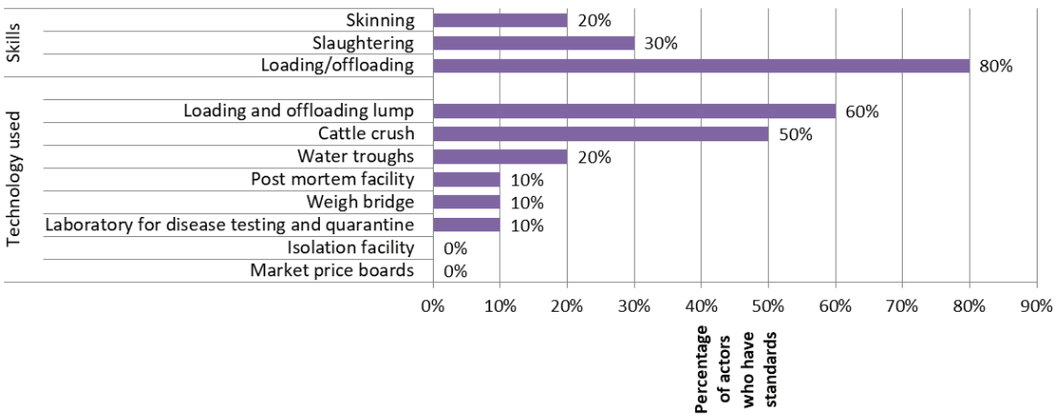
Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

5.13.2 Technologies and skills in cattle markets

Modern cattle markets are supposed to have certain technologies and equipment such as holding grounds, testing laboratories, isolation facilities for sick animals, loading and offloading ramps among others. These make the screening, inspection, and certification of cattle after inspection easy and ensure that only cattle fit for the market is sold. However, the vast majority of the markets visited (the largest in the regions) lacked these facilities. In addition, the handlers of cattle as well as transporters are supposed to have certain skills which lacked in many cases. All these contribute to the poor quality of beef.

The most common technologies available in sampled cattle markets were loading and offloading ramps, by 60% of the markets, cattle crushes in 5/10 markets and watering troughs in 2/10 markets. None of the sampled markets had Market price boards or Isolation facilities for sick cattle. In terms of skills, in 8/10 markets, managers indicated that operators have good skills in loading and offloading cattle while in only 3/10 markets, operators have slaughtering facilities, and none has operators for stunning (Figure 46).

Figure 44: Cattle markets technologies and skills



Cattle market managers also indicated that the current facilities need upgrading because they lack the essential technologies and equipment that would make them modern markets. The main investments needed were identified as cattle crushes, loading/offloading ramps, skilling in loading and offloading, a weigh bridge and water troughs (Table 76).

Table 76: Cost of developing the recommended knowledge/Skills and Technology

Technology/skill	Estimated cost to install/ start (UGX)
Conserves cattle feeds	
Cattle crush	11,500,000
Loading and offloading ramp	4,800,000
Loading/offloading training	4,005,000
Weigh bridge	1,000,000
Water troughs	550,000

5.13.3 Possible infrastructure investments on cattle markets

Market managers indicated that for them to upgrade the current cattle markets and also upgrade their operations to move into other nodes of the beef value chain such as slaughtering and supplying beef instead of live cattle, a single market requires to install a chilling facility worth UGX 900 million, have a transport system (truck) worth about UGX 307 million, get quality certification for beef export worth UGX 200 million and automate systems at UGX 200 million. However, some indicated that to ensure stable supply, they may need to establish a farm and estimated land at about UGX 800 million (Table 77).

UGX 900 MILLION — Needed to install a chilling facility in a single market.

UGX 307 MILLION — Needed to secure a transport system (truck)

UGX 200 MILLION — Needed to get quality certification for beef export

UGX 200 MILLION — Needed to automate systems

Table 77: Possible infrastructure investments per cattle market

Suggested investment	Mean (UGX)	Min	Max
Chilling/cold facility	900,000,000	900,000,000	900,000,000
Transport system	307,000,000	429,000,000	20,000,000
Slaughter facility	202,000,000	263,000,000	5,000,000
Quality standard certification	200,000,000	141,000,000	100,000,000
Own land/farm	800,000,000	800,000,000	800,000,000
Value addition machinery	323,000,000	500,000,000	20,000,000
Process automation	200,000,000	.	200,000,000
Others (expand market, install cameras, improve security)	514,000,000	991,000,000	

Source: *Cattle markets manage interviews, BVC 2022*

Note: *these wee averages of what manages at cattle markets indicated they need to upgrade a typical cattle market to a modem one.*

5.13.4 Cattle markets ownership and management

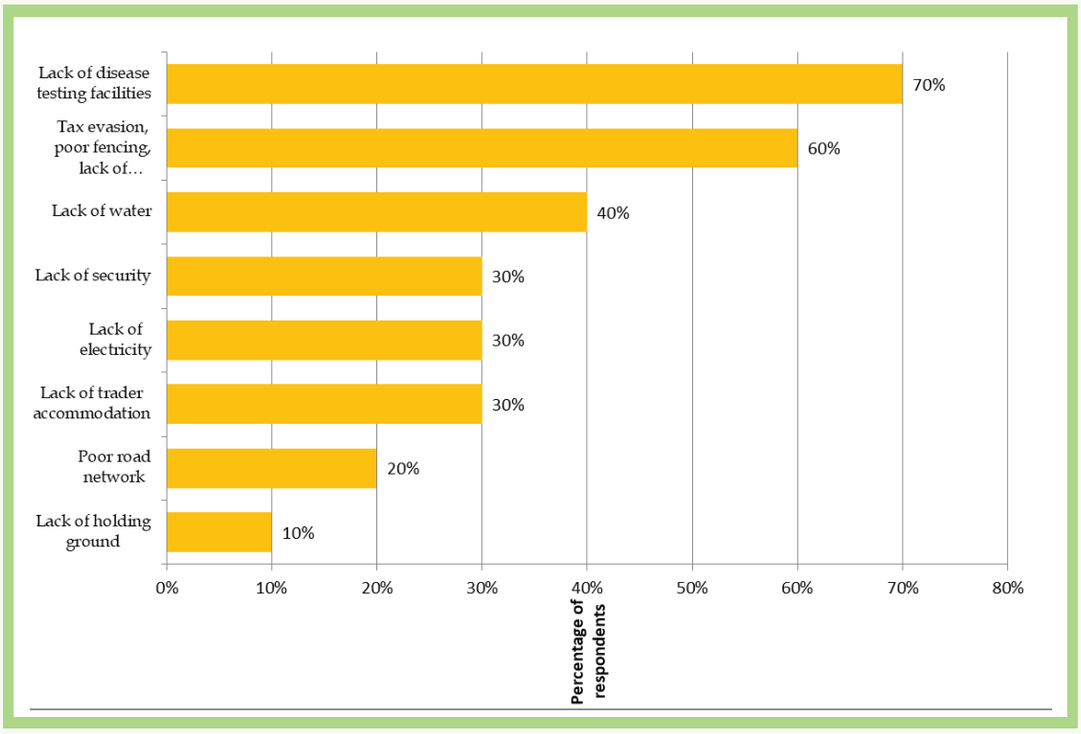
According to key informants in the cattle markets, almost all the cattle markets are owned by the Local Governments, except one market in Bukedea that is managed by a cooperative although daily running of activities is usually tendered out to service providers who collect the taxes and maintain the markets. However, the local government maintains presence in the markets through the Veterinary officers and inspectors who issue movement permits to cattle traders and do inspection of the cattle before they are loaded onto trucks to their destinations.

Asked about market integration, many of the market managers (7/10) indicated that there is less vertical integration but more of horizontal integration where cattle keepers and traders deliver cattle to the markets and sell to traders and a few live cattle exporters and few processors who carry live cattle. In 4/6 markets we found that the Government had implemented some interventions especially revamping or constructing new infrastructures, especially in Teso and Karamoja sub-regions where MAAIF has just implemented the Regional Pastoral Livelihoods Resilience Project (RPLRP) funded by the World Bank, IGAD and Government of Uganda.

5.13.5 Challenges faced in cattle markets

The leading challenges at cattle markets are Lack of disease testing facilities, Tax evasion by traders, poor fencing of the markets where animals could easily escape, lack of weighing scales to ensure animals are weighed before loading, lack of water, electricity and accommodation for traders (Figure 45).

Figure 45: Cattle markets challenges



The cattle markets also face a capacity challenge in that they only operate at 40% less than the full capacity. Some markets like in Amolator, Nakapiripirit, and Sembabule operate at 52%-80% less capacity (Table 78).

Table 78: Cattle markets capacity shortages

Cattle market/ district	Installed capacity of this cattle market/ holding ground	Current operating capacity (cattle handled/day)	Capacity utilization (%)
Amolatar	250	120	52%
Apac	150	100	33%
Bukedea	4,000	2,000	50%
Kotido	500	400	20%
Kyankwanzi	800	475	41%
Lira (Amach)	1,500	1,000	33%
Mbarara	100	100	0%
Nakapiripirit	500	100	80%
Ntungamo	1,000	1,000	0%
Sembabule	120	45	63%
Total	**892**	**534**	**40%**

5.14 Value addition and capacity utilization in beef abattoirs

5.14.1 Overview of the sampled abattoirs

The sampled abattoirs were in Kampala and Wakiso although in some upcountry towns/cities, there were slaughterhouses that are managed by tenderers awarded by the municipalities. The main roles played by the abattoirs are:

- Slaughter of animals to produce beef that is safe for human consumption;
- Inspection of animals before slaughter;
- Inspection and certification of carcasses/beef before it is dispatched to butcheries;
- Market for livestock provision, slaughter services, selling beef, employment creation;
- Social roles like charity and self-help among the abattoir actors.

In terms of vertical integration, the key informants indicated that there are no contracts among traders and beef buyers from the abattoirs. Cattle traders and sometimes farmers bring cattle to the abattoir and sell to the traders found there, who pay and slaughter for them. These then sell to various butcheries and big consumers (restaurants, hotels, meat shops). However, meat processors (some located within the abattoir premises) buy beef directly from the beef traders in the abattoir. The processors do not buy and slaughter own animals, the beef traders in the abattoir supply beef to them. Meat processors are independent from the beef traders.

5.14.2 Costs and revenues at the abattoir

The largest cost at the abattoir is for water and salaries/wages followed by licenses and electricity totalling about UGX 35.8 million. The main revenues are from the collections made in form of dues per head of cattle that comes into the abattoir for slaughter, which is about UGX 5,000 per head. This generates revenues of about UGX 90 million and gross margins worth UGX 54.2 million (Table 79).

Table 79: Costs and revenues incurred by abattoirs

Item	Cost / revenue(UGX) per year
Water charges	23,500,000
Electricity charges	500,000
Licenses	11,800,000
Salaries & wages	35,800,000
Average	90,000,000
Revenues	54,200,000
Net revenue (Gross margin)	23,500,000

5.14.3 Abattoir capacity utilization

The sampled abattoirs operate 7 days a week and throughout the year with peak months being December, April, and August while the off-peak/lean season is usually experienced in January, February, March, and November. In a typical season, the abattoirs have 5-50 head of cattle slaughtered giving about 800-5,000kg of beef much as the peak season capacity is 40-65 head of cattle that yield about 7MT of beef daily (this gives carcass yield of about 155kg per head of cattle).

The largest Kampala City abattoir has a daily capacity of about 225 heads of cattle slaughtered yielding 24,000kg-30,000kg of beef. The second largest among the sampled abattoirs is the one at Wankulukuku with daily capacity of 15 head of cattle and 1,800kg of beef. The Kampala City abattoir as a case, has about 100 cattle traders, 50 butchers, 3 processors, 10 transporters and 120 consumers (home, hotel, roadside

vendors, and restaurants). The other averagely smaller abattoirs have cattle keepers as actors, butchers, transporters, and cattle traders. For example, the Nile abattoir at Masanafu has 500 cattle keepers and 100 cattle traders who operate in it.

5.14.4 Registration and Licensing of abattoirs

Licensing at the abattoirs

The abattoirs are licensed by the city/district authorities under the veterinary officer who also doubles as cattle/beef inspector. The managers at the abattoir indicated that they pay about UGX 11.8 million annually in licenses.

Market regulations implemented/ enforced at the abattoirs and compliance:

UNBS and city/district authorities are the main regulators who set regulations and standards followed at the abattoirs. The main regulations are related to hygiene, Constant flow of clean and safe water, safety and health of animals (inspections and movement permits) and discipline among the abattoir users. On the majority of these regulations, there was full compliance in meeting the set regulations as well as partial compliance where actors meet >60% of the set regulations (Table 80).

Table 80: Market regulations and compliance at abattoirs

Market regulations	Who sets the regulation/ standard?	Level of compliance to meeting the standard
Provision of water and feed trough	UNBS	Meets half of the set regulations
Inspection of animals before slaughter	UNBS	Fully meets the set regulations
Adequate and hygienic slaughter room with separate room for bleeding, skinning and evisceration, carcass washing area	UNBS	Meets most (>60%) of the set regulations
Separate area for red and green offals	UNBS	Meets most (>60%) of the set regulations
Hanging area	UNBS	Fails to meet any of the set regulations
Cold room	UNBS	Fails to meet any of the set regulations
Enough lighting and ventilation	UNBS	Meets most (>60%) of the set regulations
Constant flow of clean and safe water	UNBS	Fully meets the set regulations
General hygiene of the premises, slaughter room	UNBS	Meets most (>60%) of the set regulations
Quality	Government	Meets most (>60%) of the set regulations
Cleanliness	District/City authority/ Abattoir Management	Meets most (>60%) of the set regulations
Transportation	Government	Meets most (>60%) of the set regulations
Movement permit rule	Government	Fully meets the set regulations
Discipline	Government	Fully meets the set regulations
Stamp Rule	Government	Fully meets the set regulations

Source: *live cattle traders, beef traders, butchers and processors survey data, 2022.*

Beef abattoirs and value addition technology:

All of the sampled abattoirs (5/5) had some storage facilities where beef is stored temporarily. The most common technologies at 4/5 abattoirs were holding grounds, broad-blade skinners, spray applicator and skinning platforms. Of the sampled abattoirs, 3/5 had refrigerated structures and boning hooks. The scarcest technologies were Gambrels/gambrel elevator (used to hoist the carcass off the ground), transfer platforms and chilling tanks (Table 81).

Among the lacking technologies that the abattoirs need and that they think would transform and upgrade their operations and position in the beef value chain were Hoisting and Railway system (semi-automatic), Water treatment system, Value addition machines for Packaging, meat handling and preservation, cold rooms and Specialized beef transportation trucks with refrigeration. Table 82 shows the possible investment in each technology as provided by the key informants.

Table 81: Availability of key beef handling technologies at abattoirs

Technologies	Abattoir A	Abattoir B	Abattoir C	Abattoir D	Abattoir E
Refrigerated structures	Yes	No	Yes	No	Yes
Holding grounds	Yes	Yes	Yes	No	Yes
Storage facilities	Yes	Yes	Yes	Yes	Yes
Broad-blade skinners	Yes	Yes	Yes	No	Yes
Hand saws can be used for both slaughter and further processing/fabrication	No	Yes	No	No	Yes
Boning hooks	Yes	No	Yes	No	Yes
Steels and sharpeners	Yes	Yes	Yes	No	Yes
Spray applicator	Yes	Yes	Yes	No	Yes
Gambrels/ gambrel elevator (used to hoist the carcass off the ground)	Yes	No	No	No	Yes
Brisket saws	Yes	Yes	No	No	Yes
De-feathering machine	Yes	No	Yes	No	No
Trolleys	Yes	No	No	Yes	Yes
Skinning platform	Yes	Yes	Yes	Yes	No
Transfer platform	Yes	No	No	No	Yes
Chilling tank	Yes	No	No	No	Yes

Table 82: Possible investments in technologies at abattoirs for upgrading

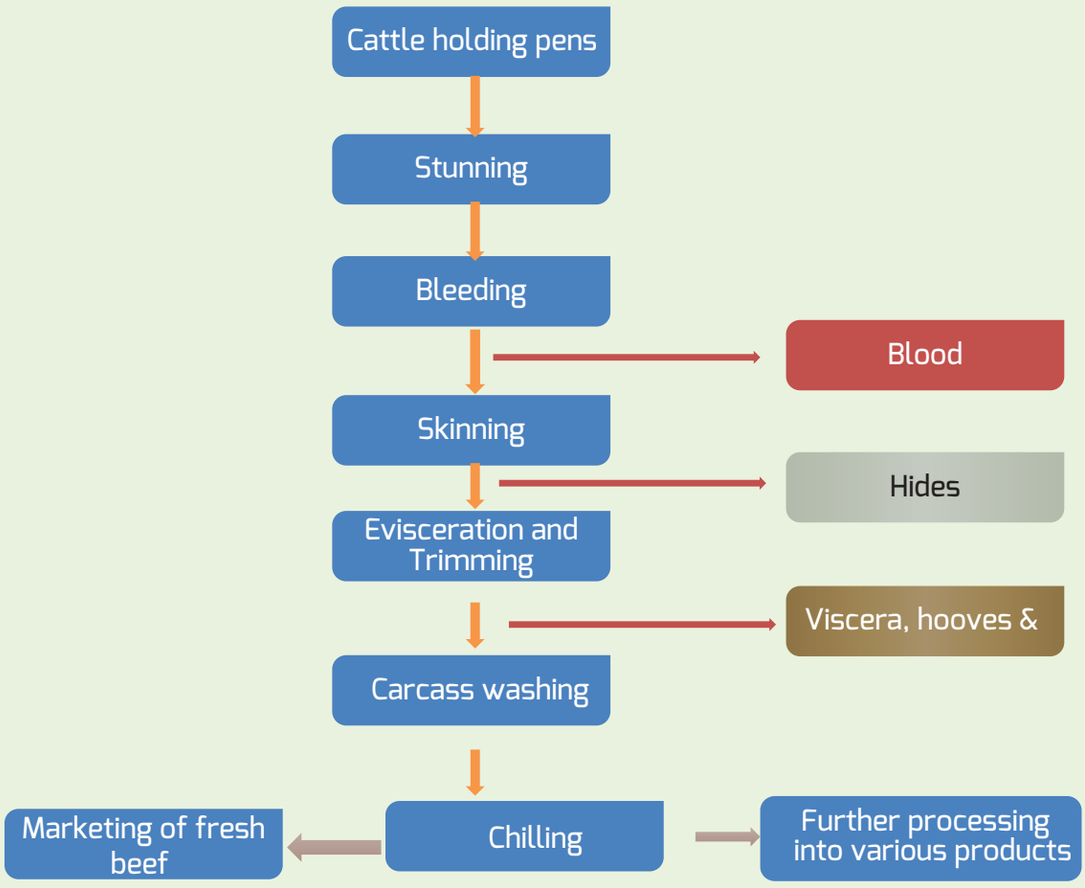
Technology/ Skill investment required	How will this investment upgrade your position in the value chai	What do you think is the cost (UGX) of the investment
Hoisting and Railway system (semi-automatic)	It improves the quality of meat and hygienic processes	2,500,000,000
Water treatment system	Provision of clean water at low prices	1,000,000,000
Value addition machines	Packaging, meat handling and preservation	300,000,000
Transport equipment	Clean transport of meat and livestock	250,000,000
Solar system	Provision of light all the time Reduce electricity bills	30,000,000
Generators	In case of power shortage	150,000,000
Stunning box/ equipment	Improve efficiency and reduce on accidents got during handling animals	-
Splitting machines	Improve efficiency and reduce contamination	-
Transfer platform	Improve meat hygiene	-
Cold room	For preservation and extending the shelf life of meat	60,000,000-80,000,000
	Stock huge quantities of beef as required by customers	
Specialized beef transportation trucks with refrigerator	Improve the capacity to deliver beef to customers	180,000,000

5.15 BEEF HANDLING AND PROCESSING TECHNOLOGIES

5.15.1 Beef Processing

Beef meat processing involves several steps to prepare cuts of meat for further processing and packaging. The key processes are summarized in Figure 47.

Figure 46: Typical process flow for beef meat processing



The first step in beef meat processing is slaughter. Before slaughter, a veterinary/ public health officer examines the animal to make sure it is fit for human consumption. If the animal is certified to be healthy, it is stunned and bled immediately to avoid blood clotting. After bleeding, the carcass is skinned and the viscera, hooves and head removed. The carcass is cleaned using portable running water and taken to a chilling room at 7°C. Equipment used is indicated in Table 83.

The next steps will depend on the existing value chain (s). If the beef meat is for the fresh market. It will be sold off to middlemen or retailers who run butcher shops, hotels, restaurants, organizations, or individuals. For beef to be further processed, it is chopped into appropriate parts such as ribs, chuck, flank, loin, round, brisket, and plate according to the client needs. Such cuts can be sold off immediately or packaged and frozen awaiting sale to processors.

Table 83: Basic equipment commonly used and required for processing fresh meat

	Activity	Equipment	Notes
1	Stunning	Pneumatic Stunning box	Used to restrain the animal during stunning. It is made entirely of stainless steel. In Uganda, slaughtering with blades and pangs is the common practice.
		Captive Bolt gun	Captive Bolt gun is used to fire a bolt through the skull of the cow using a pistol or a pneumatic device to render the animal unconscious. Electrical stunning which involves passing a current of electricity through the brain of the cow or use of carbon dioxide which acts as an anesthetic gas may also be used.
2	Bleeding	Hoists, Shackles, Transfer Hooks and Knives	A series of tools used to effect bleeding.
3	Skinning	Hydraulic skin pulling machine	Pulls off the skin of the carcass.
4	Evisceration and trimming	Leg Spreaders, Belly Spreaders, gut removers, hoof cutters (saws) and knives	A series of tools used to remove gut contents and trim of head and hooves in a hygienic manner.
5	Carcass washing		Use pressurized water to wash the carcass.
6	Chilling	Cold room	Able to chill the meat to 7-10°C.

5.15.2 Beef value addition

Beef meat can be processed into various value-added products using equipment shown in Table 87. The common ones include;

1. **Fresh cuts:** The beef meat is usually cut into four basic cuts which include; chuck, loin, rib and round. The cuts are packaged in different weights and sold chilled.
2. **Minced beef:** This is beef that has been finely chopped with a knife and ground using a meat grinder or mincing machine. It is used in many recipes including; hamburgers, bolognese sauce, meatloaf, meatballs among others. It is packaged in appropriate weights and sold chilled or frozen.
3. **Meat balls:** A meatball is ground meat rolled into a ball along with other ingredients, such as bread crumbs, minced onion, eggs, butter, and seasoning. The meat balls are packaged and sold in frozen form.
4. **Smoked beef:** Smoking involves placing a piece of beef meat in a smokey chamber while cooking it at a low temperature for an extended period of time - low and slow. The prolonged exposure to smoke allows the meat to take on a smokey flavor, giving it a unique taste. The smoked beef is vacuum packaged and chilled to ensure shelf stability.
5. **Beef sausages:** Beef sausages are defined as comminuted seasoned beef, stuffed in casings. They may be smoked, cured, fermented or heated. The production of a wide variety of sausages is possible through the manipulation of different variables such as meat formulation, processing temperature, types of casing and particle size. By altering certain processing treatments, changes occur within the product's texture and flavour, moisture content and other attributes. Beef sausages are usually packaged and marketed in frozen form.

6. **Corned beef:** Corned beef is essentially beef cured in a salt brine, with some pickling spices for added flavour. Corned beef is vacuum packaged and marketed at chilling temperatures.

