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ABBREVIATIONS AND ACRONYMS

AC	Assistant Commissioner
ACLHE	Assistant Commissioner for Livestock Health and Entomology
ADW	Average Daily Weight Gain
AfDB	African Development Bank
AI	Artificial Insemination
AU	African Union
AU/IBAR	African Union/InterAfrica Bureau of Animal Resources
BSE	Bovine Spongiform Encephalopathy
CAHW	Community Animal Health Worker
CAO	Chief Administrative Officer (in the District)
CBPP	Contagious Bovine Pleuropneumonia
CF	Complement Fixation
CLH&E	Commissioner Livestock Health and Entomology
COCTU	Coordinating Office for the Control of Trypanosomiasis in Uganda
CP	Crude Protein
DANIDA	Danish International Development Agency
DAR	Directorate of Animal Resources (of MAAIF)
DCZ	Disease Controlled Zone
DDA	Dairy Development Authority
DEU	Delegation of the European Union
DFZ	Disease Free Zone
DLHE	Directorate for Livestock Health and Entomology
DRC	Democratic Republic of Congo
DSIP	Development Strategy and Investment Plan
DWG	Daily Weight Gain
DVO	District Veterinary Officer
DWD	Department of Water Development
EBV	Estimated Breeding Value (genetic value)
ECF	East Coast Fever
ELISA	Enzyme Linked Immuno-Sorbent Assay
EU	European Union
F1	First generation of crossbreeds
FAO	Food and Agriculture Organisation of United Nations
FCR	Feed Conversion Ratio
FMD	Foot and Mouth Disease
FVM	Faculty of Veterinary Medicine
FVN	Field Veterinary Network
GIZ	German Development Agency, formerly GTZ
GOU	Government of Uganda
GTZ	German Development Agency
HPAI	Highly Pathogenic Avian Influenza
IAg	Immuno Agglutination
JICA	Japanese International Cooperation Agency
JP15	Joint Programme 15 (control and eradication of Rinderpest
LC	Local Council
LG	Local Government
LIRI	Livestock Health Research Institute
LSD	Lumpy Skin Disease
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MCC	Milk Collection Centre
MFIs	Micro Finance Institutions
MOF & ED	Ministry of Finance and Economic Development
MOH	Ministry of Health

MOLG	Ministry of Local Government
MOTT	Ministry of Trade and Tourism
MPFED	Ministry of Planning, Finance and Economic Development
MPMPS	Meat Production Master Plan Study
MTTI	Ministry of Trade, Tourism and Industry
NAADS	National Agriculture Advisory Services
NADDEC	National Animal Diseases Diagnostic and Epidemiological Centre
NAGRC&DB	National Animal Genetic Resource Centre and Databank
NARO	National Agricultural Research Organisation
NCD	New Castle Disease (or ND)
NDA	National Drug Authority
NDPAS	National Drug Policy and Authority Statue
NGO	Non-Governmental Organisation
OIE	World Animal Health Organisation
PACE	Pan African Programme for Control of Epizootics
PARC	Pan African Rinderpest Control
PCR	Polymerase Chain Reaction
PDS	Participatory Disease Search
PMA	Plan for the Modernisation of Agriculture
PEAP	Poverty Eradication Action Plan
PPR	Peste des Petits Ruminants
PRSP	Poverty Reduction Strategy Programme
PS	Permanent Secretary
PVS	Performance of Veterinary Services (OIE)
RVF	Rift Valley Fever
SERECU	Somali Ecosystem Rinderpest Eradication Coordination Unit
TAD	Trans-boundary Animal Disease
TBD	Tick Borne Diseases
UBOS	Uganda Bureau of Statistics
TBD	Tick borne diseases
TBT	Technical Barriers to Trade
UBOS	Uganda Bureau of Statistics
UBPA	Uganda Beef Producers Association
UGX	Ugandan Shillings
ULAIA	Uganda Leather and Allied Industries Association
ULATI	Uganda Leather and Tanning Industries
UNDP	United Nations Development Programme
UNBS	Uganda National Bureau of Standards
USP/L	Uganda Seed Programme/Uganda Seeds Limited
UNBS	Uganda National Bureau of Standards
UPSC	Uganda Public Services Commission
USh	Ugandan Shillings
UVA	Uganda Veterinary Association
UVB	Uganda Veterinary Board
UWA	Uganda Wildlife Authority
VC	Value Chain
OIE	World Organisation for Animal Health
US\$	United States Dollars (2200-2500 USh/US\$ in 2-3/2012)
UVA	Uganda Veterinary Association
UVB	Uganda Veterinary Board
UWA	Uganda Wildlife Authority
VCA	Value Chain Analysis
VS	Veterinary Services
WB	World Bank