7. **Canned beef:** Canned beef products are prepared by hermetically sealing the beef in a container (usually tin coated steel cans) and heating at 121°C for 5-15 minutes to destroy spoilage and disease-causing microorganisms. The process is usually referred to as caning from which the product derives its name. In the process of sterilization, the beef is cooked to a tender texture. During canning, spices and condiments are added to improve the flavour of the products. Canned beef can remain stable at room temperature for more than 1 year.

Table 84: Basic equipment required for production of meat/beef products

	Product	Equipment/Tools	Notes
1	Fresh cuts	Meat saw	Their primary function is to chop down large pieces of meat into manageable chunks.
		Meat Slicer (Electrical or Manual)	Is able to cut meat into pieces of uniform thickness and shape
2	Minced beef and Meat balls	Meat Grinder	Is capable of grinding hundreds of kilograms of meat per hour
		Vacuum packaging machine	Packaging technology that offers high-quality wrapping for both minced beef and meat balls
3	Smoked beef	Meat Smokers	May use wood, charcoal, electricity, and other methods to create smoke and slow cook the meat
4	Beef sausages	Grinder	For grinding the meat into appropriate particles
5		Bowl cutter	For emulsifying meat before filling
		Stuffing and twisting machine	For filling meat into casings and twisting the casings
		Wrapping machine	For putting a plastic wrap around sausage packs
6	Corned/ Canned beef	Empty Cans De-palletizer	For transportation of items/products among different height of floor there by easing uploading and unloading
		Bubble cleaning machine	For cleaning empty cans
		Frozen meat cutting machine	For cutting meat into appropriate chunks
		Frozen Meat grinder	For grinding frozen meat
		Vacuum double axis mixer	For mixing/homogenizing the ground meat
		Auto Weight and Filling Machine	For filling cans with predetermined weights

	Cans Sealing Machine	For closing and sealing the filled cans
	Filled cans washing and drying machine	For cleaning and drying the filled cans
	High pressure sterilization machine (Retort)	For cooking and sterilizing the meat in the cans
	Drying system	For cleaning and drying the outside surface of the cans
	Wet glue labeling machine	For labeling of the cans
	Date ink-jet printer	For putting manufacturing dates and batch numbers on the cans
	Manually base box packing platform	For packing the cans into the carton boxes
	Automatic wrapping machine	For putting a plastic wrap around the carton boxes

5.15.3 Challenges faced in abattoirs

The main challenges facing the abattoirs is low supply/scarcity of cattle, high utility costs, high taxes/dues by the urban authorities, high cost of transportation as well as a low market base for beef. However, the key informants at the abattoirs noted that if taxes are reduced, production at farm level enhanced and export markets are explored, the beef value chain would be efficient and vibrant (Table 85).

Table 85: Challenges faced by abattoirs and possible solutions

Top challenges encountered by abattoirs	Recommended solution(s)	Who should take action?
High taxes -movement permits	Reduce taxes	Government
Reduced Market opportunities (low market base)	Lobby for export markets	Government
High abattoir charges	Reduce charges	Abattoir owner
High council charges	Reduce charges	Kasangati Town Council
Scarcity of animals	Increase production at farm level	Government
High cost of transportation	Reduce cost of fuel	Government
High utility costs	Reduce cost of utilities (water, electricity)	Government
Exploitative costs of inspection	Inspection fees should be set by MAAIF	MAAIF
Low Purchasing power at butcher level	Address the biting poverty among the citizens	Government
Scarcity of animals	Increase production at farm level	Government

CHAPTER 6

BEEF VALUE CHAIN INTERVENTIONS

This chapter covers the key past, present and planned interventions in the BVC that are aimed at transforming the beef sub-sector. The report identifies priority investment interventions across the BVC. These are summarized per value chain node as follows;

6.1 Past and present interventions in the Beef Value Chain

The country has always recognized the beef industry as an important sector critical in the socioeconomic development of Uganda by contributing to national food security, household incomes, and creation of employment opportunities among others.

6.1.1 Past interventions

The GOU has implemented different programmes and projects to develop the beef industry since independence. Notable among them was the establishment of the ranching schemes with the objective of increasing production of quality beef for the domestic demand and eventually the export market.

With a focus aimed at commercializing beef production, government reclaimed vast areas in the Southwest, Central and Mid-Western Uganda from tsetse fly infestation in the 1960s and established beef ranching schemes namely, Ankole, Masaka, Singo, Buruli and Bunyoro ranching schemes. Similarly, ranches were established in the north namely, Aswa Ranch, Maruzi Farm and Bala Stock farm. Both public and private organizational arrangements were used to manage the ranches. Along these lines, GOU established the Uganda Livestock Industries (ULI) as a government parastatal and assigned it the responsibility of managing ranches such as Aswa Ranch, Maruzi Farm and Bala Stock Farm. Bunyoro Cooperative Union managed Kyempisi and Kiryana ranches. The private sector was also assigned a role and several private individuals managed several ranches in the South-West and Central Uganda, but most ranches were managed by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF).

Another historical intervention included the establishment of the state-owned export abattoir (producing corned beef[61]) in Soroti (Soroti Meat Packers Ltd) whose catchment area were the cattle rearing regions of Teso and Karamoja. These efforts made significant progress which was interrupted by civil and political turmoil of the 1970s and 1980s.

The Structural Adjustment Programmes (SAPs) of the 1990s saw government adopting new national macro-economic policies which emphasized privatization, liberalization, decentralization, and good governance. Production, processing, and marketing were divested to the private sector. Subsequently, this led to the restructuring and privatization of most of the ranches. The role of government was limited to creating an enabling environment through putting in place conducive policies, laws, regulations, standards, and strategic plans.

Several studies have been conducted to guide investments in the beef industry including the Meat Production Master Plan Study (1989), Feasibility Study on Creation of an Export Oriented Meat Industry (2007), Identification of Livestock Investment Opportunities in Uganda (2012) and the Study on Promoting Commercial Beef Industry in Uganda (2012). Insight from these studies gave rise to several current interventions aimed at mitigating the challenges, unlocking the potential, and opportunities for developing the beef industry in Uganda and have resulted into new interventions like the recent Livestock Disease Control Project and Market Oriented, environmentally sustainable Beef Industry Project (MOBIP).

6.1.2 Some notable recent interventions in the BVC

Recent interventions from government, development partners and value chain players like UMPCU and private sector players include the following:

1. Development of a Market Oriented, environmentally sustainable Beef Industry Project (MOBIP)[62]

Opportunities for food and nutritional security, employment, livelihoods and financial inclusion for the poor exist along the beef value chain in Uganda. Statistics from the Food and Agriculture Organization (FAO) show that beef consumption in Uganda has been growing at a rate of 2% for the past 50 years. Moreover, according to OECD-FAO, global beef consumption is expected to reach 72 million tons by 2025 from 70 million tons in 2021 indicating that opportunities for the sector exist even beyond the borders. However, growth of the sector is constrained by inadequate feed resources for cattle, poor access to water, cattle diseases, inadequate knowledge and skills, low adoption of commercialization approaches and low integration of beef production with other production activities.

In 2019 the EU launched a Euro 15 million (UGX 67 billion) project for development of the beef sector in Uganda. The project: "Development of a Market Oriented, environmentally sustainable Beef Industry Project (MOBIP) was a 5-year project implemented by MAAIF, aimed at addressing the afore-mentioned challenges along the beef value chain in Uganda. The National Livestock Resources Research Institute (NaLIRRI), which is one of the institutes of the National Agricultural Research Organisation (NARO), implemented a component aimed at addressing challenges related to Rangelands, Agro-forestry, and Water Resources Management (RAWM).

The MOBIP's geographical coverage were the Central and South-Western parts of the Cattle Corridor, in two areas formerly defined by MAAIF as "Disease Control Zones" (DCZ 1 & 2). The MOBIP covered the following districts: Bulisa, Kayunga, Kiboga, Kiryandongo, Kyankwanzi, Luwero, Masindi, Nakaseke, Nakasongola in Disease Control Zone 1 and Lwengo, Lyantonde, Masaka, Mbarara, Mityana, Mpigi, Mubende, Ntungamo, Greater Rakai (Rakai and Kyotera

[61] *Corned beef typically is made by salt-curing beef. Usually, brisket is used, as it is a tough cut of meat that's made tender by a long, salt-filled cooking process.*

[62] *The EU co-funded a 5-year project with a 15 million Euro contribution called "Developing a Market Oriented and Environmentally Sustainable Beef Meat Industry in Uganda" (MOBIP) implemented by the Ministry of Agriculture, Animal Industry and Fisheries, with a grant provided to Uganda Meat Producers Cooperative Union and a service contract for Technical Assistance Team. (Context: The project aims to contribute to a competitive, profitable, job-intensive, gender responsive and environmentally-sustainable agricultural sector in Uganda.).*

districts), Greater Kibaale (Kibaale, Kakumiro and Kagaadi Districts), Sembabule, Kiruhura, Kalungu, Bukomansimbi, Butambala, Gomba, Isingiro in Disease Control Zone 2 in addition to Entebbe (Wakiso District) and Kampala (the two are strategic for a number of activities in the meat industry: transporters, slaughtering, processing, and also home to the most important private sector stakeholders and marketers where 70% of Uganda's GDP is generated and 3 million urban consumers reside) [63].

In partnership with the Food and Agriculture Organization (FAO), Consortium for enhancing University Responsiveness to Agribusiness Development (CURAD) and Agriculture Environment and Ecosystems (AGRENES), the project implemented interventions in 9 districts of the Cattle Corridor namely, Mbarara, Masindi, Kiboga, Sembabule, Nakaseke, Kyankwanzi, Isingiro, Kiruhura and Nakasongola over a 2-year period ending in June 2022.

The interventions improved beef production resources for 1,120 beef producers, incubated 53 beef value chain businesses, planted over 800 acres of improved pastures and over 100 acres of pasture seed multiplication plots for sustainability. It also added 540,000 litres of water storage capacity in 18 beef farms; sensitized district extension staff on information access for weather projections to support decision-making and technical advice; trained beef producer households in production of briquettes from cattle dung. Further, the project introduced food and feed sweet potato varieties across 70 beef producer households and over 60 change agents were equipped with information and skills for supporting beef production and use of machinery for baling hay.

2. The Sustainable Livestock Business Development Project (2016-2021)

The Sustainable Livestock Business Development Project in Uganda was part of the framework agreement between Norad and Norges Vel with about US$ 1 million in funding, supported in partnership with Nortura SA. The project aimed at establishing competitive farmer organizations that represent cattle farmers in about 17 Ugandan districts (including Luwero, Nakaseke, Nakasongola, Kyankwanzi, Masindi, Kiryandongo, Kiboga, Mubende, Gomba, Sembabule, Kiruhura, Greater Masaka, Ntungamo and Mbarara) to create a sustainable supply of animals in an environmentally sustainable manner to the identified markets. The goal of the project was to attain self-sustainability through undertaking business approaches and interventions that increase revenue and member participation in the meat/beef value chain. The aims of the project were to: increase employment opportunities and income levels in livestock trade value chain; enhance livestock production through feeding, better genetics and animal health; increase competitiveness of UMPCU and UFMC in the livestock sector; and attain an equitable and better performing livestock value chain.

The project, which started in 2016 and ended in 2021, targeted about 1,000 farmers and herdsmen in the 15 cooperative societies that are members of Uganda Meat Producers Cooperative Union Ltd (UMPCU) and Uganda Farmers Meat Company Ltd (UFMC). Among its impacts, the project increased average cattle ownership among members from a baseline 220 head of cattle to 1,000 by the time it ended. Additionally, cattle keeper incomes increased from UGX 23 million per year to UGX 51 million annually. By the end of the project, UFMC's annual turnover had increased from UGX 199 million at baseline to UGX 1.6 billion (SLBDU Report, 2021).

3. ZOETIS-ALPHA project

Zoetis' African Livestock Productivity and Health Advancement (A.L.P.H.A.) initiative, co-funded with a $14 million grant from the Bill & Melinda Gates Foundation, has been working to improve livestock health and positively

[63] *https://www.agriculture.go.ug/developing-a-market-oriented-and-environmentally-sustainable-beef-meat-industry-in-uganda-mobip/*

impact farmers' livelihoods by increasing access to quality veterinary medicines and services, diagnostic laboratory networks, and animal health training in sub-Saharan Africa, mainly in Ethiopia, Nigeria, Uganda and Tanzania.The project targeted 400,000 farmers and more than 60 animal medicines approved for use and new diagnostic and vaccine care initiatives. The project developed and upgraded facilities of nine diagnostic laboratories across Ethiopia, Nigeria, Uganda and Tanzania in collaboration with strategic private and public partners.

In Uganda, the project launched in 2019 established 2 diagnostic labs at Butalangu, Nakaseke, and Nabitanga, Sembabule. This project entailed the establishment of two fully operational serology laboratories for the target district aimed at improving livestock health and farmers' livelihoods through the African Livestock Productivity and Health Advancement (A.L.P.H.A.) initiative that covered Nigeria,Tanzania, and Ethiopia. Beyond disease diagnostics, the project also offered common cattle vaccines to cattle farmers in the districts.

This year (2023), Zoetis received about US$15.3 million from BMF in new funding as part of the 'Innovative Animal Health Models for Small-Scale Producers' grant, to accelerate access to veterinary products, services and diagnostic tools to increase the productivity of smallholder farms, with a particular focus on supporting female farmers. The new A.L.P.H.A. Plus will focus on dairy and beef production, poultry and aquaculture in Ethiopia, Nigeria, Tanzania, Uganda, and now extended to include Kenya, Ivory Coast and five additional markets from East, West and Central Sub-Saharan Africa . This new initiative will also promote animal health and farmers' livelihoods through enhanced training – with a target to train 100,000 stakeholders by 2025 [64]. There will be a strong focus on gender diversity, including women-led, female-only training courses optimally designed to maximize attendance.

4. The Farmer-Led Beef Livestock Investment and Sustainability (FALBIIS)

Funded by the European Union under the European Development Fund, the Farmer-Led Beef Livestock Investment and Sustainability (FALBIIS) was implemented by the Uganda Meat Producers Cooperative Union Ltd (UMPCU)[65] over a period of 3 years (2019-2021). The agreement between the two parties was signed on 10th October 2018. FALBIIS project which focuses on smallholder and small beef-related agribusiness largely to improve economic welfare, food security and nutrition was implemented from 2019. The project was funded to a tune of Euros 1.5 million in addition to Euros 300,000 in UMPCU co-funding. In addition, the FALBIIS project is being executed in partnership with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) under the Market-Oriented and Environmentally Sustainable Beef Meat Industry in Uganda Project (MOBIP) which is also funded by the EU.

FALBIIS targets direct beneficiaries selected from 33 Cattle Corridor districts aimed at improving smallholder livelihoods and implemented by Uganda Meat Producers Cooperative Union through its member cooperatives. It intended to leverage change in the beef value chain -- cattle production and marketing systems -- to reduce poverty and food insecurity levels amongst smallholders. Final report and impacts of the project are not yet published.

[64] *https://news.zoetis.com/press-releases/press-release-details/2023/Zoetis-Secures-15.3-Million-Grant-to-Advance-Sustainable-Livestock-Production-and-Improve-Livelihoods-in-Sub-Saharan-Africa/default.aspx.*

[65] *The EU co-funded a 5-year project with a 15 million Euro contribution called "Developing a Market Oriented and Environmentally Sustainable Beef Meat Industry in Uganda" (MOBIP) implemented by the Ministry of Agriculture, Animal Industry and Fisheries, with a grant provided to Uganda Meat Producers Cooperative Union and a service contract for Technical Assistance Team. (Context: The project aims to contribute to a competitive, profitable, job-intensive, gender responsive and environmentally-sustainable agricultural sector in Uganda.).*

5. Other interventions

The other interventions are mainly those that are being implemented by MAAIF and include the meat export support services project (to fast-track sustainable supply of grade livestock for slaughter to meet beef sanitary standards; Livestock disease control programme (procurement of vaccines for different animal diseases, with view of reducing disease incidences); construction of water for production infrastructure/valley dams to provide water to farmers in the Cattle Corridor; and the regional pastoral livelihood's resilience project.

Recent market-related activity at export level with support from UEPB includes participation in several food-related exhibitions to give visibility to Uganda's food, beef inclusive. The latest such food trade business exhibitions include the trade missions to Goma in the DRC, the UK in 2022 and the most recent one to South Africa in February 2023.

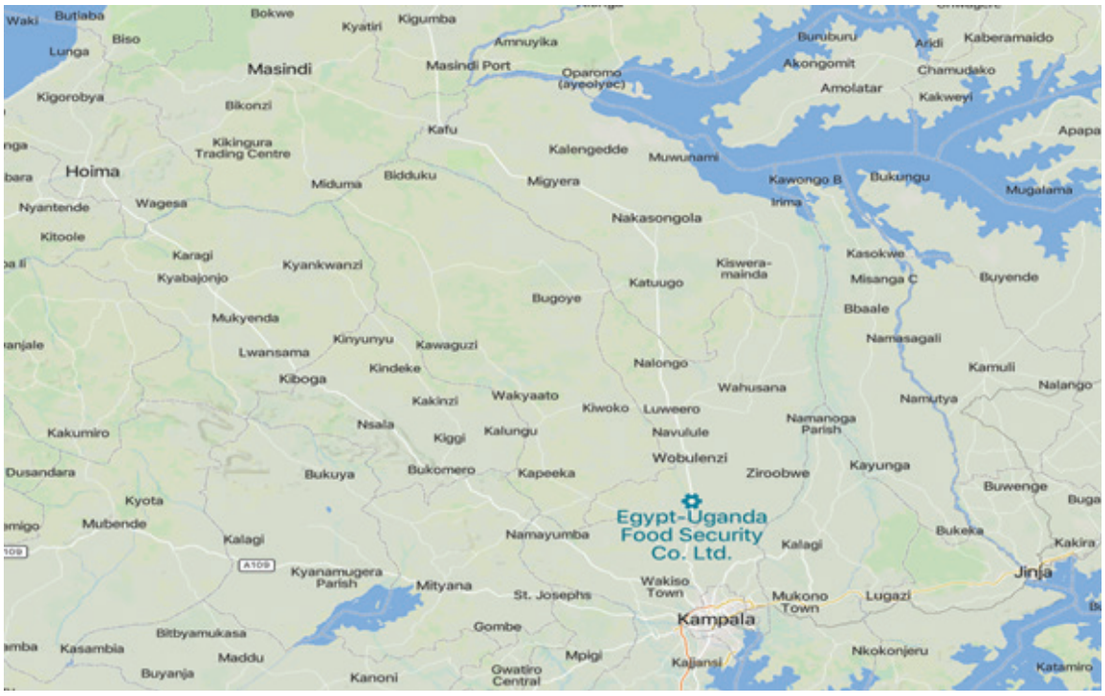
In coordination with UNBS, improvement in compliance to the regulations and standards required for exporting are being made with efforts aimed at sensitizing and inspecting beef abattoirs and processing centres, and strict UNBS Q mark enforcement for products in all trading outlets and export phytosanitary checks and compliance.

- A legislative gap analysis of existing Acts was conducted by MAAIF in 2020. These included the (a) Animal Breeding Act, (b) Dairy Industry Act, (c) Animal Diseases Act, (d) Cattle Traders Act and (e) Hides and Skins Trade Act. The analysis recommended that existing legislations be revised and new legislations enacted. As a result, principles for the amendment of the Animal Disease Act and the Animal Breeding Act and a Livestock Identification and Traceability Policy were drafted. The Veterinary Practitioner Bill, Animal Feeds Bill and Meat Industry Development Bill were drafted to amend existing laws.
- In addition, stakeholder consultations were conducted to validate: draft Rules and Regulations to operationalize the Animal Breeding Act; Regulations to register and license animal breeding service providers, hatchery operators and animal breeding associations; and amendments to the Animal Disease Act.
- Regulatory Impact Assessments were also conducted on the regulation of: animal feeds; veterinary practice; livestock identification and traceability; meat inspection and certification; animal diseases prevention and control; and management of animal genetic materials.
- The contract for construction of a meat processing factory in Kiruhura was signed and construction will start in FY2020/21[66] . MAAIF plans to undertake feasibility studies, design, construct and equip meat processing factories in Kiruhura, Mubende, Nakasongola and Mbarara.
- Sanitary and phytosanitary (SPS) certificates issued as a means of enforcing compliance with food safety standards and grades of food products. To promote beef and meat under the agro-industrialization programme, MAAIF in 2021 procured for districts 52 meat inspection kits to improve inspection and certification of meat products for human consumption, and 20 out of 50 animal products' facilities inspected were certified to receive certificates of Veterinary approval.

6.1.3 The Uganda Exports Promotion Board (UEPB)

The Uganda Export Promotion Board (UEPB) is the national focal point for export promotion and development. Its role is to help exporters export their products and services out of Uganda. It gives support services to exporters in Uganda and foreign buyers including market information, assistance with entering and establishing in new export markets, business linkages, export product development and

Photograph 6: Location of the Egypt-Uganda Food Security Company Ltd.



capacity building.

» Has participated in several food-related exhibitions to give visibility to Uganda's food, beef inclusive. For example, UEPB participated in the Expo Dubai 2020, organized by the Bureau International des Expositions (BIE) alongside over 133 countries in the United Arab Emirates (UAE). The expo gave Uganda a platform to showcase Opportunity, Mobility, and Sustainability of its food and manufacturing sectors. The Uganda Export Promotion Board (UEPB) aims to support Ugandan exporters by enhancing their presence in the global market and raising awareness about Uganda's export products. Due to geographical barriers and resource limitations, exporters face difficulties in independently accessing export markets, which is where UEPB provides assistance.

» Improvement in compliance to the regulations and standards required for exporting. UEPB does market research on the available markets for given products. The research helps exporters answer important questions about the target markets per sector and product group, to find important market information so as to make decisions confidently. It also helps exporters to get phytosanitary and certificates of origin and link them to quality assurance bodies such as the UNBS.

6.1.4 The Egypt-Uganda Food Security (EUFS) case study

The Egypt-Uganda Food Security Company (EUFS) is an US$ 11 million modern abattoir located 32 km from Kampala in Luwero District on the Kampala-Gulu highway. Incorporated on 17th May, 2011 (almost 12 years ago) by Uganda Registration Services Bureau (URSB) with a planned annual turnover of $10m (UGX 37b) and export revenues of about US$

[67] *https://www.egypttoday.com/Article/3/54887/EUFS-exports-1st-shipment-of-Ugandan-beef-to-Egypt.*

50 million (about UGX 185 billion) in foreign exchange annually and potential to create 1,000 jobs. The abattoir was established by an Egyptian firm, the Egypt-Uganda Food Security Company and opened by the president of Uganda on 11th August, 2016. The company targeted to cover an existing supply gap of about 900,000 MT of both processed and unprocessed beef products per year in Uganda. The investment also resulted from the growing trade exchange between Egypt and Uganda that increased by 27% year-on-year to reach US$66 million in 5-years. Several other projects estimated at $300 million, in the fields of electricity and energy are on the way to start in Uganda by another Egyptian firm according to the Egyptian Head of the Export Development Authority (EDA).

Photograph 7: *President Museveni opening the EUFS beef factory in 2016*

However, it was not until 29th July, 2018 that the Egypt-Uganda Food Security (EUFS) exported the first 50MT shipment of Ugandan beef to Egypt. At this milestone, the Chief Executive Officer at EUFS, Mr. Sherif el-Kallini, said that Ugandan beef is of high quality and outstrips the Brazilian beef imported to Egypt given that beef in Uganda is from livestock fed on organic food. Prior to this beef shipment, there had been numerous memoranda of understanding signed between President Abdel Fatah al-Sisi of Egypt and his Ugandan counterpart Yoweri Museveni during the latter's visit to Egypt in May, 2018.

Photograph 8: First beef shipment to Egypt by the EUFS beef processing factory

Photo credit: Internet[67]

Despite the success of shipping the first consignment, the Egypt-Uganda Food Security Company has faced challenges of penetrating the Egyptian beef market and the CEO indicated that there are pending bilateral negotiations between the two Governments to ensure a smooth flow of beef exports. It was established that the Egyptian Government was meant to provide certain incentives and waivers to enable the Egypt-Uganda Food Security Company export beef from Uganda to Egypt. However, the Egyptian Government took long to effect these incentives yet the company had already established the factory and was ready to start exporting as far back as 2018.

During these operational challenges, the company has been working to secure export certificates to the Middle East and, so far, three certificates have been secured and soon beef exports will resume. In the meantime, the abattoir is open to other beef traders and processors who use the facility on a hire basis. Based on the key informant interviews, the company is also still open to collaborations and partnerships to ensure the facility is fully utilized.

Key lessons from this case study:

The case of the Egypt-Uganda Food Security Company failing to take off in time despite having all the infrastructure in place provides a number of lessons. Here below are some of

the lessons picked:

i. **Risk identification** and **mitigation** measures should be in place at design: It is clear that at project design stage, risk identification and instituting mitigation measures is key. If the designers of this project had identified risks related to delayed certifications and authorizations, they would have thought about alternative export routes.

ii. **Diversification of market channels:** The Egypt-Uganda Food Security Company targeted only the Egyptian market, more so in the short term. If the company had diversified the marketing channels for their beef in both export and domestic markets, they would be already operating since there is still a domestic demand gap for beef in Uganda.

iii. **Sustainable supply base:** The Egypt-Uganda Food Security Company had planned to source cattle from farmers all over the country. This would not have been sustainable given the fact that they had specific standards of beef to fulfil. The best option would be to identify and organize groups of farmers and traders, train and contract them to supply cattle with specified standards which was never done.

iv. **Building strong investor-local partnerships is key:** There is no evidence of partnership with the local producers, traders or investors in this initiative which would have increased its success. Involving local stakeholders helps to create a sense of ownership and local buy-in so that even if the factory was to market its beef products locally, there would be ready support and acceptance.

6.2 PLANNED INTERVENTIONS IN THE BEEF VALUE CHAIN

This section covers the key planned and ongoing interventions in the BVC under MAAIF that are aimed at its transformation the value chain.The report identifies priority investment interventions across the BVC. These are summarized per value chain node as follows:

The key latest substantive planning document for the beef value chain (BVC) was produced by MAAIF with support of the MOBIP programme in 2020. The Meat Investment Plan (MIP) of 2020 covers the key planned and ongoing interventions in the BVC under MAAIF that are aimed at transforming the value chain. The Meat Investment Plan (MIP) provided the trajectories and the scale for investment for the beef sector and was aligned with the most successful international best practices and Sanitary and Phytosanitary Standards (SPS) to support its use as a market and promotion tool. This was meant to strategically position the sector vis-à-vis the increased internal demand of meat (in terms of quality and quantity) and prepare the beef industry to respond to the already increasing regional and international market demand. The MIP was also designed to assess and ensure a greater level of financial viability and profitability for specific actors at various levels of the meat value chain.

The report identifies priority investment interventions across the BVC. These are summarized per value chain node as follows:

6.2.1 Planned and on-going interventions in beef value chain Governance

A conducive enabling environment facilitated by good governance is crucial for the development of the sector. This consists of a set of factors embracing ethical, organizational, legislative, regulatory and technical matters and the services provided should conform to these guiding values and principles. The proposed interventions under the MIP include investments to provide a Conducive Policy Environment for the Beef industry; Conducive Legislation and Regulatory Environment; Conducive Standards in the beef industry;

[68] *https://www.agriculture.go.ug/wp-content/uploads/2019/09/MAAIF-Performance-Report-2015-2016.pdf*

and Supportive Institutional Framework for the Beef Industry. These planned investment interventions are set to lead to the availability of conducive policies, legislations, standards; and institutional frameworks[26]. The expected outcomes of this intervention include; an enabling policy, legal and regulatory environment for the beef industry growth; and a conducive and supportive institutional framework for the beef industry growth.

6.2.2 Beef supply investment interventions

The MIP targets to increase per capita beef consumption from 6.5 kg to at least 7.5 kg by 2025. With a projected human population of 48 million by 2025, the domestic beef demand will be 360,000 MT. In addition, Uganda has identified beef as one of the strategic export commodities. The target is to export at least 30,000 MT of beef annually by 2025. However, given that by 2021, Uganda exported only 170 MT worth US$340,000 of frozen, fresh or chilled beef, yet in FY 2015/16 only 55MT of beef were exported , Uganda cannot meet this target. Therefore, one of the key interventions is to increase the supply of quality and safe beef and beef products by raising production and productivity of beef cattle. This will imply improving the production parameters such as growth rate, offtake, reproductive efficiency (conception rate, calving rate, age at conception) and dressing percentage.

Under this plan, the production and productivity is hoped to be achieved through the promotion of investments that enhance transition from the largely subsistence traditional farming to commercial production, focusing on improved beef cattle nutrition; enhanced access to adequate water supply; enhanced access to quality breeds and genetic improvement services; improved animal health services; improved extension services; strengthened research and technology development; and integration of environment protection into beef value chain programmes. Programmes like MOBIP and the Agriculture Value Chain Programme (AVCP) under MAAIF have supported these interventions by providing improved valley dams, improved fodder and even construction of new beef cattle markets in the Cattle Corridor.

Expected outcomes of these interventions include Enhanced and sustained beef cattle nutrition; Sustainable water supply for commercial beef production; Improved Quality Breeds and Genetic Services; Strengthened Animal Health Services; Improved processing systems for the beef and beef products; Improved Animal Welfare; and Operational Animal Health Management Information System (AHMIS).

6.2.3 Fodder conservation

Fodder conservation is important because it bridges the nutritional gap between the dry and wet seasons; enables harvesting of grass at the most nutritious stage for conservation; helps to optimize utilization of grass; and enables keeping a proportionately higher number of animals per unit area compared to open grazing systems. It also enhances dry matter intake of animals and enhances forage yield per unit area per year.

Planned Activities by MAAIF, under this activity include the identification and training of farmers in fodder conservation technologies; Promoting formation of fodder conservation farmer groups; and Acquisition of infrastructure and equipment for fodder harvesting, conservation, and storage. Outputs include increased number of farmers adopting fodder conservation technologies.

6.2.4 Supplementary feeding

The planned and ongoing interventions to support cattle supplementary feeding as proposed by the MIP of MAAIF are aimed at bridging nutrient deficiency especially during the dry season and in cases of overstocking. In addition, deficiencies in macro-nutrients particularly vitamins, minerals and nitrogen will be addressed. These activities involve the use of agroindustrial by-products and crop residues and compound/manufactured feeds/

supplements. The agro-industrial by-products in Uganda include molasses, bagasse, brewers waste/mash, maize bran, wheat bran, rice bran, cotton seed cake, sunflower cake and soybean cake, palm oil cake, coconut cake, among others. The agricultural crop residues include maize stover, wheat and rice straws, haulms, and sweet potato vines. Compounded feeds are carefully manufactured with specification that considers special needs of animals in different physiological states and stages of production.

Planned and ongoing activities include training farmers on processing and utilization of agro-industrial by-products and crop residues as well as compounded feeds; Developing/strengthening infrastructure for manufacturing feeds; and Putting in place institutional arrangements for quality assurance and regulation. Expected outputs include enhanced capacity to utilize agro-industrial by-products and crop residuals to feed beef animals with targets including setting up of two animal feeds manufacturing plants (One per disease control zone); and at least 100 farmers adopting supplementary feeding. These activities are promoted by both MAAIF through agencies like NARO and NALIRRI, programmes like ACDP, MOBIP and development partners like Heifer International, Send a Cow, among others. Privates sector players like Robran Holdings, CURAD and local livestock feed companies are supporting in delivering this BVC intervention.

6.2.5 Establishment of Feedlots

Whereas not yet common in Uganda, feedlot beef cattle system is an important segment of beef production aimed at final conditioning of animals for the market. Feedlot is associated with lower requirements for land, improved overall production efficiency, reduced age of animals at slaughter and promotion of more efficient utilization of feed resources. Studies by Asizua *et al*. (2017) demonstrated that feedlot animals in Uganda can grow at a rate of 0.85 to 1.0 kg live weight/animal/day with dressing percentage at slaughter of 54 – 56% compared to 48 – 50% under grazing systems.

The major challenges experienced in the feedlot beef system include: (a) heavy capital investment requirements, resulting in higher input costs per kilogramme of beef produced; and (b) successes can be achieved only when premium prices are paid for the higher quality meat produced. Consequently, investments at the upper end of the beef value chain, especially marketing, are critical for the success of feedlot systems. Nevertheless, the emergence of various meat processing plants in the country provides the best opportunity for promotion of feedlot finishing to meet the demands for higher quality meat at the processing plants. Some of the major targeted advantages of intensive beef production system include: The system helps the farmer to easily supervise and monitor the land and protect his livestock from wild animals; large productivity is possible with less amount of land, leading to economies of scale which directly contributes towards meeting the ever-growing demand for beef supplies; Feedlots are associated with increased nutrient supply and remarkably reduced maintenance energy requirements as a result of reduced activity especially walking which is typical of grazing animals; and Feedlot systems can more than double the growth rate of animals under grazing systems, thereby shortening the time of preparing animals ready for the market.

Planned and ongoing activities include: Carrying out site-specific feasibility studies; Producing designs for the feedlot; Undertaking construction of the infrastructure (feed resources, water, animal health, confinement of animals); and Operating and maintaining the feedlot. Expected Outputs include increased number of feedlots; and Increased quantity and quality of beef produced from feedlots. Target for this intervention includes the establishment of 10 feedlots, of which 5 will have capacity of 500 head of cattle each and will have 1000 head of cattle each. This is proposed to be mainly private sector led.

Expected Outputs from beef nutrition interventions include improvement of rangeland resource utilization and cattle pasture, forage development and conservation

promotion, increase in the utilization of crop residues and agro-industrial by-products, increased utilization of manufactured feeds, and establishment of feedlots.

6.2.6 Quality breeds and genetic improvement services interventions

Cattle breeding and genetic improvement play major roles in increasing production and productivity through production of bigger and faster growing animals that meet the needs of stakeholders in the domestic and export markets. Appropriate breeding programmes are required to enhance profitability and sustainability of beef enterprises. They influence the key parameters in production such as calving rate; herd offtake; weaning weight; feed to meat conversion rate; carcass weight; meat to bone ratio; and fat distribution. It is important to use the appropriate breed and breeding methods for different beef production systems and agro-ecological zones in Uganda, taking into consideration resistance and/or adaptability to environmental conditions. Consideration will be given to special attributes of local/ indigenous breeds for their environment adaptability and meat product qualities. This intervention is currently spearheaded by NAGRC&DB and NALIRRI.

As stated in the preliminary situational analysis findings, one of the core problems limiting production and productivity in the beef industry is limited access to appropriate breeds and breeding services suitable for the various agro-ecological zones and classes of farmers practicing different production systems. In the MIP, access includes availability and affordability occasioned by high costs of improved breeding services; weak animal breeding extension services; unguided breeding programmes and weak regulatory framework, among others.

The investment plan proposals are aimed at addressing these challenges, and building on the foundation that was laid by other programmes and projects. The National Animal Breeding Policy and the Agro-Industrialization programme of the NDP III puts emphasis on: implementing a national beef cattle breeding programme, promoting countrywide crossbreeding programmes using artificial insemination (beef and dual-purpose cattle semen) and improved beef bulls and establishing a national beef cattle improvement scheme to enhance production and multiplication of quality beef breeds using the open nucleus-breeding scheme. The planned changes are revisions and enactment of: Animal Breeding Act, National Dairy and Beef Cattle Breeding Strategy, National Small Ruminant Breeding Strategy, National Artificial Insemination Strategy, National Pig Breeding Strategy, Livestock, livestock product, and breeding stock distribution guidelines.

The Performance assessment report of the agro-industrialization Programme indicated that by 2022, over 6,000 improved breed of calves had been produced and distributed across the country; 62,500 doses of semen were produced and extended to farmers; 5 animal breeding scientists recruited by NARO; and 35 admin units had been constructed on NAGRC&DB centre farms. Additionally, 90 animal holding grounds, quarantine stations and animal check points were established.

Therefore, the investment interventions planned are expected to result in strengthening and establishment of breeding services at community level, improved breeding standards and schemes and enhanced conservation of indigenous beef breeds.

6.2.7 Strengthening/establishment of breeding services

NAGRC&DB has been implementing various programmes to promote sustainable genetic improvement and delivery of the services to various strata of the community. The proposed investments will take advantage of the interest

[69] *This registry monitors livestock births, deaths, parentage, individuals acquired from, their location, and any transfers of individuals.*

generated for crossbred cattle by establishing community-centred breeding services to improve the genetic merit of the herds. These will include Artificial Insemination, bull schemes and embryo transfer. Focus will be on enhancing institutional management to ensure appropriate balance in crossbreeding so as to avoid loss of desirable traits of indigenous breeds such as hardiness and tolerance to adverse conditions of weather and challenges of the vector-borne diseases such as ticks and tick-borne diseases, tsetse fly and tsetse-borne Trypanosomiasis. MAAIF, through NAGRC&DB, will utilize community-public-private partnerships to deliver superior genetic material primarily using both natural bull service, artificial insemination, and other technologies such as the use of heat synchronization techniques and embryo transfer. Therefore, breeding services will be implemented using the nucleus breeding approach where lead beef farmers will be selected from each of the disease control zones to act as centres for the dissemination of high-quality genetics for improvement of the existing indigenous breeds. The community-level breeding programmes will be two-fold: Artificial Insemination; and Community Bull schemes.

6.2.8 Provision of Community-Based Artificial Insemination (AI) Services

Investments will be undertaken in Community-based AI services programme by establishing banks for both liquid nitrogen and semen with nucleus breeders through contract schemes with the private sector. These farmers/breeders will be the focus for holding and support distribution of local and imported semen of superior genetic quality. MAAIF, through NAGRC&DB, will procure the basic equipment like liquid nitrogen tanks for semen preservation and hormones for synchronization. The private sector (e.g., farmers' organizations) will take on this investment with the guidance of MAAIF. In addition, resources will be availed to NAGRC&DB for the operation and maintenance of the liquid nitrogen plants at Entebbe and Mbarara respectively. To ensure continuous operation of AI services country-wide, it may be deemed necessary to establish an additional liquid nitrogen plant at a suitable location to enhance quick access.

Provision of AI services is proposed to be done by both public and private sector inseminators as deemed appropriate, based on prevailing conditions in specific areas. These will be inducted, trained, certified, and licensed by NAGRC&DB with the endorsement of MAAIF (Directorate of Animal Resources). All calves born out of AI program will be identified with barcode ear tags and data inserted accordingly. The implementation of the AI programme will be monitored and periodically evaluated by a joint technical team from MAAIF, NAGRC & DB, district local government officials, private sector representative and/or regulatory bodies for veterinary professionals and paraprofessionals.

Planned and ongoing activities include: Identification and registration of nucleus farmers; Training of farmers; Refresher training of Artificial inseminators; Procurement of AI equipment; Operation and maintenance of Liquid nitrogen plants (Entebbe and Mbarara); Strengthening the animal breeding database; and Supervision, monitoring and evaluation. Expected Outputs: Access to artificial insemination services increased and the target is to produce at least 6,000 crossbreed beef calves directly with enriched genetic material.

6.2.9 Establishment of bull schemes

MAAIF MIP rightly identifies that AI has many advantages for genetic improvement, but it may not be readily accessed by all beef farmers because of the long distance from the AI service centres; high cost per insemination; low farm incomes; lack of skilled professionals; and limited knowledge and experience of farmers. To bridge the gap, investments will be made to establish/strengthen Beef Bull schemes to be operated by farmers' groups. Special priority will be given to women and youth groups. Initially, bulls are planned to be selected and procured from established nucleus breeders with a good track record in

terms of breeding, record keeping, and good husbandry practices. These will eventually be replaced by pedigree stock once the modality and capacity for management by the farmers' groups is adequately enhanced. A blueprint for the design, site selection and construction of the bull housing and mounting infrastructures for the breeding bulls will be provided by Government. Other activities will include identification and training of bull handlers; sensitization and awareness creation for potential users of the bull services; and screening of cows for reproductive diseases such as brucellosis and vibriosis.

The investment will be a partnership between Government and the private sector. Government, through NAGRC&DB, will be responsible for procuring the bulls and associated inputs, training of bull handlers and farmers' groups, training of beneficiary farmers, synchronization of cows, and providing the design and costs of the infrastructure for managing the bulls. The farmers' groups will be responsible for the operational costs of the Bull scheme. The local governments will provide extension services, support supervision and monitoring. The beneficiary farmers will be required to pay for the services of the bull at rates to be agreed upon by the stakeholders.

Planned and ongoing activities include the formation of participating farmers' groups; Training of farmers and breeding bull handlers; Procurement of bulls; Construction of infrastructure for managing the bulls; and Management of the bull service. Expected outputs include increased use of elite bulls for genetic improvement and this is targeting 50 farmers' groups.

6.2.10 Multiple Ovulation Embryo Transfer (MOET)

MOET is one of the technologies that has been successfully introduced in Uganda to speed up genetic improvement in cattle because of the following advantages, including but not limited to: Increases the number of offsprings sired from superior females, It results in faster genetic improvement, It is possible to obtain offspring from injured or old animals incapable of breeding or calving naturally, It contributes to increased farm income through sale of embryos and Exportation and/or importation of embryos is easier than live animals.

Investment is planned to support expansion of the MOET programme at NAGRC&DB working with NALLIRI by procuring embryos of high-quality pedigree beef breeds for use by private nucleus breeders, and the NAGRC&DB ranches. In addition, private practitioners will be encouraged to carry out MOET with guidance and regulation of MAAIF. Planned and ongoing activities include: Procurement of embryos; Training of farmers and professionals; and Strengthening infrastructure for MOET. Expected outputs include increased number of offspring sired from superior females and it is targeting 500 elite calves produced. The activity is already being piloted at Namulonge NALLIRI centre but still in its infancy pilot stage.

6.2.11 Creation of Stud Books

The investment interventions will strengthen the earlier efforts to create stud books[69] for the various beef breeds. NAGRC&DB will be facilitated to enrich its genetic pool by importing elite genetic material (bulls, semen, and embryos) of selected breeds for immediate use in the contract mating scheme on selected farms. The bulls produced will then be recruited into NAGRC&DB at three months of age where proper management will be instituted including record keeping, having a large active breeding population, maintaining clear breeding objectives and accuracy in performance assessment during selection. To ensure quality of the genetic material procured, NAGRC&DB will work with and sign contracts with the appropriate bodies managing the stud books in the countries of origin. The breeds imported will be determined by the technical teams composed of MAAIF and NAGRC&DB and working in consultation with the beef farmers. A similar procedure will be followed for recruiting indigenous breeds into the stud book. Planned Activities

include: Determining the specifications of the breeding material based on the intended objectives; Sourcing of the breeding material; Identification and selecting farmers to participate in the nucleus breeding scheme (based on the agro-ecological conditions, farmers' competence and interest); Progeny testing; and Registration of the bulls into the stud. Expected outputs include: Stud book for beef breeds set up and the target is 50 bulls per stud book.

6.2.12 Establishment and strengthening of breed societies

The objective is to promote, preserve and improve a specific breed, by defining the breed standard and recording pedigrees. Breed societies are there to maintain the integrity of the breed and the BRAND (traits and qualities for which it has been known) that is represented by that breed. Although there should be efforts made to advance the breed, care should always be taken not to compromise the brand. Preserving the gene pool of the individual breeds ensures that they are not diluted, genes continue to exist (and can be secured through semen banks for example) and excellence can be traced and potentially replicated. Organizing shows where members show their best quality cattle is a key promotional activity.

Planned and ongoing activities include: Mobilization and sensitization of stakeholders on the importance of establishing breed societies; Recruit members to the society; Training of members; Registration of societies; Supervision and monitoring; and Supporting cattle shows and exhibitions. Expected Outputs include Breed societies established and the target is 4 such societies.

6.2.13 Conservation of indigenous breeds

Indigenous cattle genetic resources in Uganda are in a continual state of decline due to indiscriminate crossbreeding and institutional policies that have supported use of high producing exotic breeds. Their erosion is currently a cause for concern, as they are an integral contributor of food, agricultural power, agrarian culture and heritage, and genetic biodiversity. Animal genetic diversity enables farmers to select stocks or develop new breeds in response to changing conditions, including climate change, new or resurgent disease threats, new knowledge of human nutritional requirements, and changing market conditions or societal needs.

Uganda's climate and production environment vary widely and include numerous harsh environments that combine high temperatures, droughts, floods and epidemic diseases and parasites related to climate change. Such conditions give the indigenous breeds competitive edge over exotic breeds that have been raised in temperate climates. Given the current harsh production circumstances and potential for significant future changes in production conditions and production goals, it is crucial that the value provided by indigenous cattle genetic diversity is secured through conservation and development of appropriate breeding programmes. Investment in this area will build on earlier interventions to characterize the indigenous cattle breeds, with focus on Ankole, Nganda, short-horn Zebu and Chwezi.

Planned and ongoing activities include: Phenotypic selection of indigenous bulls and dams, establishing a technical team to define the parameters of each indigenous breed; Sensitize stakeholders on importance of conserving indigenous breeds; Carry out field survey to identify potential donor farms; and Selection and acquisition of the elite performing cattle. Genotypic characterization and multiplication are also proposed. In situ Conservation is also planned and this entails conservation of beef breeds within their production system in the area where the breed developed its characteristics (on farm conservation). This will be through a public-private partnership.

6.3 WATER FOR COMMERCIAL BEEF PRODUCTION INTERVENTIONS

Commercial beef production can only be stimulated and sustained through reliable and sufficient water supplies. These interventions are spearheaded by MoWE, MoLG through programmes like the Local Economic Development (LED) programme and MAAIF under programmes like Water for production and Agriculture Cluster Development Program (ACDP). Water is one of the vital inputs in the beef value chain, constituting a major success factor in improving livestock health, production, and productivity. It is a critical nutrient in animal life, as it constitutes at least 50% of the animal's body. However, the major water constraints include uneven water distribution; abundant but under-utilized water resources; poor operation and management of the available watering facilities; inadequately constructed watering facilities and distribution infrastructure; high cost of constructing water infrastructure; and poor access to communal water facilities due to location.

Water scarcity forces animals to walk long distances to the water sources, thus contributing to low growth rate and uncontrolled breeding with attendant low productivity. In addition, it causes environmental degradation by cattle crowding in areas surrounding watering points, triggering gullies, removal of vegetative cover and proliferation of undesirable grass species and shrubs. This also significantly contributes to the spread of diseases along the animal movement routes. To this end, the plan emphasizes stimulation of sustainable commercial beef production through reliable and sufficient water supplies.

The interventions include; Conducting a beef production needs assessment and feasibility studies, Rehabilitation/construction of large water reservoirs (dams and valley tanks) for communal farmers and private commercial farms, Strengthening operation and management of water for livestock facilities (water user committees, sustainability, user fees, bye-laws, community mobilization and sensitisation and capacity building), Widening water reticulation (distribution) network from bulk water supplies, where viable to serve more farms, Tapping underground water (drilling) and use of water harvesting technologies especially for the small-scale farmers and Addressing issues of conflicts e.g. land ownership, other enterprises (crops, fisheries, brick-making).