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EXECUTIVE SUMMARY

1. The overall objective of the present mission is: To contribute towards obtaining an insight in the beef value chain in order to design interventions that lead to commercial, sustainable solutions that contribute to better performance through a public-private partnership with focus on small and medium enterprises.
2. The specific objectives of the study are:
 - To assess the status of the commercial beef industry in Uganda, the policy and regulatory framework, the institutions in charge and existing interventions and investments in commercial beef industry
 - To carry out a Value Chain Analysis, including a structured mapping of actors at the various levels of the value chain, and an analysis of the "dimensions of interest" (volumes, prices, costs, demand, ...) highlighting the functioning of the value chain
 - To identify opportunities, key constraints, weaknesses and threats hindering the development of the commercial beef industry
 - To identify strategic interventions, activities to be implemented, implementation modalities, time-frame, costs and funding sources to promote investments in the commercial beef value chain
 - To identify bankable projects in relation with the agreed priority areas for action, and make appropriate cost-proposals for funding
 - To advise on possible strategies and modalities for implementation of the identified bankable projects in the short (5 years), medium (10 years) and long-term (15 years), making a clear distinction between the respective roles of the public and private sector. This will be done in collaboration with the relevant task force that is operationalising the Development Strategy and Investment Plan.

The Livestock and Cattle Sub-sector

3. Livestock products in Uganda play important roles in many families, including raising household incomes and providing protein. The contribution of the livestock sub-sector to GDP declined from 1.6% in 2005/2006 to 1.5% in 2006/2007 and remained at the same level in 2007/2008. The Agricultural sector that includes food and cash crops, livestock, and fishing activities grew by only 0.9 percent in 2010/2011 (due to poor rainfall) compared to a growth of 2.4 percent realised in 2009/2010. The sector had a total contribution to GDP at current prices of 23.8 percent in the fiscal year 2009/2010 compared to 22.5 percent in 2010/2011. The GDP of the livestock sector grew by 3% annually from 2006/2007 to 2010/2011.
4. The national livestock population amounts to 11.4 million cattle, 12.5 million goats, 3.4 million sheep, 3.2 million pigs and 37.4 million chickens (UBOS 2008). After a decline in livestock production in the 1970s, there has been a steady increment in livestock production since 1986. 93.6 percent of Uganda's cattle herds are indigenous; Ankole (29.6%) and Zebu/Nganda (70.4%), whereas 0.8% are beef exotic/cross breeds and; 5.6% are dairy exotic/cross breeds. The greatest concentration of livestock is found in the "cattle corridor", extending from South-Western to North Eastern Uganda. Livestock is predominantly used for supporting rural households (80% owned by smallholders, i.e. herds of 5-100). About 165 large ranches account for 2% of cattle (largest up to 3,000). About 130 ranches are organised in the Uganda Beef Producers Association (UBPA).
5. The livestock industry is regulated by MAAIF under several acts, including the Animal Diseases Act (1964), the Hides and Skins Act (1964), the Veterinary Surgeons Act (1970), the Animal Straying Act (1964), The Animal (Prevention of Cruelty) Act (1957), the Animal Breeding Act (2000), the Cattle Grazing Act (1964), the Public Health Act (Meat and Milk Rules) (1964) and the Code of Meat inspection Uganda

(1973). Other laws affecting livestock in Uganda include the Food and Drug Act (1964), the National Drug Authority Policy and Statute (1994) and the National Bureau of Standards (1993 and 1998), as well as Uganda's international obligations (MAAIF, 2005).