Planned and ongoing activities include: Rehabilitation/construction of water facilities, Construction of the Dams and Valley tanks and Rehabilitation of the Dams and Valley tanks Operation and Maintenance of the water facilities, Small-scale water harvesting technologies and widening the distribution network from bulk water supplies.

6.3.1 Rehabilitation/construction of water facilities

This involves construction of the Dams and Valley Tanks Sub-activities; Water needs assessment; Feasibility studies; Site Selection (site-specific studies): Topography, soil characteristics, EIA, social economic studies; Design and supervision of works; Construction /rehabilitation of water facilities; Monitoring of works by contractor; and Supervision and monitoring by government.

Rehabilitation of the Dams and Valley Tanks Sub-activities includes: Confirmation of suitability of the site for the purpose; Determining magnitude of rehabilitation requirements; Redesigning and production of BOQ; and Construction and supervision of works.

6.3.2 Small -Scale water harvesting technologies

This is supplementary to other water interventions targeting mainly small-scale

farmers who may not readily access the water reservoirs. This will include: tapping into underground water (drilling of boreholes); and rainwater harvesting from roof run-off.

6.3.3 Widening distribution network from bulk water supplies

The country is endowed with several natural water reservoirs which can be utilized to supply beef production areas sustainably by putting in place water reticulation infrastructure. MoWE with NWSC and MAAIF are spearheading projects towards new irrigation facilities. Examples of potential supplies include River Nile which can supply water to DCZ 2, Lake Kachera and Lake Mburo to DCZ 1. Extending water supply lines to production units from bulk water sources is essential even if the cattle are near the sources. This is because direct drinking from the large water bodies carries with it high risks of contracting disease from other stock using the same source.

The fencing off of major rivers and lakes is prohibited by the National Environment (Wetlands, Riverbanks and Lake Shores Management) Regulations, 2000. It is therefore essential to invest in systems for transferring water from the large bodies to individual farms/ ranches. In addition, accessing natural sources is in some cases limited by other land use priorities especially human settlements and crop farming. Under this planned activity, investment will be to establish water distribution networks in areas surrounding large water bodies such as River Nile, Kafu and Katonga , Lake Kachera, Lake Mburo and Lake Kyoga.

Activities planned include: Feasibility studies (hydrological and environmental studies, socioeconomic studies); Design of works; Construction of distribution infrastructures; Putting in place institutional framework and capacity building to manage the operations; and Operation and maintenance. Expected Outputs: Increased access to water for beef production; Improved animal production and productivity; Reduced spread of animal diseases and vectors; and Reduced environmental degradation. Targets include: Construct/rehabilitate at least 50 water facilities (dams and valleys) located in priority beef producing districts; Infrastructure expected to support and enhance the performance of over 500,000 beef cattle per year; and 100 boreholes for small and medium farmers will be constructed as backup. MoLG programmes like Local Economic Development programme supported by the Islamic Development bank are also actively supporting the programme together with ACDP, Development Initiative of Northern Uganda (DINU), among others.

6.4 STRENGTHENING ANIMAL HEALTH SERVICES INTERVENTIONS

Uganda is host to many cattle diseases and vectors owing to its weather conditions. All diseases have production limiting effects and others are directly trade-sensitive and partially or completely inhibit trade even when a handful of animals are affected. These include Foot and Mouth Disease (FMD), Contagious Bovine Pleuropneumonia (CBPP), Lumpy Skin Disease (LSD) and Rift Valley Fever (RVF). Others are transmissible to humans (zoonotic diseases) such as Anthrax, Rabies, Brucellosis and Bovine Tuberculosis. Not many interventions are running in this area other than the tick vaccine development under STI.

The interventions under animal health are aimed at ensuring sustained animal production and productivity, animal welfare, public health and promotion of trade in animals and animal products by preventing and controlling animal diseases, including zoonoses (those that are transmissible to human beings) through therapeutic and non-therapeutic interventions.

Effective and efficient disease prevention and control depends on strengthening sub-systems as part of an overall animal health

system. The sub-systems include: Organization and governance of the animal health services; Disease surveillance and reporting; Veterinary Laboratories; Livestock and animal products movement control; Establishment of disease control zones including disease-free zones and compartments; Sound clinical veterinary practice; Animal identification and traceability; and Animal health information management system.

6.4.1 Disease epidemic-surveillance and reporting system

DDisease surveillance means the systematic ongoing collection, collation, and analysis of information related to animal health and the timely dissemination of information so that appropriate action can be taken. Specifically, the epidemio-surveillance system helps to: Identify circulating pathogens (disease-causing organisms) and characterize specific strains to enable their rapid detection in populations of susceptible species and map their distribution to inform response options; Improve understanding of the ecology of circulating pathogens and assess the rate of natural evolutionary drift in pathogens in given ecosystems.

Others are: Establish the role of livestock in the spread and emergence of diseases in wildlife populations and vice versa; Contribute data for evaluation of economic impacts of diseases on livestock populations, opportunity cost of their presence, and assessment of the effect on trade of live animals and livestock commodities; Provide data for use in risk analysis and for targeted interventions; Monitor and measure success of interventions; and establish a database to support control of various diseases.

The development of an organizational structure for the national animal disease surveillance at national level and in the field aimed at creating a comprehensive national animal disease surveillance network encompassing all essential elements of an effective system, e.g. epidemiological unit with advanced risk analysis capacity, disease investigation and reporting; Capacity Building for Animal Disease Surveillance thus ensuring sufficient staffing and competence in disease surveillance; Training (short and long-term); Equipment; Interviews and field observations; and Production and dissemination of reports internally within the country, regionally and internationally; Establish an IT-based system for data management and reporting; and Develop a communication plan for advocacy and awareness to enhance participatory surveillance activities are some of the planned activities. Expected Outputs include a comprehensive animal disease surveillance and reporting system strengthened. The target is a fully functional Division of animal surveillance and reporting.

6.4.2 Strengthening the National Veterinary Diagnostic Laboratory System

According to the OIE, a veterinary diagnostic laboratory refers to a properly equipped institution staffed by technically competent personnel under the control of a specialist in veterinary diagnostic methods, who is responsible for the validity of the results. Development of strong national laboratory services is a pre-requisite for efficient disease prevention and control. The quality is assured by the laboratory quality management system. In Uganda, the system is composed of the central referral National Veterinary Diagnostic Laboratory – The National Animal Disease Diagnostics and Epidemiology Centre (NADDEC); which handles specialized diagnostic functions.

The MIP proposes the setting up of 13 regional laboratories that can provide lower-level but specialized services, and district veterinary laboratories that can handle routine field diagnostic services. By 2022, three (3) specialized Assisted Reproductive Technology (ART) mobile laboratory equipment, installing 2 new liquid nitrogen (LN2) plants and constructing and establishing/strengthening three (3)

[60] *https://nagrc.go.ug/index.php/downloada/*

satellite Artificial Insemination (AI) centres. Five (5) specialized mobile ART equipment were procured all located at Aswa, Nshaara, Maruzi, Rubona, Lusenke, Bulago and the Livestock Experimentation Station. Four ART satellite centres in Gulu, Iganga, Soroti and Moroto were equipped to supply critical inputs (semen and LN2) to AI technicians in these areas under NAGRC&DB.

In Uganda, there is limited capacity to detect Transboundary Animal Diseases (TADs) and zoonotic diseases of socio-economic significance due to inadequate laboratory capacity to support implementation of animal health measures as per set national and international standards. The laboratory system is constrained by inadequate human resource at the national, regional and district levels; lack of equipment; and uneven distribution of laboratories (upcountry districts are not well served). There is, therefore, need to strengthen the national laboratory system to detect and manage diseases and vectors. In addition, the services will provide quality assurance measures in support of beef trade in the domestic and international market.

The interventions proposed will ensure that the veterinary diagnostic laboratory services have the capability and capacity for detecting and characterizing animal disease-causing pathogens, vectors and parasites as required by international standards. The proposed interventions include: Strengthening the Central Veterinary Laboratory Services to BSL3 standards and ensure sustainability; Establish/ strengthen Zonal and District Laboratories and ensure their sustainability, efficiency and effectiveness; Provide logistics and facilitation for sample collection, testing and analysis of priority diseases; Establish a Laboratory Quality management system (QMS) including development of quality manuals, and engaging in proficiency testing with other laboratories; Provide laboratory capacity for antimicrobial resistance (AMR) surveillance; Conduct refresher courses in specialized areas of laboratory animal disease diagnosis; Collaborate with other dedicated laboratories such as COVAB (MUK) and UVRI; and internationally e.g. ILRI, and other OIE reference laboratories to provide auxiliary laboratory diagnostic support and human resource capacity building; and Establish a regulatory mechanism for the development and operations of private veterinary disease diagnostic laboratories.

Planned and ongoing activities include: Assessment of the national laboratory needs as a basis for future investments (Central, regional and district laboratories); Recruit and deploy the required human resource as per OIE recommendations; Build capacity of personnel through specialized training (short and long-term course); Construct the physical infrastructure (Central, regional and district laboratories); Provide the necessary required laboratory equipment and reagents; Put in place Standard Operating Procedures for internal quality assurance in compliance with ISO 17025; and Collaborate with regional and international laboratory networks as a way to improve national laboratory practice. Expected Outputs include the strengthening of the veterinary laboratory system, and the target is one NADDEC, 13 zonal laboratories and 60 district laboratories.

6.4.3 Livestock and animal products movement control system

The regulation of movement of livestock and animal products is a key input in disease prevention, control, and eradication. The efficiency and effectiveness of the movement control system depends on the integrity of the veterinary inspection, certification and enforcement services backed by legal provisions, physical infrastructure, and epidemio-surveillance. The country has been experiencing poor regulation of movement of animal and animal products. Consequently, it has become a primary source of spread of animal diseases and thus making Uganda a

[70] *https://www.agriculture.go.ug/wp-content/uploads/2021/12/AGI-PROG-PERFORMANCE-REPORT-2020-21.pdf*

home to many production and trade-limiting diseases. Effective regulation depends on effective legal provisions backed by physical infrastructure like quarantine stations, holding grounds, gazetted stock routes, specialized transport facilities and enforcement mechanisms. Movements are approved based on the epidemiological picture. Therefore, Uganda must ensure that the animal and animal product regulatory system is provided with an adequate organization, sufficient infrastructure, and equipment (quarantine system) for the application of the measures as recommended in the OIE Terrestrial Animal Health Code. The interventions are meant to protect animal health through efficient and effective regulation of movements of animals and animal products.

The planned and ongoing activities include: Strengthening the inspection and certification service; Providing adequate legal support; Development of requisite infrastructure; and Enforcement of movement controls. The Expected outputs include animal movement control system improved and the target is at least 20 holding grounds; and 50 check points.

6.4.4 Developing animal quarantine systems

The quarantine system is part of the overall animal movement control system. It includes Import/Export Quarantine stations and border posts; Internal check points and gazetted stock routes. As defined by OIE, Quarantine station means an establishment under the control of the Veterinary Authority where animals are maintained in isolation with no direct or indirect contact with other animals, to ensure that there is no transmission of specified pathogen(s) outside the establishment while the animals are undergoing observation for a specified length of time and, if appropriate, testing and treatment. In a nutshell, it is a self-contained system. Previously the country had 16 quarantine stations strategically located to manage stock movement. However, they are now dilapidated. Only one quarantine station at Entebbe is still in use but with minimal activity.

Planned and ongoing activities include: the Assessment of the requirements for a quarantine system; Identification and mapping suitable sites taking into consideration the evolving conceptualization of the quarantine system; Designing the quarantine system; Constructing, equipping, and staffing quarantine stations, holding grounds, border posts and check points all over the country (improving SPS control); and Ensuring sustainable operations of the quarantine system. Expected output: Animal quarantine system established. And targets: 10 quarantine stations.

6.4.5 Establishing Disease Control and Free Zones and Compartments.

Uganda has repeatedly expressed interest in exporting beef, given her potential and the benefits that can accrue. However, accessing lucrative international markets demands compliance with conditions (sanitary measures) generally described in the WTO SPS agreements. The OIE endorsed zoning and compartmentalization for the purposes of enhancing international trade in animals and animal products. The OIE defines a zone as "a clearly defined part of a territory containing an animal sub-population with a distinct health status with respect to a specific disease for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade".

One of the strategies is to develop disease-free zones and compartments in which the beef for export will be produced. The country has natural features that can enable the creation of disease-free zones from which beef exports can be made. The presence of DFZs will demonstrate the presence of a surveillance programme with clear documentation of the health status of the animals, and will provide importing countries, assurances that there will be minimal risk in trading with Uganda. The interventions planned include the establishment of disease-free zones and a National Livestock Identification and Traceability System (LITS) intervention to support traceability among other things.

Planned and ongoing activities include: the Development of a supportive legislative framework (Formulation of Animal Identification and Traceability Bill); Design the Animal Identification and Traceability system; Train the requisite personnel; Sensitize, mobilize, and create awareness among stakeholders; Put in place the required LITS infrastructure - procurement of inputs; Establish a data management system for LITS; and Operationalize and maintain the LITS. The expected output includes a comprehensive and effective LITS system established and the Animal Health Management Information System (AHMIS).

6.4.6 Animal welfare

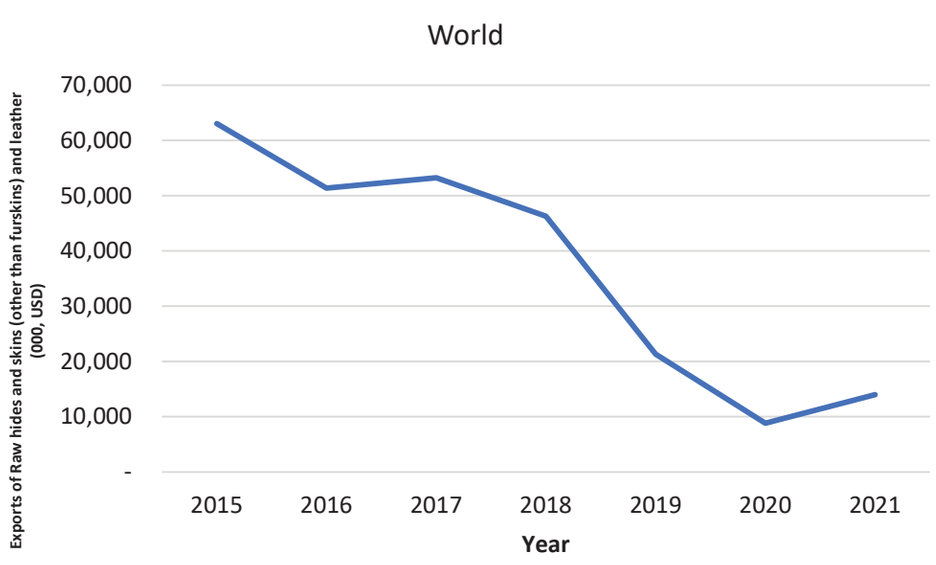
According to the OIE, Animal welfare refers to how an animal copes with the conditions in which it lives. It is considered from the perspective of freedom from undesirable

Table 86: Uganda's sausages exports (2016-2021)

COUNTRY	2016	2017	2018	2019	2020	2021
Burundi	1,000	1,000	-	-	-	-
South Sudan	2,000	3,000	6,000	18,000	13,000	3,000
World	17,000	4,000	6,000	18,000	13,000	3,000

Source: ITC (2022).

Figure 47:Uganda's hides, skins and leather exports (2015-2021)



Source: ITC (2022).

conditions. The 'five freedoms' internationally recognized include freedom from hunger, thirst, and malnutrition; freedom from fear and distress; freedom from physical and thermal discomfort; freedom from pain, injury and disease; and freedom to express normal patterns of behaviour. In the context of the beef industry, good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling, and humane slaughter.

Planned and ongoing activities include the: Sensitization and creation of awareness among stakeholders; Review the legislation pertaining to animal welfare to bridge the gaps; Improve the infrastructure for management and handling of animals along the beef value chain; Strengthen the institutional framework for animal welfare functions at central authority, local governments, the private sector, and other institutions engaged in animal welfare. The expected outputs are an effective animal welfare programme established.

6.5 TECHNOLOGY GENERATION AND DISSEMINATION

6.5.1 Research and technology development

With regard to beef, the key institutions that carry out research include: National Agricultural Research Organisation (National Livestock Resources Research Institute (NALRRI) and Mbarara Zonal Agricultural Research and Development Institute), Makerere University (College of Veterinary Medicine, Animal Resources and Biotechnology - COVAB, and College of Agricultural and Environmental Sciences). Many technologies have been generated over the years to support cattle beef productivity by improving animal nutrition, genetic improvement, and animal health.

Currently, the main challenges to research in the beef value chain include the following: Underfunding: beef cattle research takes a longer cycle to obtain results compared to other sectors, hence it is less attractive to some funding agencies; Inadequate human resource; Inadequate supporting infrastructure and equipment at the research stations such as diagnostic and analytical laboratory facilities; Low uptake of the technologies generated (poor research-extension-farmer linkages; Limited involvement of the private sector; and Limited research on the socioeconomic issues, processing and marketing interventions as highlighted earlier.

6.5.2 Beef industry extension services

Extension services play a very important role in the development of the beef industry by guiding the farmers to access and adopt improved and appropriate technologies that enhance productivity, quality, and safety of animal products. This is particularly vital while transforming subsistence farmers to commercial market-oriented producers. Extension workers provide linkage between farmers and researchers by disseminating the generated technologies and providing feedback on performance. Currently, the delivery of extension services is constrained by the following; Limited numbers of trained livestock extension workers, Inadequate logistical and financial support, Poor animal husbandry and non-climate-smart beef production practices by farmers, Inadequate demonstration centres and reference materials, Weak stakeholder coordination and collaboration and Weak farmers' organizations. Therefore, investments will be undertaken to support interventions that improve the delivery of extension services.

The following are the planned and ongoing activities under this intervention and they include: Strengthen the human resource in local governments by recruiting more workers and deploying them strategically in the beef priority areas; Encourage in-service training and career development pathways for the livestock extension staff; Improve facilitation and logistical support to extension workers (transport, tools and motivating remuneration);

Promote pluralistic approach by supporting the private veterinary livestock service providers; and Public-Private-Partnerships in the delivery of private and shared goods and services; Intensify training of farmers in Good Animal Husbandry Practices (GAHP) and promote climate-smart beef production including feeding, watering, breeding, animal health, housing, animal welfare, farm waste handling technologies such as biogas digester and manure management; Support establishment of demonstration centres for key beef industry technologies (could be on selected individual farms, or training centres); Support production and dissemination of extension materials to guide extension workers and farmers (booklets, posters, brochures); Intensify the use of ICT to reach more farmers (internet, websites; social media, TV and radio programmes); Support formation/strengthening of producer, processor and marketing associations, groups and institutions; and Encourage and support development of appropriate insurance packages to respond to disasters in the animal resource industry.

6.6 BEEF PROCESSING AND MARKETING

6.6.1 Beef processing investments

The investments cover a range of activities including slaughtering of the animal, cutting the meat, inspecting it to ensure that it is safe for consumption, packaging, processing it into other products and labelling up to the point of delivery to the final customer. The beef may be presented to the market as fresh beef or subjected to some physical and chemical treatments that may alter the form in which it is presented.

The interventions proposed under MIP are to ensure availability of safe, quality, and wholesome beef and beef products that satisfy the needs of varied customers in the domestic and export market without causing environmental degradation by adhering to the sanitary and phytosanitary measures along the entire chain right from slaughter of cattle, to processing and handling of carcasses, storage, packaging and labelling up to delivery to the consumer. This will be achieved by putting in place requisite infrastructure, competent personnel and enforcement of regulatory measures such as mandatory meat inspection and records management. It also entails putting in place effective process controls in abattoir operations including Good Hygiene Practices (GHP) and Hazard Analysis and Critical Control Point (HACCP) schemes.

Planned and ongoing interventions, mainly by MAAIF include; Infrastructure development, Rehabilitating/Establishment of infrastructure at the slaughter places including slaughter slabs, small, medium and large-scale slaughter houses and export abattoirs, and Ensuring the availability of laboratory facilities for diagnosing parasitic or infectious diseases, and detection of residues of heavy metals and veterinary drugs in meat, Sensitization and awareness creation for the various stakeholders; Streamlining institutional arrangement and staffing for the meat inspection function; Enactment of appropriate policies and laws; Strengthening enforcement of laws and regulations; and, Training to improve meat inspection practices.

Infrastructure Development planned activities under MIP and the MAAIF-led Meat Export Support Services Project (MESSP) include the Establishment of 300 small-scale slaughter facilities (throughput 20-100 head of cattle) with basic facilities and that primarily supply the traditional meat markets in rural areas around the cattle corridor districts, including the modern one at Sanga in Kiruhura District; Establish 22 (one per municipality throughput 100-300 head of cattle) efficiently run medium-sized cattle slaughterhouses with relatively modern line slaughter systems that produce chilled premium beef cuts from cattle; Establish 9 modern city abattoirs with throughput 400-600 head of cattle per day; and Establish/strengthen 4 export

abattoirs. Expected output: infrastructure for beef processing developed and targets include: 300 small-scale slaughter facilities, 22 (one per municipality throughput 100 - 300 head of cattle), 9 modern city abattoirs with throughput 400-600 head of cattle per day, 4 export abattoirs established, rehabilitated, or strengthened.

6.6.2 Strengthening meat inspection and hygiene services

This will involve deployment of adequate numbers of well-trained meat inspectors. Planned Activities include: Enhancing the knowledge and skills of meat inspectors by; reviewing curriculum in tertiary training institutions; short refresher training for meat inspectors; and training in specialized courses that support the operations such as Abattoir Technology and Hygiene, Good Hygiene Practices, HACCP and SPS. Provide the necessary tools and equipment for meat inspection (Inspection kit; personal protection kit); and strengthen supervision and monitoring of the meat inspection.

Expected Output:Meat inspection and hygiene services strengthened, and targets 200 inspectors trained and equipped. This will be in over 52 districts where meat inspection kits were procured for districts to improve inspection and certification of meat products for human consumption (MAAIF, 2021)[70].

6.6.3 Improving livestock market system

Marketing of beef cattle takes place at four levels: farm-gate marketing; primary livestock markets; secondary markets; and tertiary markets. Cattle markets play a central role in the beef industry by providing an avenue for the farmers and traders to transact trade for mutual benefit. It is part of the disease surveillance, management of livestock movements and overall enforcement of veterinary regulations. Finally, it enables the local governments to collect revenue. Therefore, the market should be well designed to enable carrying out of these functions. The essential ingredients of the market infrastructure include perimeter fencing, holding grounds, crush for inspection and treatment, an office for veterinary work, loading ramp and sanitary facilities. Above all, it should be manned by competent personnel.

Key constraints to cattle marketing include: Poor market infrastructure that impedes market activities. Many of them, lack basic facilities such as fencing, crushes, loading ramps, weighing bridges and sanitary facilities. This makes them prone to spreading diseases; Lack of accurate market information; Farmers are not well organized into groups which reduces their bargaining power; Animals are not graded according to quality, and pricing does not reward farmers; accordingly, Poor location and accessibility of livestock markets; and Poor livestock transport infrastructure. It is therefore important that investments be undertaken to address the constraints above to improve beef cattle marketing for the benefit of all stakeholders. Planned investment interventions include the Construction or rehabilitation of livestock markets; Strengthening of market information system; Capacity building for market operators; and Enforcement of regulations governing livestock trade including transportation.

6.6.4 Construction and rehabilitation of livestock markets

MoLG and KCCA are currently leading this intervention with support from projects like LED and CAIIP, The planned and ongoing activities include: Identification of suitable sites for locations; Undertake a feasibility study to establish catchment area, access routes and future projections, land ownership and environmental issues; Design of the livestock markets; Undertake the rehabilitation/ construction of the markets; and Build capacity of the market operators (tailored training programmes), operation and maintenance. Current and

expected outputs include the new Livestock markets constructed or rehabilitated across the country and the target is rehabilitation of 100 secondary livestock markets.

6.6.5 Access to market information

Planned and ongoing activities include: Establishing a market information collection and dissemination system; Utilizing ICT (digital system using phones, electronic applications on internet) in collaboration with private sector organizations, strengthening marketing groups/ associations; and, Promotional activities nationally and in targeted export markets (exhibitions, embassies). Target is a centrally controlled beef marketing information system established by December 2022. Under the MIP, the planned ICT-enabled agric extension supervision system that was to be developed and operationalized has not taken off yet with zero districts using the ICT-enabled agricultural extension supervision system.

6.6.6 Improving domestic marketing of beef and beef products

This covers improvements in infrastructure: butcheries, supermarkets, cold chain and storage facilities. Planned activities include Assess the status of infrastructure in beef processing and marketing outlets; Carry out sensitization and training for stakeholders; Improve the infrastructure (stalls, cold chain, machinery); and Carry out supervision, monitoring, and enforcement. The target is improved infrastructure for domestic marketing of beef and beef products with: 300 modern butcheries; 50 supermarkets in the various cities of Uganda under the MOBIP project with modern beef stands mainly in the Kampala metropolitan area where a lot of beef activity happens and Four quarterly sensitization and awareness sessions per year (workshops, electronic media, and production of IEC materials, radio and TV talks).

6.6.7 Enhancing access to beef export markets

Uganda has not been responsive to international protocols that demand that beef production and trade systems should be based on management of quality and process controls throughout the food chain, from farm to fork (a value chain approach) as checks on the product alone would not be capable of providing the same level of safety, quality and transparency to the consumer. The country needs to address several challenges that currently limit access to the export market. These include the SPS requirements as stipulated in the WTO SPS agreement and tailored to specific importing countries. It entails revision of legislation, standards, development of infrastructure along the entire value chain. It also entails commercialization of beef production (including intensive feedlots) to produce good quality/grade of beef. The investments are meant to prepare the country to export beef to the lucrative markets by addressing the following interventions. Establishment of Disease-Free Zones; Putting in place an enabling policy and legal framework; Improvement of livestock production systems; Putting in place the relevant infrastructure to enable attainment of the required market standards; Improving cost-effectiveness of cross-border interfaces; and Establishment of the beef commodity in the export market.

The planned and ongoing intervention is carrying out beef market research related to international beef export requirements to enhance knowledge on competitiveness in cross-border transactions and in the export markets. Other planned activities include undertaking an unspecified number of studies on cross-border transaction costs (clearing costs, customs, and transportation from exporting to importing country); and identifying the demand/carrying out research in a targeted market. Expected output is information on the potential

[73] *https://nagrc.go.ug/index.php/downloads/*

export market produced and the target is four quarterly reports.

6.7 SECONDARY AND TERTIARY PROCESSING IN THE BEEF VALUE CHAIN

Secondary processing of beef and its products has been covered under section 6.6 above. However, tertiary food processing is defined as the commercial production of what is commonly called processed food. These are ready-to-eat or heat-and-serve foods, such as frozen meals, sausages for street foods and re-heated airline meals. Some of the documented cases of tertiary beef processing are in the production of sausages by companies such as Fresh/Quality Cuts (this controls 85% of the market size), Farmers Choice company and others which are largely a reserve delicacy for the urban elite communities. Growth in consumption of processed meat products is often more visible among middle-class consumers (Uganda Investment Authority, 2016). UIA estimated that processed products such as canned meat, corned beef, canned minced meat, canned meat pieces in stew and canned hams would require an investment of US$2.5 million with a three-year payback period with 5,000 cans per day capacity[71]. It is worth noting that a minority of beef products are sold in supermarkets, mainly frozen beef, minced meat and sausages because beef is mostly sold unrefrigerated within hours of slaughter in street butcheries. Uganda has low exports of processed products such as sausages with exports to South Sudan only at US$3,000 by 2021, yet exports to Burundi stopped in 2017 (Table 86).

Other by-products of beef processing are the hides, skins and leather. There has been growth in production and exports of these by-products from 1,600MT of wet blue hides and skins and 1,200MT of leather in FY2015/2016 worth US$114.4 million. However, since 2015, Uganda's foreign exchange from hides, skins and leather has been reducing to only about US$14 million (Figure 47).

6.8 PLANNED INTERVENTIONS AT THE SECONDARY AND TERTIARY BEEF PROCESSING NODES

a) According to the Leather Sector Profile by the Uganda Investment Authority, Uganda has a potential raw material of about 1.9 million cattle hides and about 4.8 million goat/sheep skins. However, most of the hides and skins are exported in their raw form, mainly wet-salted and air-dried. To add value to the products, Uganda has embarked on a new era of processing hides and skins into leather. One of the efforts is the Kawumu Leather Tannery, which is a project initiated by State House Uganda to produce leather products such as shoes, belts, bags and jackets. Farmers interested in supplying hides and skins to the tannery are required to sign supply contracts with State House Uganda and follow certain guidelines on how to slaughter animals in a way that enables them to produce quality hides.

The study covered the key intuitions in the country that are handling R &D and policy work around the BVC. These institutions included NALLIRI, NAGRC & DB, NARO, COVAB, CURAD, ILIRI, UIRI, UNBS, HEIFER international, UNBS and MAAIF. A number of findings were gleaned by interviewing the key personnel and heads in these institutions to paint a clear picture around the focus of work in this space of the value chain.

The key major livestock research institutions in the country are NARO-NALLIRI supported by COVAB and NAGRC & DB. The research institutions in the country working around the BVC have their key vision and mission geared towards enhancing the utilization of livestock research output for improved livelihoods of Ugandans. The mission

[71] *https://www.ugandainvest.go.ug/wp-content/uploads/2016/02/AGRICULTURE-Beef.pdf*

rotates around spearheading generation and dissemination of improved livestock technologies and knowledge for sustainable national economic development. However, entities like CURAD agribusiness incubator focus on the dissemination and use of these new technologies to develop new enterprises and for improved farmer incomes. Regulatory entities like UNBS have a unique role of developing the relevant standards which could be product specific e.g., standards for beef cuts and carcasses, codes of practice like codes of hygiene, guidelines to prevent microbial spoilage of meat, among others. These institutions are mandated to undertake research in all aspects of livestock production, marketing and policy environments.

b) Movable salughter facility by MAAIF

Still on paper, the ministry has a plan to introduce a Mobile / movable slaughter facility to cover over 30 cattle corridor districts . The MSU is part of a larger project called Market Oriented and Environmentally Sustainable Beef Meat Industry in Uganda (MOBIP), which was launched in 2018 with the support of the European Union and the Ministry of Agriculture, Animal Industry and Fisheries. A mobile or movable unit for slaughter operations provides a place to humanely kill and safely process animals that have not been stressed in transport. The facility will need total fixed costs amounting to USD 216,110 with capacity to handle about 50 animals daily and generate annual revenues of UGX 2.8 billion. The plan is to have the MSU move to another site after slaughter but farmers at the first site may still bring their animals for slaughter, and these animals need to be kept at site until such a time that the MSU is available again. This requires that some pasture be planted for these animals to graze but provision of a refrigerated truck helps to go and pick the processed meat from each site.

The MSU is intended to improve the hygiene and quality of beef meat production and processing in Uganda, especially in the disease control zones (DCZs) where movement of animals is restricted. The design of the MSU was based on converting a 20ft or 40ft container into a slaughter unit with different sections for slaughtering, skinning, dressing, and chilling. The MSU also requires site facilities such as docking site, enclosure, lairages, holding pens, water supply, solar power unit, site offices, change rooms, toilets, fencing, security, and waste management. The cost of converting and operationalizing the MSU was estimated at about 200 million Ugandan shillings for the 20ft container and 400 million Ugandan shillings for the 40ft container. The MSU is expected to have capacity of slaughtering 10-15 cattle per day for the 20ft container and 20-30 cattle per day for the 40ft container. The MSU is also expected to generate income and employment opportunities for the local communities and enhance the competitiveness of the beef meat industry in Uganda.

c) Cattle horn processing:

We found no evidence of planned interventions in the public sector to add value to cattle horns save for the private sector. According to Horn Products Uganda, a company that deals with cattle horn products, Uganda has a rich resource of cattle horns from the Ankole cows, which are known for their long and curved horns. The company uses the horns to make various products such as jewelry, buttons, cutlery, lamps, and sculptures. The company also exports the horn products to different countries such as the USA, UK, Germany, France, and Japan. The company claims that the horn products are environmentally friendly, bio-degradable, and durable.

[74] *https://webstore.unbs.go.ug//store.php?src=US%20EAS%201026:%202021 & preview*

[75] *The British Retail Consortium (BRC) standards audit is an independent assessment of a company's food safety management system. The audit is conducted by an accredited certification body and covers nine core areas of food manufacturing operation. To pass the audit, a company must demonstrate that it has a robust food safety management system in place that meets the BRC standards. The audit will assess the company's documentation, records, and procedures, as well as its physical facilities and practices. By taking these steps, companies can increase their chances of passing the BRC audit and demonstrating their commitment to food safety.*

Another source of information on tertiary processing of cattle horns in Uganda is the ASL2050 Livestock Production Systems Spotlight by the Food and Agriculture Organization (FAO). The report states that Uganda has a potential of producing about 3.5 million tons of animal by-products annually, including horns, hooves, bones, blood, and offal. However, most of these by-products are wasted or underutilized due to lack of processing facilities, technologies, and markets. The report suggests that Uganda can improve its value addition and income generation from animal by-products by investing in modern processing plants, developing quality standards and certification systems, promoting product diversification and innovation, market access and linkages.

6.9 POLICY AND RESEARCH AND DEVELOPMENT IN THE BEEF SUBSECTOR

6.9.1 Current Research and development and policy issues in the Uganda Beef Value Chain

The study covered the key institutions in the country that are handling R &D and policy work around the BVC. These institutions included NALLIRI, NAGRC & DB, NARO, COVAB, CURAD, ILIRI, UIRI, UNBS, HEIFER International, UNBS and MAAIF. Several findings were gleaned by interviewing the key personnel and heads in these institutions to paint a clear picture around the focus of work in this space of the value chain.

The key major livestock research institutions in the country are NARO-NALLIRI supported by COVAB and NAGRC & DB. The research institutions in the country working around the BVC have their key visions and missions geared towards enhancing the utilization of livestock research output for improved livelihoods of Ugandans. The mission rotates around spearheading generation and dissemination of improved livestock technologies and knowledge for sustainable national economic development. However, entities like CURAD agribusiness incubator focus on the dissemination and use of these new technologies to develop new enterprises and for improved farmer incomes. For example CURAD implemented the improved pasture and rangeland improvement activity with NARO and also implemented the new technology dissemination and enterprise development component of the MOBI programme. Regulatory entities like UNBS have a unique role of developing the relevant standards which could be product-specific, e.g., standards for beef cuts and carcasses, codes of practice like codes of hygiene, guidelines to prevent microbial spoilage of meat, among others. These institutions are mandated to undertake research in all aspects of livestock production, marketing, and policy environments.

6.9.2 Current R & D issues and activities in the Beef Value Chain

The study identified the R&D, policy issues and activities that are being handled (over the past 2 years) by these institutions under different government and donor funded interventions to support the BVC are as follows:

- Lack of sufficient improved breeds. The generation of improved breeds of cattle in terms of performance and dissemination to farmers to improve production;
- Breading technologies not widely available. The Agricultural Value Chain Development (AVCDP) where support to Artificial Insemination (AI) and farmer training /training to equip AI Technicians was done;
- Provision of improved Agricultural technologies and agribusiness advisory services (ATAAS) through community breeding;
- Provision of Competitive scheme grant to support beef livestock breeding by MAAIF-NAADS and development partners like Heifer International;

- New embryo synchronization technologies at NALLIRI. This involves the production of Multiple embryos developed from good traits in a cow, that are then transferred to surrogates;
- Development of Anti-tick vaccine and verification of its efficacy supported by Ministry of Science and Technology and the private sector;
- Conservation of indigenous cattle breeds like the Nganda and Zebu cattle genes by MUZARD and NAGRC & DB to preserve a vibrant gene pool and consequent multiplication;
- Research to produce improved pastures with higher nutritional value which is a plus for farmers as it increases production and productivity mainly at the ZARDIs, NARO NALLIRI and even at CAES -- Makerere University;
- Proposed initiatives targeting almost all actors (processors, farmers, transporters) in the beef sub-sector to enable them meet standards, hygiene, productivity at the farm level, linkage to buyers and animal welfare are currently ongoing;
- Animal breeding component of the MOBIP programme (Project identifying female actors to keep bulls);
- Animal induction, synchronization, and Artificial Insemination.

The Impacts of these R&D initiatives and programmes currently and over the years were highlighted as follows:

- The impact of R&D activity along the improved breed technologies is the realisation by beneficiaries and other cattle keeping communities that improved breeds grow faster (better productivity) leading to improved household income. This has led to increased adoption of new breeding technologies.
- R&D work at Pre-production (Inputs) has led to the development of new effective vaccines, e.g., the Anti-tick vaccine confirmed to effectively control blue ear ticks.This is impacting heavily on tick-bourne disease control.
- R&D activity has also led to increased knowledge on improved and high yielding forage in addition to management to prevent their depletion, leading to high production and productivity.
- Increased accessibility of farmers to pasture seeds. For example, MUZARDI partners with Syova Seeds Uganda Limited to produce and sell more seeds for the pastures. NALIRRI has worked with CURAD to disseminate improved resilient pastures along the Cattle Corridor.
- Local livestock varieties have been conserved with better offspring realized for future interventions and research.
- Water/communal valley dams have been constructed at farm level (individual level in the west).
- Livestock markets, animal holding grounds and quarantine centres have been constructed.
- At transportation level, Guidelines to regulate movement of cattle and beef so as not to compromise quality of beef/ hides and skins have been developed. Ministry to procure specialised trucks to act as samples for specification of what is acceptable means of transporting cattle/beef, plus customizing motorcycles for meat transportation.
- Routine countrywide inspections to sensitise transporters and traders on the requirements of transporting animals (route stock route inspections/animal check points) have been conducted.
- At processing level (Slaughter, storage, processing), Construction of livestock

markets and improved slaughter houses to ensure meat is slaughtered in hygienic places. This is impacting positively the quality of meat in the market.

6.9.3 Limitations of past and current interventions in the beef VC

Limitations of past and current interventions that were cited along the BVC and related institutions include the following:

Limitations at pre-production and production level:

- Insufficient interventions in the provision of water sources to livestock. Thus, continued drought impacts, leading to limited pastures and water for the animals negatively impact herds both in numbers, productivity and quality of beef and hides.
- Interventions in breading and support with improved breeds have also had a negative impact too. Farmers tend to sell them off first in times of financial difficulty since they fetch more money, leading to unsustainability of such interventions and reducing their impacts.
- Financial constraints of farmers to buy drugs and supplements which are required to care for improved breeds still remain a key challenge. This has a negative effect on the adoption of the improved breeds and consequent productivity.
- Interventions have not adequately tackled the issue of land fragmentation. Small land holdings owned by farmers, lead to low adaptation and Low knowledge and skills on cattle management under small holdings and consequent low cattle productivity.
- Lack of sufficient supplementary feeding support initiatives; this impacts productivity and profitability of the value chain.

Limitations at aggregation and marketing level:

- Poor transport means that is not suitable for animal movement if the target is quality beef.
- Poorly equipped cattle markets and holding grounds where livestock disease testing is rare or non-existent that leads to constant otbreaks of quarantine-causing diseases such as foot and mouth disease which disrupts business.
- Lack of a reliable and stable supply of cattle from tme to time which causes price fluctuations and increased transaction costs since traders have to move longer distances looking for cattle.

Limitations at processing level:

- Use of poor and obsolete processing technology.
- Expensive, unstable and unreliable power supply.
- High taxes on processed products.

Limitations at export level:

- Lack of reliable beef suppliers that fit export market standards.
- The sedentary numbers of cattle over the years means that beef offtake is low for Uganda and once an export opportunity arises, the supply may not be sustained.
- The high domestic demand gap amidst a growing population implies that Uganda has a long way to go to to produce a beef surplus that can be converted into exports.

Limitations at policy and implementation level:

- Limited funding available to support R and D activities. The impact of this has far-reaching consequences right across the value chain from inputs to beef trade.

- Insufficient numbers of trained breeders. There is a need for more trained personnel to acquire knowledge and skills in breeding. The lack of skilled personnel is negatively impacting breed improvement interventions.
- Most interventions have limited engagement with the right stakeholders and assessing the real needs of the stakeholders. It is often noted that Government understands the farmers' problems, but these are often not properly addressed during planning and implementation.
- Most interventions have not picked on the issue of selecting the right animals for a given environment. Delicate Friesian cows have been supplied to arid, hot regions, leading to high mortality rates. For instance, the two purely beef breeds developed by NAGRC&DB, that is the Romagnola and Brahman, are not popularly adopted and widespread[73] . Thus failure to choose/keep the right breeds that fit in the environment affects productivity negatively.
- Lack of sufficient animal holding grounds and quarantine stations nationwide: The negative effect is increased diseases in the Cattle Corridor that seriously impacts the cattle/beef trade.
- Lack of a credible livestock identification and traceability system: This negatively impacts animal safety, health, quality and breeding programmes since it is difficult to adequately identify good quality breeds in communities.
- Lack of proper animal feeds regulations/ enforcement leading to farmers purchasing low quality feeds.
- The Animal Breeding Act is weak, making enforcement of animal genetic quality impossible.
- Inadequate resources to enforce quality standards in all beef markets countrywide: This negatively impacts the quality of beef on the market; may lead to disease outbreaks, thefts and even frustrate market access.
- Laws/policies are too old to be enforced in the current situation.
- Lack of cooperation from other stakeholders which limits cross-learning, adequate implementation and impacts across the entire value chain. For example, a productivity programme implemented by MAAIF without MTIC involvement may lead to the promotion of breeds that have poor local and export markets.
- Law enforcement agencies have inadequate knowledge of the relevant animal guidelines, regulations, and standards.
- The NADECC Laboratory is not funded/ financed by government because it is not fully established by law.

6.9.4 Existing opportunities and gaps at the R&D level

The study identified several opportunities and gaps as cited by different respondents that the consultant interfaced with. These include:

- Increased demand for good quality beef by the increasing population within the country and outside, hence the need for researchers to breed varieties that are fast growing and of good quality to meet the demand.
- Increased demand and adaptability of fast-growing forage by farmers for increased production and productivity. Thus a gap exists to further increase the variety of fast-growing forage.
- Increased funding to facilitate more research and interventions that will enhance production and productivity (technology and infrastructure).
- Increased capacity building of the available skilled labour involved in

research through trainings by agencies like UIRI and further studies in developed countries known for high beef production such as the Netherlands and the more recent in-country capacity building in beef processing for women and youth groups that was implemented by UIRI and USSIA under the MOBIP Programme.

6.9.5 Identified institutional gaps and mitigation measures

Knowledge gaps identified that may need to be filled by the R and D institutions, government and the private sector include the following:

Gaps in research institutions:

- Market and information gaps: Research to inform policy on market, structures, value addition and sustainable beef production in extensive and intensive systems.
- Knowledge gaps at farm level: Sensitize farmers on breed sustainability and the population on the importance of animal protein in improving health.
- Animal treatment and medication gaps: Develop vaccines and drugs for disease control and prevention.
- Insufficient funding: Partner with donor organizations to attract more funding to increase their capacity to produce more output and strengthening the regulation to deter importation of substandard drugs and Identification of genuine products from fake products.
- Knowledge gaps in disease management and standard quarantine practices: Poor Herd health management and production for the export market.
- Technology gaps and use of modern livestock processing production machinery.

Government gaps and possible mitigations:

- Inadequate funding: Increase funding to research related to livestock.
- Inadequate disease control: Promote animal disease control and prevention and promote supplementary feeding.
- Insufficient water infrastructure for cattle: Construction of water dams to avail water during droughts.
- Inadequate processing facilities: Construction of standardized slaughter facilities or rehabilitate existing ones to address hygiene.
- Outdated regulatory policies: Review and update policies, regulations, guidelines, and standards in the beef value chain and ensure compliance.
- Inadequate market access and supplies in the local regional and intrenational markets: Government should streamline beef marketing structure in view of price stabilization and expansion of Uganda's quota in the regional and international markets (bilateral and multilateral engagements).
- Inadequate disease management and improving surveillance and control of Foot and Mouth Disease and establishment of disease-free zones.
- Regularization of policies that are currently shelved and solving the issues of implementation of said policies which takes unnecessarily long.

Private sector gaps

- Insufficient public private sector partnerships: The private sector should partner with government at all levels.
- Disorganised production systems: Formation of beef cooperatives for improved production.
- Poor market coordination: Cooperative extension and marketing, including partnerships for international markets (exports).
- Inadequate funding: Increased funding

from the private sector through UDB and other agencies.

» Lack of sufficient supportive partnerships :Public-private partnership for better investment and strategic support to the private sector through entities like UDC.

6.9.6 Challenges identified at marketing, trade and policy level

Challenges identified at marketing, trade and policy level that are hampering the development and commercialization of beef from production, marketing, consumption, and exports in Uganda are as follows:

» Weak policies and regulations.

» Non-compliance to regulations and guidelines by actors in the beef value chain.

» Lack of support/facilitation and enforcement.

» Trade requirements relating to permits and animal welfare practices during transportation;

» Negative mindset of value chain players: How to support mindset change right from input suppliers to retailers of beef and beef products;

» Insufficient financing of the Beef Value chain;

» Inadequate market linkages: How to effectively access the lucrative beef and beef products markets for foreign exchange;

» Poor compliance: Low levels of compliance to the required standards is the biggest challenge;

» Low understanding of the required standards and their importance by the different actors.

6.9.7 UNBS and BVC standards

An interaction with UNBS's standards officer revealed the following standard guidelines that apply across the BVC. The key standards specifying hygiene requirements that apply for butcheries and other meat handling facilities are the US736; 2019 standard, the US 737:2019; Production of packaged meat products (processed) Hygienic requirements, the US 932:2012; Bovine (beef) carcasses and cuts – specification and the US 931:2019; Minced meat - Specification[74] . Some key details of these standards are as follows:

Standards at pre-production

» Standards for vet-drug residues and withdraw period.

» Quality standards for animal feeds.

» Standards for animal welfare, housing standards, specifications for holding grounds management.

» Quality standards of animal medicines and drugs.

At transportation level

» Standards on transportation vessels. Vessel/containers shall be made of impervious materials that are non-corrosive, easy to clean, disinfected and well maintained.

At processing level

» The carcasses to be derived from healthy bovine.

» Slaughtered in hygienically managed slaughterhouses supervised by competent authorities.

» Carcasses to be certified as sound and free from diseases and fit for human consumption.

» Carcasses to be maintained fresh, chilled or frozen at specific temperatures.

» To conform to minimum residual limits for pesticides and vet drugs and heavy metals, micro-organisms.