6. Constraints in cattle production include low livestock productivity, endemic diseases, **inadequate feeding**, scarcity of water for livestock and inadequate infrastructure for livestock markets, abattoirs, and dip tanks. Weaning rate is only about 44% on average while commercial ranches in the large exporting countries have a weaning rate of 70-90%. The commercial producers in Uganda also have higher weaning rates which should not be below 70%. Most of the ruminant livestock in Uganda are indigenous and are raised in the traditional system. The inherent features of indigenous livestock are survival rather than productivity, hence their small body size. Factors such as diseases, parasites, inadequate nutrition and water coupled with their small body size and low milk yield mean that they grow slowly and often attain market weights at between 5 and 10 years of age.
7. About 85% of total milk and meat marketed in Uganda come from indigenous livestock, which thrive on natural pastures in the rangelands. However, the rangeland pastures are of low quality because of poor management coupled with overgrazing and encroachment by bush or weed, drought and water shortage. The pastures are characterised by poor yields especially in the dry season. The carrying capacity of grazing lands in Uganda has never been established with certainty, although they have been estimated to range from 0.7 ha/TLU for high rainfall areas to 2.7 ha/TLU for dry areas.
8. One recent project focused on beef production - the Uganda Meat Export Development Project. This study on developing an export oriented meat industry in Uganda was **sponsored by Norway/Nortura** and completed in 2007. The study resulted in the implementation of the Uganda Meat Export Development Project (UMED IP –Interim Programme) from 2009-2011 funded by NORAD/NORTURA and the Government of Uganda. The objective of this project was **to prepare the country to export beef to the lucrative markets of Europe by establishing Disease Free Control Zones (DFZs)**, putting in place an enabling legal framework, improvement of livestock production systems, developing the relevant infrastructure to enable attainment of the required EU standards, formation of the Uganda Meat Producers Cooperative Association (UMPCU) and the Uganda Meat Export Company (UMEC). **Funding for the DFZs was not available, and thus many of the proposed interventions were not adequately realised.**
9. Different production systems and intensification levels have been analysed by the consultants and its financial results assessed (see Annex 12). Gross margins per cow and year increase from about 100 USD/cow/yr for traditional herds to about 280 USD/cow/yr for commercial producers (including home consumption and family labour). Smaller commercial units would have to produce beef and milk to provide for a sufficient income. However, milk production needs collection which is not provided in very remote places where land prices are lower. Land price is another criteria for beef production. Per cow and year between 0.3 and 0.7 cattle can be sold according to calving and mortality rates. In addition, veterinary input is too low in the traditional systems with only 0.3 cattle sold annually per cow (about 7 USD/cow with followers and year for the veterinary costs) leading to high disease and mortality risks.
10. The overall beef consumption is low in Uganda. According to slaughter statistics it is 147,000 t (4.2 kg carcass weight per person and year) while it is higher if we calculate with estimated herd productivity and extrapolated UBOS 2008 cattle figures which are: 11.4 mill total cattle in 2008 (and annual increase of cattle since), 2.1 mill cattle slaughtered per year, 150 kg carcass weight, 70% bone out ratio, gives 6.3 kg per

person with a population of 35 mill. This corresponds approximately to figures from the last household survey.