At packaging level

» Product specifications, e.g., tinned beef specifications;

» To be packed in hygienic food grade materials;

» Frozen cuts to be wrapped in hosiery or linen cloth then polythene vacuum containers, to be chilled at 3^0C for offals and 7^0C for other meat.

» To be labelled with a health mark, nutrition claims and date of maximum durability.

At export level

The national UNBS standards US736;2019 standard applicable to meat and meat products is an acceptable standard for local and regional export markets. However global markets often require a range of additional product standards and specifications. The International Standards Organisation-ISO 23722: 2021 is the latest international standard for meat and meat products that is acceptable globally. Local meat processors should endeavour to get this ISO certification, but the costs are often prohibitive for most SMEs. However, products should meet the national standards and requirements for the country of destination, e.g., Passing the British Retail Consortium (BRC) standards audit is essential in accessing the British retail market[75].

The study, however, found that compliance levels were identified as low across most nodes of the value chain. On the question of what needs to be done to ensure quality beef at every stage of the value chain, the following measures were proposed by UNBS.

» Complying with standards at all stages which is key to ensuring quality.

» Sensitization of different actors along the beef value chain on standards and their importance, while explaining the technicalities in simple language, preferably local languages. Sensitization materials should be developed and disseminated.

» Mindset trainings for standard users to better understand benefits of compliance vs non-compliance.

» Ensure Multi-sectoral engagements at all stages.

» It was also cited that financial and technical support to BVC actors may help to address the challenges that might be hindering compliance with standards, e.g. by supporting improved technology and the requisite infrastructure.

6.9.8 SWOT analysis of the beef value chain structure in Uganda

Information was collected on beef value chain actors involving; strengths, weaknesses, opportunities and threats/constraints (SWOT). Table 87 shows the SWOT analysis based on evidence generated from various actors and supporters of the beef value chain. The table is an aggregation of issues identified by a myriad of studies including; key informant interviews with sector experts in this value chain study plus the consultant's observations.

Table 87: SWOT analysis of the Uganda beef industry

Strength	Weaknesses
A coordinated disease diagnosis and monitoring system for diseases such as FMD, tick diseases and the existence of a central disease diagnostic laboratory.	The beef sector is largely dominated by subsistence small scale farmers. This provides a myriad of organization and support challenges as well as productivity problems.
The growing middle class is providing a good scope for growth of the value-added quality products from beef and specialty cuts.	A key challenge in the sector is poor animal husbandry and non-climate-smart beef production practices by farmers (feeding, breeding, animal health, housing, records management).
	Failure to adopt and underutilization of modern forage production, processing and preservation technologies.
	Another core challenge is Low productivity of beef cattle (low offtake, low carcass weight, low meat/bone ratio)
Uganda has a large cattle population which can be improved for enhanced productivity.	Animal welfare observance is very poor in the industry with cattle transportation to the abattoirs done in the crudest ways.
High skills levels in most core technical positions in the value chain management at the top level (MAAIF)	The inadquate technical skills in processing and marketing especially among farmer stakeholders.
Strong institutional support from entities like UNBS, MAAIF directorates, NAGRC & DB, local governments for extension services, farmers' associations for production.	Limited veterinary services (lack of the needed infrastructure in form of laboratories for disese diagnosis, low efficacy vaccines due to poor cold storage facilities,)
Abundant natural feed resources and grazing lands, including agro-industrial feeds and crop residues.	The gross underutilization of some of the government supported infrastructure such as slaughter houses, cattle markets e.t.c. as well as private sector abattoirs.
Uganda is blessed with abundant water resources (rivers, lakes, underground water and man-made reservoirs).	Inadequate enforcement of standards for meat hygiene and safety, grading of carcasses and Poor enforcement of policies, laws and regulations.
Existence of a wide range of ISO-compliant national standards across the beef value chain	Low productivity of the indigenous breeds and inadequate breeding services.
Observance of Halaal slaughter (Halal slaughter is the process of slaughtering an animal in accordance with Islamic law. The animal must be alive and healthy at the time of slaughter, and it must be killed with a single, sharp cut to the throat.) Here are some of the specific advantages of Halal slaughter:	Limited awareness and appreciation of quality products by the consumers.

• Humane: Halal slaughter is considered to be more humane than other methods of slaughter, as the animal does not suffer as much. The animal is killed with a single, sharp cut to the throat, which causes immediate unconsciousness and death. This is in contrast to other methods of slaughter, such as captive bolt stunning, which can cause the animal to suffer for a prolonged period of time before it dies. • **Healthier:** Halal meat is considered to be healthier than other types of meat, as it is free from blood and other impurities. Blood is a breeding ground for bacteria and can also contain toxins. When blood is drained from the carcass, it reduces the risk of foodborne illness. Additionally, Halal meat is typically raised on a diet of grass and hay, which makes it higher in nutrients and lower in fat than meat from animals that are raised on a diet of grain. • **Efficient:** Halal slaughter is more efficient than other methods of slaughter, as the animal is killed instantly and the blood drained quickly. This reduces the risk of contamination and allows the meat to be processed more effectively. • **Ethical:** Halal slaughter is considered to be more ethical than other methods of slaughter, as the animal is treated with respect and dignity. The animal is neither abused nor mistreated, and the death is quick and painless. Halal slaughter is also in line with Islamic teachings, which emphasize the importance of compassion for animals.	
Increased collaborations regionally and globally through by-lateral and multi-lateral agreements (EAC, AU/IBAR, COMESA, OIE, WTO, EU, USAID).	Inadequate beef production extension services.
Growing body of private institutions with government and donor support to facilitate cattle/beef production expansion including interventions by IGAD and EAC	Poor market linkages between the various players.
A growing population with increasing urbanisation will provide a stable and large domestic as well as regional (EAC population stands at about 350 million people) markets.	The very low private and public funding for the beef value chain.
Growing body of private institutions with government and donor support to facilitate cattle/beef production expansion including interventions by IGAD and EAC	Weak institutional structures and lack of strong active organized beef producers, processors and marketing groups.
	Unfavourable land tenure system (land conflicts, difficulties in acquiring land for large scale investment)

	Low technical extension staff levels at the regional and district levels with veterinary competences

Opportunities	Threats
A growing middles class and increasing domestic demand for meat (increasing population, increasing peoples' income and urbanization)	Climate change, affecting weather patterns leading to floods and drought.
The enhanced road network covering and connecting the entire cattle corridor to cattle markets is a critical opportunity for farmers.	High cost and unreliability of utilities e.g., electricity and water.
The climate experienced in Uganda is favourable for forage production e.g., two peak rain seasons for continuous forage production but limited capacity for extensive forage production and conservation on farms.	High prevalence of export-sensitive and zoonotic diseases.
Good climate, with bi-modal rainfall pattern.	Increasing climate change that causes scarcity of water and pastures limits stocking capacity of many farmers, an eventually limiting number of cattle available for the market.
Increasing global demand for beef (Middle East, EU and China other Asian countries) – export opportunity).	High competition in the export market. High competition in the export market can become a threat to a country's products in several ways: • It can reduce the market share and profitability of the country's exporters, especially if they face lower-cost or higher-quality competitors. • It can force the country's exporters to lower their prices or improve their quality, which may entail higher costs or lower margins. • It can induce the country's exporters to focus on their best performing products and abandon their less competitive ones, which may limit their product range and diversification. • It can affect the country's terms of trade and balance of payments, especially if the country relies heavily on exports for its foreign exchange earnings. • It can undermine the country's comparative advantage and technological leadership in certain sectors or industries, especially if the competitors are able to innovate faster or adopt better standards.
Increasing global demand for beef (Middle East, EU and China other Asian countries) – export opportunity).	Increasing climate change.
Abundant water resources but limited capacity of most farmers to distribute water for livestock	High competition in the export market.
Favourable macroeconomic policies e.g., Investment policy, tax policy on agricultural inputs and products.	
Favourable sector policies and legal frameworks e.g., the parish development model (PDM), policy on delivery of veterinary services, animal breeding policy, animal feeds policy, Animal Diseases Act, Animal Breeding Act).	

6.9.10 Beef value chain CATWOE analysis

In this beef value chain study, a CATWOE analysis was carried out to define and analyse beef business stakeholder perspectives regarding Customer, Actor, Transformation, Worldview, Owner, and Environment perspectives of the actors (Table 88). In this CATWOE analysis, focus was on the upgrading of beef value chain activity at each node of the value chain and what the actors perceive as the main benefits and impacts.

Table 88: CATWOE analysis of the beef value chain

Element	Analysis
Customers	The main beneficiaries of the interventions in the beef value chain are the domestic consumers including home consumers, hotels, restaurants, and roadside food vendors. In addition, other actors such as traders, butchers, processors, and exporters significantly stand to benefit from beef value chain upgrade interventions. The value chain upgrade interventions will improve quality, create more value and lead to business growth as well as a healthy consumer population.
Actors	The main actors in the beef value chain have been identified as cattle keepers, farm workers, traders, butchers, processors, and exporters. Offshoots such as hides and skins as well as horns and hooves also provide more opportunities for the leather industry to thrive (manufacturing).
Transformation	The ultimate changes that will occur by implementing a beef value chain upgrade intervention will be based at various nodes of the value chain; • Farm level: There will be increased adoption of improved technologies, increased farm employment (job creation), increased investment in farms (wealth creation) that will spur increased beef production in Uganda. • Market level: There will be increased investment in technologies such as transport technology, road infrastructures, market infrastructures such as well constructed and modern holding grounds, testing laboratories, and market information systems. • Abattoir/processing level: There will be increased investment in modern carcass handling technologies, improved skills on carcass and beef management, storage systems, beef transport and distribution systems etc. • Export level: Upgrading the beef value chain will result into improved quality and quantity of beef for export and this will lead to increased foreign exchange for Uganda, increase the tax base and lead to national development. • Consumption: The consumers in the domestic market will benefit through improved quality, value for money, and stabilised beef supply.
Worldview	A value chain upgrade at all levels will lead to more organization and restructuring of the beef value chain. The size and scale of businesses will increase, the beef value chain will attract foreign investment and partnerships as well as increasing the number of jobs in the sector.
Owner	A beef value chain upgrade will be the responsibility of both Government and the private sector. The GOU will be responsible for enacting and repealing and revising laws and regulations (domestic, regional and international) to create an enabling environment for the beef value chain actors (Including stability of the macro and micro economy through fiscal and monetary policy formulation and implementation). In addition, GOU will be responsible for investment into the infrastructures such as roads, public holding grounds as well as electricity and water. GOU under MAAIF/NARO will be responsible for providing extension, inspection and regulatory services to the actors. The private sector will play the role of investing into the beef subsector and spur business growth.
Environmental constraints	• **Farm level:** At this level actors are limited by inadequate land, climate change effects such as prolonged droughts that lead to inadequate pastures and water. Other constraints are low access and adoption of modern farming technologies, increased frequency of disease outbreaks especially FMD that leads to quarantines. There is also inadequate staff for provision of extension/veterinary services. • **Market level:** The constraints here are poor infrastructures, poor transport means, low level of skills in handling livestock, fluctuating prices, inadequate cattle supply • **Abattoir/processing level:** There low use of modern technologies, high costs of operation caused by high electricity, water and fees. Low quality of cattle supplied that does not measure up to the international market standards for beef. • **Export level:** High taxes are a big constraint, poor quality cattle and beef that is below export standards as well as low government investment to enhance the export market • **Consumption:** The increasing costs of living mean that per capita beef consumption will go down due to many families not being able to afford it.

6.9.11 PESTEL analysis

A PESTEL analysis as a framework or tool was used to analyse and monitor the external environment factors which have an impact on the value chain actors and their businesses (Table 89). The results of this were also used to identify threats and weaknesses, strengths and opportunities which can be considered or used in a SWOT analysis.

Political

- The country has just gone through an election in 2021 and the new government represents continuity, peace, and stability experience over the last 20 years.
- The beef industry is one of the priority 10 sectors and commodities of focus for the accelerated development of the agricultural sector under the Uganda Vision 2040 and the current NDP III.
- Favourable tax regimes on agricultural production (inputs used for agricultural purposes are duty and tax free on importation).
- Strong political and development partner support to the livestock sector as illustrated by the current MOBIP and other related programmes.
- Conducive policies to support beef industry such as, privatization, liberalization, National Meat Policy, Animal breeding Policy and Animal Feeds policy.

However, some weaknesses persist such as:

- Poor planning, monitoring and evaluation of programmes and projects among farmers and other stakeholders.
- A lack of coordination, collaboration, and harmonization of public and private institutions in the beef value chain.
- Weak implementation of policies associated with beef production, processing, and marketing.

Economic

- Uganda's economy is projected to grow by over 5% in the current financial year 2021/2023 according to the latest BOU review in December 2022. The country has been experiencing fair economic growth, with an average GDP growth of 6% over the decade.
- Uganda's income per capita hit lower middle-income status in 2021 of approximately $1000 and is projected to grow even further over the next few years, this will positively be affecting the purchasing power of potential consumers of beef as well as investment by stakeholders.
- Low investment capacity by the private sector inclusive of farmers, feed manufacturers and input suppliers.
- The cost of capital remains quite high with interest rates hovering above 25% in most commercial banks.
- Uganda's climate is favourable for forage production, e.g., two peak rain seasons for continuous forage production but limited capacity for extensive forage production and conservation on farms.
- Land and water as key factors of production are relatively available in the Cattle Corridor and this ensures availability of scope for expansion of the sector.
- Uganda's geographical location provides comparative and competitive advantage for beef marketing in the region.

Social

- Uganda is the second youthful country in the world only second to Niger with over 70% of its approx. 46M million people under 35%. This is a boon for any industrial sector.
- The livestock farming population is very passionate about the industry and have strong traditions towards the sector as exemplified by HE the President. This is also a big social plus for the sector.

- On the downside, limited orientation towards commercial beef production – belief in possession of large numbers of animals rather than economic output.
- The high population growth rate (3.3%) is also a negative that puts pressure on availability of land for commercial beef production but provides a large potential market for beef if their effective demand is enhanced by increased household incomes.
- Several projects including MOBIP have shown a receptiveness of many livestock keepers towards transformation of production practices. For example, the improved pastures component of this project implemented by CURAD was enthusiastically taken up by farmers[76].
- Receptiveness of many livestock keepers towards transformation of production practices.
- Limited involvement of women and youth in commercial beef production and marketing activities.

Technological

- There is a huge gap in the availability of applicable technologies, infrastructure and equipment for mechanization services in the beef value chain.
- The cattle keepers have a relatively high levels of awareness and knowledge of improved production technologies by especially commercial farmers.
- there is also a marked low adoption and usage of appropriate technology.
- Inadequate research in the characterization of breeding animals and vaccine production.
- New ICT supported technologies like the Jaguza app are also becoming popular in helping farmers to manage their herds with technology.

Environment

- The traditional methods of livestock management that most farmers use tend to extensively degrade rangeland and even cause desertification in extreme cases. This is a key environmental challenge for the industry.
- The traditional methods of livestock management that most farmers use tend to extensively degrade rangeland and even cause desertification in extreme cases. This is a key environmental challenge for the industry.
- A marked weakness in the enforcement of regulations and environmental policies is also a key problem for the beef value chain. Quarantines are always broken and overgrazing bylaws are rarely followed.
- Poor and unregulated drugs and chemical use is creating major environmental challenges that are impacting the sector negatively. This often leads to poor meat quality, environmental damage, drug resistance in animals and even hampering tick control.
- Emission of greenhouse gases (such as methane and carbon dioxide) from large herds of cattle may contribute to depletion of the ozone layer and attendant climate change effects.

Legal

- Huge enforcement gaps in the beef value chain especially around meat hygiene and veterinary public health laws and regulations negatively affect the quality, safety and marketability of beef and beef products.
- Most laws governing the livestock sector were enacted during the colonial era and are simply archaic -- for example, the animal Disease act. These must be amended quickly to adapt to the changing operational environment of the sector.
- Poor implementation of SPS regulations is impeding Uganda's zeal to export beef to lucrative markets.

[76] *Unpublished CURAD MOBIP report*

Table 89: PESTLE analysis of the beef value chain

Political	Economic	Social	Technological	Legal	Environmental
Positive factors					
• Beef and cattle generally are prioritized by NDP III as a national commodity that has potential for poverty reduction and improved income in Karamoja, West Nile and parts of Bunyoro, although Western Uganda is supported under the dairy initiatives that are closely linked to the beef sector. • Development of transport infrastructure to reduce cost of transportation. • Regional integration that opens a large market for beef, including emerging markets like Sudan and DRC.	• There is increasing support by both government, development organizations and of private sector institutions that facilitate cattle keeping/ production and marketing of beef [77]. • High population growth rate in urban centres with changing consumer preferences presents increased market opportunities for increased domestic beef consumption. • Growing GDP from livestock regional and international exports	• Population increase and urbanization will likely increase demand for beef domestically but also spur increased production with spill over effects on exports. • The already existing network of actors in the beef value chain such as cattle traders, cattle markets in Uganda are key to value chain streamlining and structuring	• Existence of projects and programs for AI and improved breeds under NAGRC & DB, NaLIRI and research and training (R&D) in the livestock sector under Makerere University (COVAB) and NARO • Increasing use of ICT e.g., mobile phone applications and access to internet will enable the beef VC actors to access market information, access finance & increase VC efficiency. • Availability of proven technologies that can be adapted to increase production, marketing and reduce losses such as Invitro fertilisation, embryo synchronisation.	• Published East Africa harmonized Standard – beef specification. • IGAD and EAC standards on beef and cattle as well as animal diseases surveillance in the region. • Local and regional efforts to reduce/ eliminate trade barriers (NTBs) is likely to smoothen trade.	• Suitable soils and tropical climate that favour two production seasons. • Utilization of by-products from rice for animal feeds, fuel, and soil conditioning.
Negative factors					
• Increase in fuel costs results into higher operational and transactional costs for many beef value chain actors • Cross-border regional restrictions hamper trade especially with DRC where there is conflict. • COVID 19 and Ebola and other related pandemics restrictions on movements curb the rate of trade flow	• Lack of suitably matching financial products for investment. Access to credit is characterized by high interest rates, unfavourable repayment periods and increased operational costs for beef value chain actors who want to grow and expand business as well as start-ups.	• Men tend to benefit from cattle and beef proceeds than women because many women do not own productive resources as well as livestock. • Rural-urban migration by the youth leaves cattle production to elderly thus compromising on production and prospects of use of modern technology. • Preference of other beef substitutes by a growing health-conscious urban class	• Although technologies exist, limited access to them continuously deters increase in productivity and lowering of transaction as well as production costs e.g., improved breeds at farm level and Hi-tech abattoir and slaughter technologies. • Low adoption of modern cattle feeding and raising technologies to increase production	• Weakness in implementation of set policies and strategies • Limited pro-poor market policies, unclear detailed information that examine constraints at every level of the beef value chain. • Informality of most beef value chain businesses limits structured trade	• Climate changes with periodic drought periods, heavy rains and floods largely result into yield variations between seasons and locations.

CHAPTER 7

PROFITABILITY OF THE BEEF VALUE CHAIN

This chapter presents a discussion of the profitability of each of the value chain nodes i. e, the costs, revenues, margins, and gross margin ratios in relation to determinants of profitability such as prices and volumes sold by the various actors.

7.1 PROFITABILITY OF VARIOUS NODES OF THE BEEF VALUE CHAIN

This section presents the profitability measurements and variables per beef value chain node, starting with the production to the end market nodes.

7.1.1. Small-medium cattle keepers' profitability

The most common costs incurred by small-medium cattle producers (who own 10-200 heads of cattle) are veterinary services, vaccination, and acaricides for spraying against ticks and mites, salt, disease treatment drugs and hiring male workers where between 50% and 95% of the producers' incurred costs. The highest variable costs were captured on expenditures on loss of animals to disease and other accidents (UGX 5.8 million), water (UGX 3.3 million), hiring male workers (UGX 3.1 million), and buying livestock to expand herds (UGX 3 million) (Table 91). The average total annual variable cost was captured as UGX 6.4 million while the annual revenue was UGX 8.4 million and the gross profit margin on a small-medium farm was 24% (for every 1000 shilling earned as revenue, UGX 240 was profit), making small farms relatively profitable.

Table 90: Small-medium cattle keepers' variable costs, revenues and gross margins

	Annual variable costs (UGX) (October 2021-September 2022)				
Variable	Percentage of cattle keepers incurring cost	Mean (UGX)	Std. Dev.	Min	Max
The cost of buying livestock	18%	3,040,560	12,400,000	30,000	100,000,000
Fodder	1%	3,640,000	4,751,760	280,000	7,000,000
Fodder processing	0.3%	1,200,000	.	1,200,000	1,200,000
Concentrated feed	2%	2,750,000	1,854,450	400,000	6,000,000
Green and coarse fodder	0.3%	200,000	.	200,000	200,000
Straw	0.3%	1,500,000	.	1,500,000	1,500,000
Hay	1%	1,000,000	1,407,125	100,000	3,500,000
Silage	2%	1,858,890	1,645,820	100,000	4,000,000
Feed supplements	2%	1,355,000	1,172,600	65,000	3,150,000
Forage grass	1%	1,150,000	1,202,080	300,000	2,000,000
Self-made concentrated feed	2%	1,148,570	892,330	300,000	2,500,000
Commercial concentrated feed	1%	1,393,330	1,595,030	180,000	3,200,000
Peelings	1%	606,700	547,840	120,000	1,200,000
Industrial by-products	0.3%	720,000	.	720,000	720,000
Salt	71%	579,060	717,145	2,700	5,400,000
Breeding	3%	2,653,100	1,481,540	40,000	5,000,000
Water	5%	3,304,470	4,788,135	300,000	20,000,000
Fuel	17%	1,908,220	3,454,400	30,000	20,000,000
Dead cattle	54%	5,807,600	7,025,750	50,000	40,000,000
Transport	22%	1,570,050	3,114,180	4,000	20,000,000
Family labour	23%	516,280	439,950	150,000	1,800,000
Hired males	59%	3,132,280	2,102,300	6,000	16,800,000
Hired females	11%	1,558,050	735,770	1,000,000	3,600,000
Acaricides	95%	865,290	1,868,930	5,000	30,000,000
Drugs	92%	908,650	1,772,450	10,000	18,000,000
Veterinary doctors	66%	242,050	318,500	5,000	2,400,000
Vaccination	56%	297,460	482,000	2,000	5,000,000
Artificial Insemination	3%	245,540	827,700	5,000	3,000,000
Average annual Variable Costs (TVCs)		6,428,965	8,148,379	100,000	53,000,000
Total revenue (TR)-Live cattle	88%	8,421,056	15,900,000	100,000	173,000,000
Gross Margin (TR – TVC) (GM)		1,992,091	7,751,621	90,000	120,000,000
Gross Profit Margin Ratio (GM/TR*100)		24%			

Source: Small-medium scale cattle producer survey, (UDC,2022).

7.1.2 Large scale cattle keepers' profitability

The highest variable costs incurred by large-scale cattle producers were expenditures on fattening cattle (cattle bought to feed for shorter period and sell off) (UGX 70.7 million), death of cattle (UGX 21.5 million), hiring male workers (UGX 18 million), and concentrated and farm-made feeds (UGX 10 million) (Table 92). The annual revenue was UGX 447 million and the gross profit margin on a small-medium farm was 64% (for every 1,000-shilling earned as revenue, UGX 640 was profit), making large-scale farms highly profitable.

Table 91: Large-scale cattle keepers' variable costs, revenues and gross margins

	Annual variable costs (UGX) (October 2021-September 2022)			
Variable	Mean	Mean (UGX)	Std. Dev.	Min
Fattening cattle	70,700,000	98,100,000	1,300,000	140,000,000
Concentrated feed	10,000,000	.	10,000,000	10,000,000
Silage	200,000	.	200,000	200,000
Supplementary feeds	4,000,000	.	4,000,000	4,000,000
Homemade feeds	8,000,000	.	8,000,000	8,000,000
Salt	3,660,000	3,317,348	840,000	10,000,000
Fuel	3,672,000	2,358,712	1,200,000	6,720,000
Death loss of cattle	21,500,000	23,300,000	500,000	48,000,000
Transport	1,725,000	1,803,122	450,000	3,000,000
Hired males	18,000,000	11,700,000	2,400,000	36,000,000
Hired female	4,350,000	1,577,973	2,000,000	5,400,000
Acaricides	5,672,000	5,270,110	100,000	16,800,000
Drugs	4,865,000	4,752,195	150,000	15,000,000
Veterinary doctor	3,861,111	5,861,729	50,000	18,000,000
Vaccines	2,092,857	2,076,943	200,000	5,000,000
Total annual Variable Costs (TVCs)	162,297,968	160,118,132	31,390,000	326,120,000
Revenue/Sales				
Revenue stream 2- live animals	447,000,000	819,000,000	5,900,000	2,500,000,000
Total revenue (TR)	447,000,000	819,000,000	5,900,000	2,500,000,000
Gross Margin (TVCs – TR) (GM)	284,702,032	658,881,868	.	2,173,880,000
Gross Profit Margin Ratio (GM/TR*100)	64%			

Source: *Large scale cattle producer survey, 2022.*

7.1.3 Live cattle traders' profitability

Live cattle traders mainly spend on transport, taxes, and licenses. The average total monthly variable cost was captured as UGX 2.8 million while the monthly revenue was UGX 37.5 million (Table 92). The gross profit margin for live cattle traders was 92% (for every 1,000-shilling earned as revenue, UGX 920 is profit), making the live cattle trading business the leading profitable venture in the beef value chain.

UGX 2.8 MILLION — the average total monthly variable cost for live cattle traders

UGX 37.5 MILLION — the total monthly revenue for live cattle traders

92% — The gross profit margin for live cattle traders

Table 92: Live cattle trader monthly variable costs, revenues and gross margins in Ugandan Shillings

Monthly variable costs	Mean	SD	Min	Max
Transport	3,203,500	2,663,280	375,000	7,681,200
Taxes	50,000	.	50,000	50,000
Licenses	100,000	.	100,000	100,000
Total monthly Variable Costs (TVCs)	2,821,800	2,691,700	150,000	7,681,200
Revenue/Sales				
Revenue stream 1 e.g. live animal	37,500,000	34,600,000	8,400,000	120,000,000
Revenue stream 2 e.g. beef				
Total revenue (TR)	37,500,000	34,600,000	8,400,000	120,000,000
Gross Margin (TR – TVC) (GM)	34,678,800	31,908,300	8,250,000	112,318,800
Gross Profit Margin Ratio (GM/TR*100)	92%			

Source: Live cattle/beef trader, and processors market survey, 2022.

7.1.4 Beef traders/butchers' profitability

Beef traders, including butchers spend on transport, electricity, taxes and licenses, salaries/wages and the beef that forms the core of their business. The average total monthly variable cost was captured as UGX 22.7 million while the monthly revenue was UGX 33.4 million (Table 94). The gross profit margin for beef traders/butchers was 32% (for every 1,000 shillings earned as revenue, UGX 320 is profit), making the beef trading business a profitable venture in the beef value chain.

UGX 22.7 MILLION — the average total monthly variable cost for beef traders/butchers

UGX 33.4 MILLION — the average monthly revenue traders/butchers

32% — The gross profit margin for beef traders/butchers

Table 93: Beef traders/butchers' variable costs, revenues, and gross margins in Ugandan Shillings

Monthly variable costs	Mean	SD	Min	Max
Electricity	57,000	35,610	20,000	120,000
Water	15,620	16,100	5,000	55,000
Transport	772,200	1,017,040	2,970	3,800,000
Taxes	76,200	105,977	6,000	348,900
Licenses	39,450	27,600	6,700	80,000
Wages/salaries	195,800	120,750	15,000	450,000
Beef /cattle	27,300,000	12,500,000	2,000,000	52,700,000
Processed beef				
Total monthly Variable Costs (TVCs)	22,700,000	15,500,000	75,000	53,000,000
Revenue/Sales				
Revenue stream 1 e.g. live animal	3,029,600	6,934,300	980,000	27,000,000
Revenue stream 2 e.g. beef	30,400,000	25,589,700	7,960,000	61,400,000
Total revenue (TR)	33,429,600	32,524,000	8,940,000	88,400,000
Gross Margin (TR – TVC) (GM)	10,729,600			
Gross Profit Margin Ratio (GM/TR*100)	32%			

Source: *Live cattle/beef trader, and processors market survey, 2022.*

7.1.5 Beef processors' profitability

Beef processors were found to spend on transport, electricity, water, taxes and licenses, and the beef that forms the substrate for their business. The average total monthly variable cost was captured as UGX 83.3 million while the monthly revenue was about UGX 144 million (Table 94). The gross profit margin for processors was 42% (for every 1,000 shillings earned as revenue, UGX 420 was profit), making the beef processing business a profitable venture in the beef value chain with low margins just because of the high cost of beef for processing from highly priced beef as a raw material, high cost of water and electricity.

UGX 83.3 MILLION — average total monthly variable cost for beef processors

UGX 144 MILLION — Average monthly revenue for beef processors

42% — The gross profit margin for processors

Table 94: Beef processor variable costs, revenues and gross margins in Ugandan Shillings

Monthly variable costs	Mean	SD	Min	Max
Electricity	444,000	393,040	120,000	1,100,000
Water	142,700	222,890	10,000	400,000
Transport	8,000,000	.	8,000,000	8,000,000
Taxes	406,700	390,040	20,000	800,000
Licenses	178,889	191,500	66,700	400,000
Beef	626,000	577,130	150,000	1,600,000
Processed beef	73,500,000	83,700,000	13,200,000	200,000,000
Total monthly Variable Costs (TVCs)	38,400,000	40,000,000	15,600,000	98,000,000
Revenue/Sales				
Revenue stream 1 e.g. fresh beef or live animals	980,000	-	980,000	980,000
Revenue stream 2:	143,980,000	68,800,000	16,580,000	173,980,000
beef processed products	143,000,000	42,300,000	113,000,000	173,000,000
Total revenue (TR)	143,980,000	42,300,000	113,980,000	173,980,000
Gross Margin (TR – TVC) (GM)	60,681,700			
Gross Profit Margin Ratio (GM/TR*100)	42%			

Source: *Live cattle/beef trader, and processors market survey, 2022.*

7.1.6 Supermarket level profitability

A supermarket that sells beef (usually in frozen form, minced or sausages) spends on transport, electricity, taxes and licenses, salaries/wages and the beef that forms the core of their business. The average total monthly variable cost was captured as UGX 22.6 million while the monthly revenue was UGX 59.8 million (Table 96). The gross profit margin for supermarkets was 62% (for every 1,000 shillings earned as revenue, UGX 620 was profit), making the selling beef in a supermarket a profitable venture in the beef value chain.

UGX 22.6 MILLION average total monthly variable cost for supermarket

UGX 59.8 MILLION Average monthly revenue for beef dealers in supermarkets

UGX 620 Gross profit margin for supermarkets was 62% (for every 1,000 shillings earned

Table 95: Supermarket variable costs, revenues, and gross margins in Ugandan Shillings

Monthly variable costs	Mean	SD	Min
Electricity	160,000	160,000	160,000
Water	20,000	20,000	20,000
Transport	300,000	300,000	300,000
Licenses	250,000	250,000	250,000
Wages/salaries	450,000	450,000	450,000
Fresh beef	11,000,000	11,000,000	11,000,000
Processed beef	10,400,000	10,400,000	10,400,000
Total monthly Variable Costs (TVCs)	22,600,000	22,600,000	22,600,000
Revenue/Sales			
Revenue stream 2 e.g. beef (fresh and processed)	59,780,000		58,800,000
Total revenue (TR)	59,780,000		58,800,000
Gross Margin (TR – TVC) (GM)	37,180,000		36,200,000
Gross Profit Margin Ratio (GM/TR*100)	62%		

Source: *Live cattle/beef trader, and processors market survey, 2022.*

7.1.7 Per unit gross margin analysis

The profitability analysis of the value chain nodes has been undertaken at 4 levels of production, trade, processing, and end market. Overall, the highest gross profitability margin is earned by the live cattle traders (92%) followed by large scale cattle keepers (64%) with the lowest being earned by processors who earn margins at 26% and the small -medium cattle keepers at 24% as highlighted in Figure 49.

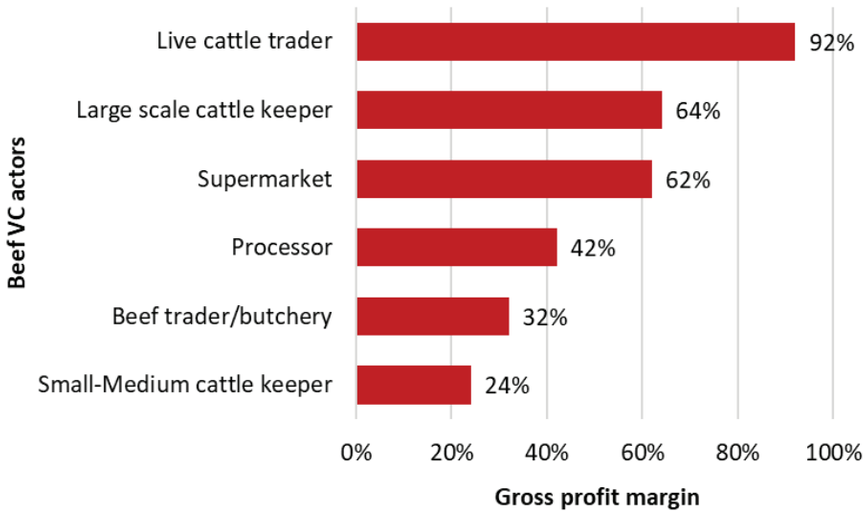
At the production level the large-scale producers earn the highest revenue per unit kilogramme of beef sold at about UGX 24,520 per kilogramme followed by the small medium cattle keepers at UGX 9,220 per kilogram and feedlots with UGX 7,000 per kilogramme. Large-scale producers also incur lower unit variable costs at UGX 6,268 per kilogramme than small-medium producers at UGX 7,042 per kilogramme, making the former earn higher unit gross margins of UGX 6,268 per kilogramme compared to UGX 2,182 per kilogramme for the small-medium scale producers (Figure 49).

92% gross profitability margin for live cattle traders

64% gross profitability margin for large scale cattle keepers

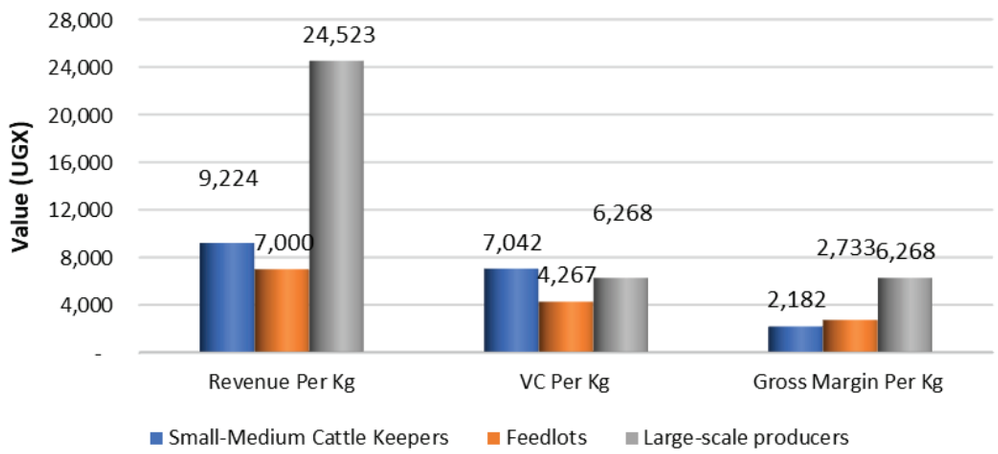
24% gross profitability margin for medium cattle keepers

Figure 48: Gross profit margin %



Source: *Live cattle/beef trader, and processors market & producer surveys, (UDC, 2022).*

Figure 49: Gross margins per Kg (UGX) in production value chain node

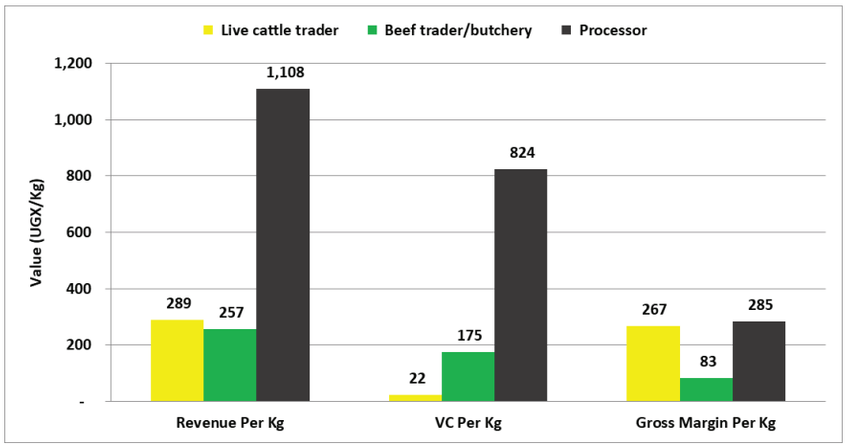


Source: *Live cattle/beef trader, and processors market & producer surveys, (UDC, 2022).*

At the trading, processing and end market level, the supermarkets earn the highest unit gross margin of UGX 3,098 per kg of beef sold, followed by beef processors with UGX 285 per -kg and live cattle traders at UGX 267 per kg. Lastly, beef traders/butchers earn UGX 83 per kg of beef sold (Figure 50 and Figure 51).

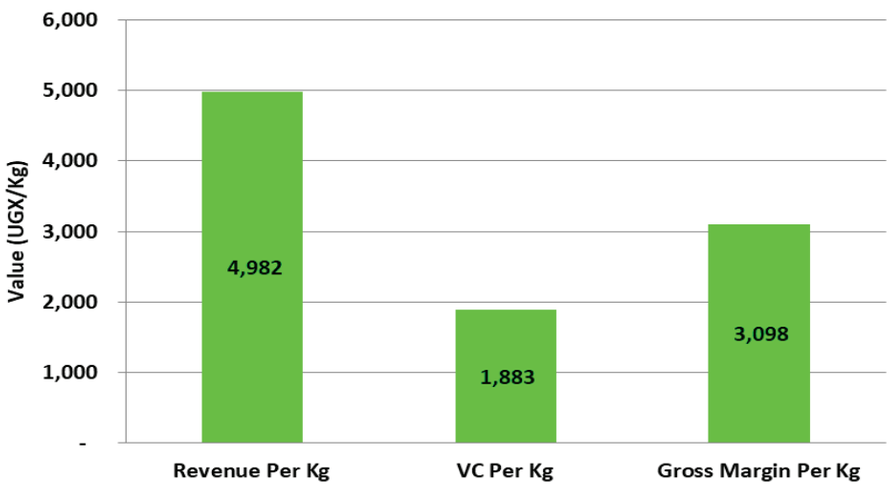
UGX **83,098** PER KG — the highest gross margin earned level by processors

Figure 50: Gross Margins per kilogramme (UGX) in trade value node



Source: *Live cattle/beef trader, and processors market & producer surveys, 2022.*

Figure 51: Gross Margins per kilogram(UGX) for butchers



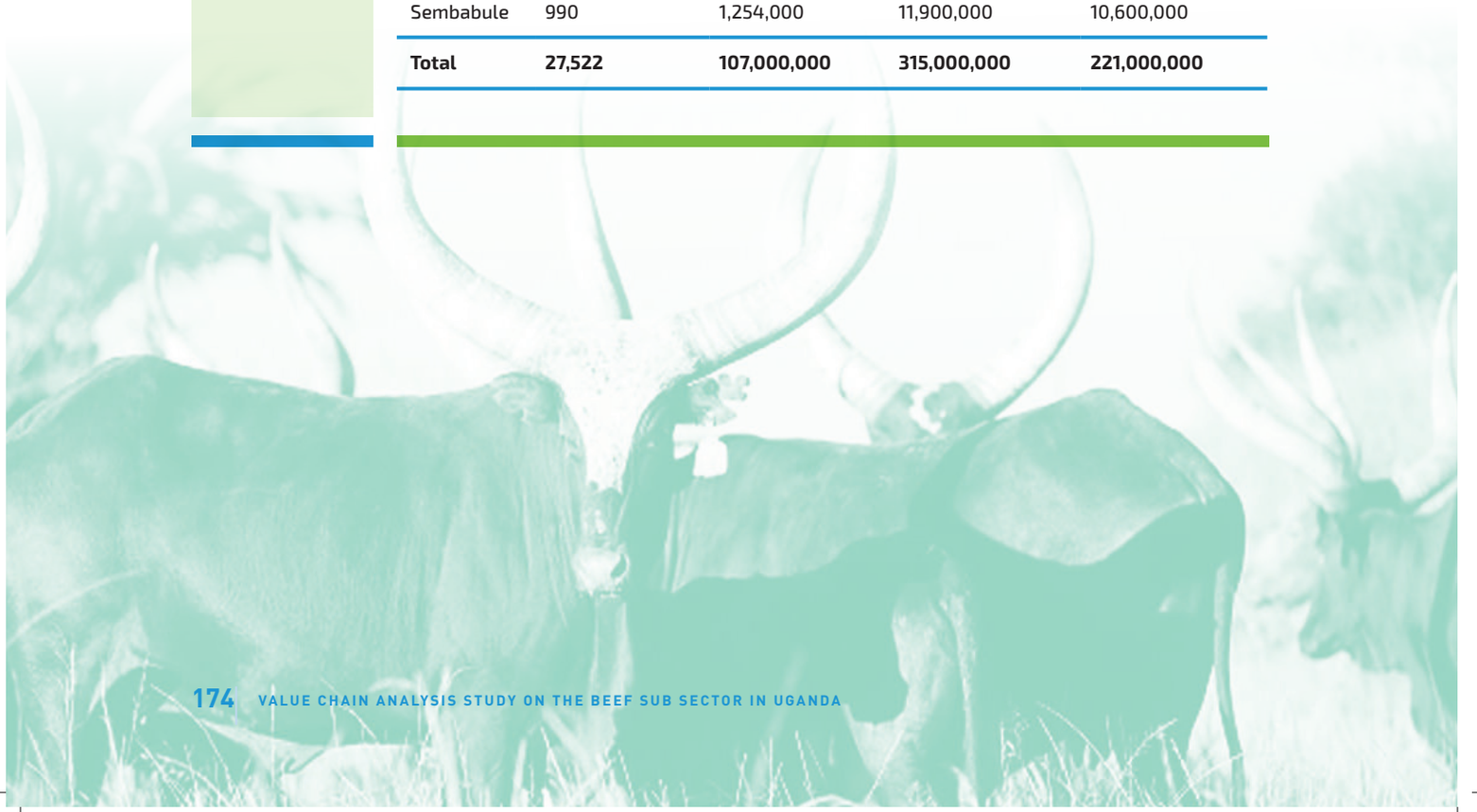
Source: *Live cattle/beef trader, and processors market & producer surveys, 2022.*

7.1.8 Cattle markets and holding grounds - Costs and revenues

The largest cattle markets in Lira and Bukedea handle 88,000 heads of cattle each annually followed by Mbarara with 34,100 heads of cattle, Ntungamo with 22,000 heads of cattle and Kyankwanzi with 10,450 heads of cattle. The two largest sampled markets in Lira and Bukedea generate UGX 880 million and UGX 968 million a year from fees collected from the market actors who sell and buy cattle. Two of the markets in Amolator and Apac were not profitable since they had negative gross margins, something caused by fewer livestock handled that could not generate fees enough to offset the costs (Table 96).

Table 96: Cattle markets annual operating costs, revenues, and gross margins

District	Number of cattle heads traded annually	Annual costs incurred (UGX)	Annual revenues generated(UGX)	Annual gross margins (UGX)
Nakapiripirit	4,400	13,200,000	48,400,000	35,200,000
Bukedea	88,000	366,000,000	968,000,000	602,000,000
Lira	88,000	355,000,000	880,000,000	525,000,000
Mbarara	34,100	35,200,000	341,000,000	306,000,000
Kotido	17,600	61,600,000	211,000,000	149,400,000
Ntungamo	22,000	2,333,100	198,000,000	196,000,000
Kyankwanzi	10,450	2,200,000	157,000,000	155,000,000
Amolatar	5,280	55,600,000	37,000,000	-18,600,000
Apac	4,400	35,500,000	35,200,000	-308,000
Sembabule	990	1,254,000	11,900,000	10,600,000
Total	**27,522**	**107,000,000**	**315,000,000**	**221,000,000**



CHAPTER 8

KEY TAKEAWAY MESSAGES AND RECOMMENDATIONS

This section presents the main messages we can pick from the beef value chain in Uganda and expert recommendations necessary to transform the beef sub-sector into a vibrant sector that can create jobs, increase producer incomes and generate foreign exchange through exports.

8.1 KEY TAKEAWAY MESSAGES

The following are the key messages we can take away from the beef value chain study:

1) **The beef sub-sector in Uganda has a lot of unlocked potential at all levels of the value chain** and key interventions are needed to unlock this potential. The following points show the hidden potential:

» At the production level, cattle keepers have the will to increase productivity, but the current breeds are mainly local (preferred for their resistance to pests and diseases and resilience to harsh climate) and so farmers must overstock to try and make a profit from their labour and investments. The feeding systems are still poor, with over-reliance on rangeland grazing (estimated at 97% as per study findings) and less emphasis on supplementary feeding which is very low, currently at 6%.

» Live cattle traders on average source cattle from 3-5 markets scattered all over the region with several districts to fill their trucks, an indication that supply is not commensurate with demand.

» Beef traders, butchers, and processors indicated that they have observed the increasing demand for beef and that they are affected by seasonality, and quarantines which result in price fluctuations. In addition, these actors as well as consumers are not satisfied with the quality of beef because of animals in poor state of health as well as poor beef handling facilities and transportation.

2) **Cattle keeping is a profitable venture:**

Cattle keepers, both small, medium, and large scale earned positive gross margins although these margins can still go up if counterfeit drugs are reduced on the market, improved breeds are adopted, and supplementary feeding technologies are adopted as well as water access being improved.

3) **The cattle and beef trade are profitable ventures:** Cattle and beef traders earned way too high margins compared to producers. This is an indication that there is a disproportionate distribution of value and gains along the value chain.

4) **Beef processing is a profitable venture** although its profit margins are low which

were blamed on high taxes and high operational costs. More investments by Government and the private sector needs to be given priority. Value addition to beef is the only way to increase value upstream of the beef value chain for cattle keepers to gain and be incentivized to increase investment into production technologies and increase supply.

5) **Extension services and institutional development need to be tagged and enhanced:** Veterinary extension services are mainly provided by veterinary practitioners recruited by Government at local Governments. Other extension service providers such as water engineers, animal feeding and management extension workers, as well as Community development officers (for institutional development), are not very active in the livestock sector. This creates a knowledge gap on these critical aspects of production. There is a need to have a mechanism where Veterinary doctors work with these other subject matter specialists to see that cattle keepers get a complete package of extension services. There are very few vibrant cattle keeper cooperatives and associations (institutions), yet these are key in awareness creation, marketing, and collective action among producers.

6) **More investments are needed in transport, cold storage, and water and power infrastructures:** The current transport systems for the animals from cattle markets do not ensure quality beef at the end of the chain. Abattoirs lack cold storage facilities -- this means beef must be sold immediately after slaughter, yet butchers also lack such facilities. Many abattoirs lack a stable supply of power and potable water, yet these are key to preserving beef.

7) **Research and Development:** There is a vibrant R&D agenda for the livestock sector, and beef sub-sector in particular. Institutional capacity is already strong with MAAIF, ZARDIs, NARO, NAGRC & DB, NALLIRI, COVAB-Makerere, and even CAES - Makerere University, all aligned to offer research outputs that have the potential to transform the beef sub-sector. On-going R&D activities in areas such as the development of Anti-tick vaccines and verification of their efficacy, new Embryo synchronization technologies at NALLIRI, Agricultural Value Chain Development (AVCDP) under NALLIRI supports Artificial Insemination (AI), and farmer training as well as training to equip AI technicians.

8) **There is great need for an Effective and efficient disease prevention and control and Disease epidemic-surveillance and reporting system.** This will depend on strengthening sub-systems as part of an overall animal health system, including organization and governance of the animal health services; Disease surveillance and reporting; Veterinary Laboratories; Livestock and animal products movement control.

9) **There is need for a beef marketing strategy** that targets improving the quality of beef targeting the export market but also strengthening standards and foothold on the domestic market.

10) **Policy environment:** The current policy environment favours more domestic beef and cattle trade and less export trade. For example, the Animal Identification and Traceability Bill is still in its infancy and has not yet been tested.

    There is planned construction of slaughter places in Sanga, Bombo, and Nakasongola designed to meet export market standards, however, the meat export policy and strategy are not yet drafted.

8.2 POTENTIAL AREAS FOR UDC INVESTMENT IN THE BEEF VALUE CHAIN

UDC was established with the primary objective of promoting and facilitating the industrial and economic development of Uganda. This mandate when applied to agribusiness is primarily focused on supporting value addition and the upper ends of the value chains where there are insufficient investments by the private sector. With MAIIF and its departments and authorities focusing mainly on the productivity nodes of the value chain, even with the BVC, UDC should naturally focus on value addition. Based on the main constraints identified at the beef processing node, UDC investments in the following areas would upgrade the value chain and position the beef sub-sector for exploiting the local regional and export market. These proposed investments may be handled according to the set Investment procedures and criteria of UDC.

At production level:

1) **Breed improvement:** MDAs such as MAAIF (livestock sector) and agencies such as NAGRC & DB need to partner with ranchers and private sector to promote beef-specific breeds such as the Brahman and Romagnola that are not yet fully adopted. Interventions will include setting up AI or community bull service centres.

2) **Ramping up production:** There are already private ranch and feedlot start-ups in Uganda, but they lack capacity to expand production. Production ramping is necessary to reduce the price of beef for processing. This will be achieved rapidly through contract ranching and nucleus farms (small-medium farms organised around ranches) establishment to supply established abattoir/slaughter/processing facilities followed by additional services such as training, AI services, transport services.

3) **Institutional development along the value chain:** UDC will need to partner with line ministries such as MAAIF (livestock sector) and MTIC (Trade and cooperatives) to set up/strengthen beef producer cooperatives as well as trader associations. This will also entail building the capacity of the Veterinary officers as well as Community Animal Health Workers (CAHWs) to pass on skills and knowledge to the producers and aggregators. This will ensure a stable and sustainable supply of cattle/beef to the processing facilities and both domestic and export markets.

At aggregation/marketing level:

4) **Setting up a modern abattoir with cold chain facilities:** UDC may partner with private sector players, KCCA, and beef trader association (s) in Kampala and/or Wakiso to set up a modern abattoir with cold chain facilities and modern equipment. Regional abattoirs in the cattle corridor equipped with refrigerated beef distribution trucks would also be an ideal investment that may also reduce the cruelty in animal transportation and improve beef quality. Such a high-end setup can spur further investments by the private sector to exploit opportunities in the extended value chain using the outputs and waste from this facility. The high-quality standards that may be installed in such a facility can also spur fresh beef exports from Uganda. Such a facility may enjoy economies of scale that can make value addition more profitable for the private sector.

5) **Beef quality improvement:** There are capacity gaps in terms of skills in handling cattle from cattle markets to handling beef at the abattoirs and processing facilities. Only 20% of the processors, 25% of the beef traders, and none of the butchers indicated they possess skills in carcass treatment. UDC can partner with UNBS, MAAIF, MOH, Makerere School of Public Health, COVAB, and others to build

the capacity of the actors along the beef valuee chain in quality management.

At processing level:

6) **Establishing beef processing facilities.** Alongside the abattoirs, beef processing facilities may also be established that can add value to the beef by processing it into products such as sausages, deli meats, minced meats, and beef cuts (targeting the supermarkets). The key impediment to the private sector to further exploit beef value addition are the low profit margins driven down by the high costs of utilities and beef costs. UDC investments that help drive down costs can ensure scale and cost-effectiveness to make a profitable venture. Such a facility can also produce sausage casing from intestines and other related cold chain products.

7) **Investments in extended value chain nodes using the by-products from the abattoirs.**

i. Facilities for handling blood, bones, horns, hooves, and gut wastes that can then be used to produce animal feeds, fertilizers and even cooking gas may be a good investment by UDC.

ii. A tanning factory could be another ideal investment by UDC. Most private-sector tanneries like the one in Masaka are struggling due to poor waste management. A proper well designed and managed tannery in an ideal location in the cattle corridor would be a game changer in the Beef Value Chain.

iii. The natural industrial extension for a tannery would be an investment in shoes, belts, bags, suitcases, high-end leather fashion items, and related products facility. No large factory currently exists in the country and a UDC investment could change this.

iv. A tannery can also have complementary industries handling cattle hair into brushes and other related products. Such a facility can also be equipped with units that can produce products from Horns like Buttons, scrappers, and even artefacts.

iv. An incubation Hub supporting MSMEs that can be interested in making shoes, belts, buttons, brushes, and horn artefacts can also be another investment angle geared towards job creation for the youth and private sector development.

At export level:

8) **Facilitation of beef traders and processors** to process beef export certifications to high value markets especially high beef importing countries.

9) **Interventions for quality improvement and standards:** These can include trainings of personnel, especially at UNBS and processing facilities, to enforce and conform to international standards.

8.3 RECOMMENDATIONS

To maximize the opportunities along the beef value chain in Uganda, the following key interventions and recommendations would go a long way to increase the competitiveness of the beef sub-sector and create better value for all actors along the beef value chain.

i) Streamline access to better technologies.

The government of Uganda through MAAIF and NAGRC & DB and NALIRRI should streamline access to better technologies especially improved beef breeds of cattle, spray equipment, and water and power access. Farmers are largely using local breeds and communal grazing with high carrying capacity because of low productive cattle breeds kept currently. Uganda targets to export at least 30,000 MT of beef annually by 2025. Hence, one of the key interventions is to increase the supply of good quality and safe beef and beef products by raising the production and productivity of beef cattle.

ii) **Cattle producer institutional development:**

The only beef cooperative union in Uganda, the Uganda Meat Producers Cooperative Union (UMPCU) has only 2,600 members and 34 primary cooperatives. This is an indication that many of the cattle farmers are not organized as a bloc except those in dairy cooperatives. The Government, therefore, needs to develop farmer institutions such as cooperatives and associations to ease access to extension services, technologies, and markets. Strong producer institutions will be vehicles for the promotion of technologies and systems such as Bull Schemes, Multiple Ovulation Embryo Transfer (MOET), Creation of Stud Books (Catalogue/Register of certified breeding animals), Community-Based Artificial Insemination (AI) Services, and Veterinary and Breeding Services.

iii) **GOU should support beef SMEs such as abattoirs,** butchers, and processors to develop a competitive edge by ensuring that they access the necessary technologies and equipment for slaughter, handling, transport, and storage of beef to upgrade the quality of products and increase value. By building and developing relationships with established actors, by organizing them into strong associations or cooperatives, the target can be to create a Ugandan beef brand that is produced and marketed as Ugandan and preferred by customers throughout Uganda and in export markets. This will require intervention at the slaughter, transport, storage, processing, and marketing stages of the value chain.

iv) **More investment in Research and Development:** There are several planned research interventions, but funding is low. It is highly recommended that R&D be given enough funding to push for increased output of technology dissemination, push for uptake for increased productivity and eventually beef production to cover the current and future demand gaps.

v) **Expedite the formulation and enactment of the meat export policy and strategy, Animal Identification and Traceability Bill:** UMPCU has started talks with MAAIF to develop the policy and strategy. However, such policies and strategies are only successful if they go through a consultative process involving all stakeholders. It is advisable that GOU and other donors to the livestock sector urgently formulate this policy and strategy so that the NDP III plans to export more beef have legal and policy backing. In this regard, it was found that the NADECC Lab is not funded/ financed by the government because it is not fully established by law.

vi) **Strengthen disease surveillance, production, and procurement of effective vaccines and drugs** for disease control and prevention. There is a high presence of counterfeits in animal drugs and vaccines and many farmers and veterinary practitioners mentioned it. GOU needs to come up with tough measures on counterfeits, but also strengthen disease surveillance to curb disease outbreaks to reduce the frequency of quarantines.

vii) **More investments should be directed towards the water for commercial beef production** interventions as well as animal feeds. These two constitute the highest cost and burden in cattle keeping especially in the climate-constrained Cattle Corridor. Increased water and animal feed access will ensure cattle keepers can increase the numbers of cattle kept and sold to increase beef supply for domestic and export markets. These may include rehabilitation of the dams and valley tanks, the promotion of small-scale water harvesting technologies, and the rehabilitation/Construction of Water Facilities.

viii) **There is a need to invest in improved product quality through interventions at slaughter and processing levels.** Such interventions may include, but are not limited to, Strengthening meat inspection and hygiene services, and putting in place requisite infrastructure, competent personnel, and enforcement of regulatory measures such as mandatory meat inspection and records management.

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APPENDICES

Appendix 1: Modal cattle prices on small-medium farms in last two years

	Modal prices (UGX/animal) in last two years			
Cattle type	**Mean**	**Std. Dev.**	**Min**	**Max**
Local Bulls	1,140,963.00	425,373.40	60,000.00	2,500,000.00
Improved bulls	1,425,019.00	695,504.00	70,000.00	5,000,000.00
Local female calf	1,290,819.00	574,038.80	35,000.00	2,500,000.00
Improved female calf	2,053,766.00	2,030,002.00	400,000.00	25,000,000.00
Local cow	1,129,139.00	977,717.40	40,000.00	12,000,000.00
Improved cow	1,561,605.00	1,304,600.00	100,000.00	18,000,000.00
Local steer	1,147,426.00	429,891.00	100,000.00	3,000,000.00
Improved steer	1,520,321.00	929,107.50	100,000.00	13,000,000.00
Local weaner	991,864.40	795,397.30	50,000.00	9,000,000.00
Improved weaner	1,428,017.00	872,577.70	130,000.00	10,000,000.00

Appendix 2: Fixed cost investments on small-medium farms

	Costs at time of Construction							
Region	**Cattle shed**	**Machinery**	**Fences**	**Dam/tank**	**Cattle crush**	**Feed troughs**	**Land**	**Other infrastructures**
Northern	1,112,500	199,375	951,273	.	.	.	1,500,000	176,000
Eastern	1,000,000	.	500,000	.	.	.	2,500,000	.
Central	306,667	1,825,000	5,380,000	5,600,000	873,000	796,667	13,000,000	.
Western	3,928,571	4,425,000	4,937,879	2,558,679	498,310	528,929	7,336,364	.
Total	2,258,000	2,103,393	4,647,469	3,634,268	609,604	609,250	7,385,714	176,000
			Costs in additional investment after construction					
Northern	2,816,667	245,833	1,162,667	.	.	.	1,500,000	452,333
Eastern	.	.	1,500,000	.	.	.	2,000,000	.
Central	1,175,000	412,500	1,597,308	2,142,857	463,056	349,167	2,000,000	.
Western	350,000	655,000	2,400,816	2,346,406	227,391	684,286	4,166,667	.
Total	**1,642,857**	**435,250**	**2,013,341**	**2,284,457**	**293,672**	**562,424**	**3,045,455**	**452,333**

Appendix 3: Annual revenues, costs and margins on small-medium farms by district

		Annual income	TVC	Annual gross margins
Cattle type	**Mean**	**Std. Dev.**	**Min**	**Max**
Amolatar	Mean	7,771,429	1,361,857	6,409,571
	SD	5,499,610	1,230,295	4,791,449
Apac	Mean	4,695,556	1,495,719	3,199,837
	SD	7,810,301	2,053,245	8,356,716
Bukedea	Mean	2,505,000	1,774,200	730,800
	SD	2,552,037	1,945,278	3,491,005
Kaabong	Mean	1,575,000	370,300	1,204,700
	SD	1,002,998	469,936	1,095,380
Katakwi	Mean	3,606,727	1,474,336	2,132,391
	SD	3,418,219	1,441,681	3,971,662
Kiruhura	Mean	16,800,000	14,200,000	2,624,676
	SD	17,100,000	14,100,000	14,500,000
Kitgum	Mean	4,108,824	1,502,882	2,605,942
	SD	4,980,658	1,634,469	4,425,507
Kotido	Mean	3,124,286	171,071	2,953,214
	SD	3,645,855	141,841	3,637,136
Kyankwanzi	Mean	27,200,000	19,100,000	8,181,111
	SD	18,000,000	26,700,000	31,400,000
Mbarara	Mean	12,800,000	17,700,000	-4,925,270.00
	SD	15,200,000	32,600,000	35,200,000
Nakapiripirit	Mean	2,280,556	1,007,279	1,273,277
	SD	2,206,694	1,559,049	2,553,456
Nakasogola	Mean	24,600,000	25,600,000	-1,053,684.00
	SD	23,100,000	44,600,000	37,700,000
Ntungamo	Mean	14,400,000	15,200,000	-743,428.60
	SD	13,900,000	18,000,000	14,800,000
Sembabule	Mean	20,100,000	30,800,000	-10700000.00
	SD	19,000,000	33,400,000	32,000,000
Serere	Mean	2,918,750	4,050,125	-1131375.00
	SD	3,811,443	7,829,557	8,866,927
Total	Mean	12,200,000	12,600,000	-340518.70
	SD	15,600,000	24,000,000	22,000,000

Appendix 4: Sample size distribution for all the value chain actors

Costs at time of Construction							
Value chain actor	**Central**	**Western**	**Eastern**	**Karamoja**	**Northern**	**Kampala & Wakiso**	**Total**
Inputs							
Inputs	6	6	6	6	6		30
Agro dealers						2	2
Breeders	6	6	6	6	6		30
Animal health workers							
Production	69	139	47	54	76		385
Small to medium scale farmers (>10-200)	3	3	3	3	3		15
Total farmers	**72**	**142**	**50**	**57**	**79**		**400**
Ranchers		1	1	1	1		4
Feed lots	2	2	2	2	2		10
Aggregators							
Traders live animals	3	3	3	3	3		15
Slaughterhouses/abattoirs	3	3	3	3	3	6	21
Transporters beef						12	12
Cooperatives/associations	2	2	2	2	2		10
Cattle markets and holding ground managers	3	3	3	3	3		15
Total	**13**	**13**	**13**	**13**	**13**	**18**	**83**
Processors						10	10
Retail							
Butcheries	3	3	3	3	3	20	35
Beef consumers	3	3	3	3	3	20	35
Restaurants/hotels	1	1	1	1	1	10	15
Supermarkets & meat shops						10	10
Exporters						7	7
Buyers of skins and hides						6	6
Other actors							
Regulators national						4	4
Regulators district	3	3	3	3	3	2	17
Research institutions						5	5
Development partners						5	5

Appendix 5: Sample size distribution for the farmer survey

Region Name	Districts sampled	Popn_2014 estimates	Population Proportion	Sample size for the district	# of large farmers (200+ and over)	# of small to medium farmers (10-<=200)	# of farmers per village
Central	Nakasongola	181,863	0.05	20	2	18	10
	Sembabule	252,994	0.07	28	3	25	14
	Kyankwanzi	214,057	0.06	24	2	21	12
	Kampala		0.00	0	0	0	0
	Wakiso		0.00	0	0	0	0
		648,914	0.18	72	7	64	36
Western	Ntungamo	489,323	0.13	54	5	49	27
	Kiruhura	328,544	0.09	36	4	33	18
	Mbarara	474,144	0.13	52	5	47	26
		1,292,011	0.36	142	14	128	71
Eastern	Serere	95,623	0.03	11	1	9	5
	Katakwi	165,553	0.05	18	2	16	9
	Bukedea	188,918	0.05	21	2	19	10
		450,094	0.12	50	5	45	25
Karamoja	Kaabong	169,274	0.05	19	2	17	9
	Nakapiripiriti	169,691	0.05	19	2	17	9
	Kotido	178,909	0.05	20	2	18	10
		517,874	0.14	57	6	51	29
Northern	Apach	368,786	0.10	41	4	37	20
	Kitgum	204,012	0.06	22	2	20	11
	Amolatar	146,904	0.04	16	2	15	8
		719,702	0.20	79	8	71	40
		3,628,595	1.00	400	40	360	100

Appendix 6: Reasons for keeping local and cross breeds by small-medium producers

	LOCAL CATTLE%						CROSS BREEDS%					
Reason for keeping breed	Northern	Eastern	Central	Western	Karamoja	Total	Northern	Eastern	Central	Western	Karamoja	Total
Resilient to harsh climate	97%	93%	92%	100%	100%	97%	100%	67%	16%	17%	0%	18%
Grow faster	20%	35%	8%	0%	22%	20%	100%	100%	67%	83%	0%	77%
Highly marketable	42%	33%	12%	6%	25%	29%	100%	67%	78%	76%	0%	77%
Easy to feed and manage	88%	93%	72%	81%	84%	86%	100%	100%	26%	10%	0%	17%
Others (cultural, heritage, ghee)	9%	25%	32%	31%	10%	17%	0%	0%	64%	77%	0%	71%

Appendix 7: Mean weight (Kg) of cattle sold by small-medium cattle keepers

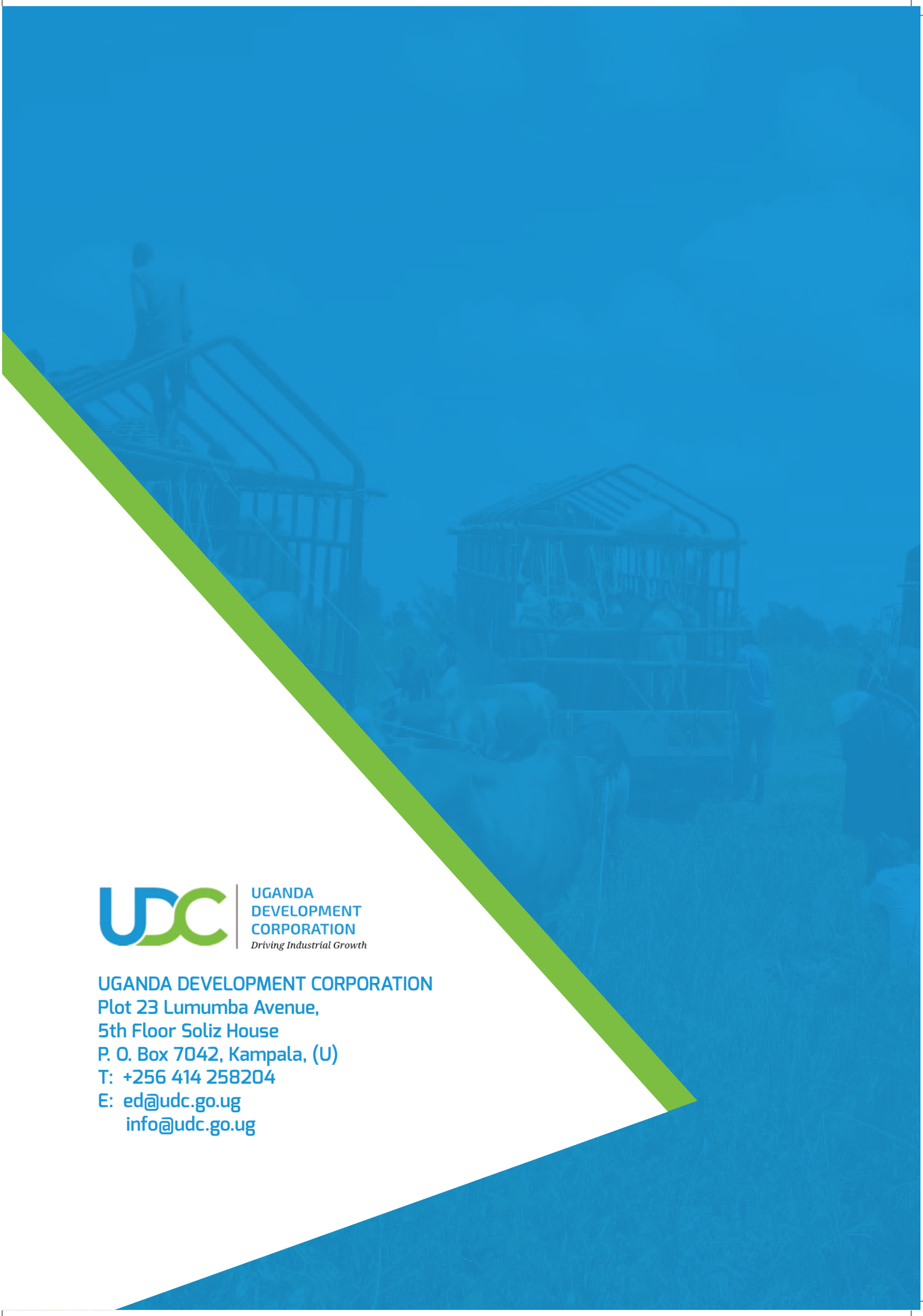
Mean weight (Kg) of cattle sold					
	Cross breed		**Local breed**		
Region	Mean	SD	Mean	SD	P-value
Northern	100.00	.	161.46	95.78	0.70
Eastern	163.33	51.32	113.53	54.34	N/A
Central	140.14	69.48	134.00	50.25	0.68
Western	136.72	65.07	146.88	88.30	0.55
Karamoja			107.33	34.75	N/A
Total	**138.15**	**66.18**	**133.61**	**73.64**	**0.47**

Appendix 8: Beef price on farm (UGX/Kg) sold by small-medium cattle keepers

Beef price per Kg on farm (UGX/Kg)					
	Local breed		**Improved /cross breed**		
Region	**Mean**	**SD**	**Mean**	**SD**	
Northern	13,136.48	4,156.30			
Eastern	15,027.40	4,369.39	15,000.00	.	
Central	11,344.08	4,245.35	13,140.65	3,916.62	
Western	14,732.93	3,163.29	15,142.04	3,676.35	
Karamoja	10,888.02	4,256.23			
Total	**12,800.94**	**4,351.23**	**14,201.16**	**3,884.40**	**Pr(T > t) = 0.0016**

Appendix 9: Individual beef processor and supermarket gross margins

District	Actor	Gross margins
KAMPALA	Beef processor	(1,040,000,000)
WAKISO	Beef processor	(127,000,000)
KAMPALA	Beef processor	(305,000,000)
KAMPALA	Beef processor	(122,000,000)
KAMPALA	Beef processor	13,900,000
WAKISO	Supermarket	467,000,000



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