11. At present the number of commercial beef farms is limited. The commercial beef industry is small comprising only about 0.8% of the cattle stock. Ugandan livestock farmers have increased their supply of beef mainly through expanding herd size rather than through enhancing productivity (efficiency). There is however a larger commercial low input dairy industry which is dual purpose, milk-beef, and shall be considered in this context.
12. In 2008, 0.8% of cattle are beef exotic/cross breeds and 5.6% are dairy exotic/cross breeds, according to the UBOS household sample census. The present rate is probably somewhat higher as crossbreeding is getting more popular. However, all cattle are producing beef and the overall rate of milk production is low. On average only 8.5 litres of milk are produced per milked cow per week in Uganda (UBOS, 2008).
13. The present bank interest rate is 30%, which is at least 6% over the central bank rate - presently at 23%. Inflation is now 25% and was at 31%. The priority of Government policy is to reduce inflation. The Government's approach to inflation control is reducing lending which makes it difficult to borrow money from banks. Other measures would be to reduce Government spending or to improve savings.

Value chains

14. The traditional agricultural commodity value chain encompasses farmers, traders and livestock markets including rural slaughter slabs and butchers or city slaughterhouses and street butchers. A minority of products are sold in supermarkets. Meat is mostly sold unrefrigerated within hours of slaughter in street butcheries.
15. The different value chains in the beef sub-sector are (see Annex 4):
 - a. Traditional value chain in the district: From farmer, to livestock market, trader, abattoir, street butcher
 - b. Traditional to the capital: From farmer, to livestock market, trader, abattoir, street butcher
 - c. Improved 1: From farmer, to trader , abattoir, processor, supermarket
 - d. Improved 2 (proposal, not yet existing): From farmer, directly to processor with its abattoir, supermarket
 - e. Export 1: Farmer, livestock market, trader to Sudan
 - f. Export 2: Farmer, processor, high value export market (presently UN troops in neighbouring countries.
16. Live animals are transported to metropolitan areas where they are slaughtered and beef is offered for sale. The beef is offered for sale largely in its fresh state and consumers seem to prefer this type of beef. The street butchers operate at lower costs than supermarkets and can therefore sell at a lower price. There is lack of an orderly marketing system in the beef sub-sector and much activity goes unrecorded. Information like export prices for beef, potential areas, market preferences, including grades and standards in these markets and on transport charges, are lacking.

Cattle Trade

17. The marketing structure involves primary marketing through local cattle markets located in rural regions. Costs incurred are in the form of labour for ferrying the animal and payment of token market dues. Cattle traders normally interact with farmers in rural cattle markets to procure cattle. Apart from the producer price, the traders incur transport costs to the main urban areas and costs for waiting at the slaughter houses,

such as (feed, food and accommodation). Transport costs depend on the number of cattle on a truck.

18. The difference between primary and secondary livestock markets is generally one of size and throughput. It is estimated that at least one LC3 market is a livestock market, which suggests that 600-650 primary livestock markets exist in the cattle corridor. Livestock markets normally take place once every two weeks or once a month and the throughput varies between 20 - 500 or more cattle, 10 - 80 goats and 10 - 200 poultry per market day.
19. The markets are managed by private individuals who tender to run the market. They pay a fee, collect the market levies, care for security and cleanliness and (in principle) maintain the infrastructure. Movement permits are issued at livestock markets. A *primary market* is generally one formed by several villages within a Parish. Local farmers buy breeding stock and traders buy animals for slaughter, which are often taken to Kampala. At the smaller markets animals, after purchase, are often driven from the market on the hoof. Traders purchase animals from several primary markets until they have sufficient to fill a lorry. A *secondary market* normally has a larger throughput than a primary market. Traders come with lorries and hope to buy a full load for immediate transportation to large centres such as Kampala. The seller is at a disadvantage if he doesn't inform himself before negotiating, if there are few traders present with whom to negotiate, and if he is selling under pressure in order to meet an immediate cash need.
20. However in Districts where there are large numbers of animals for sale and numerous traders, livestock owners are able to bargain successfully with traders to obtain a fair price. Port Masindi is an example of a market which is strategically placed to receive traders from a wide catchment area. These traders, because they do not know each other well, are less prone to collude to try to keep prices artificially low. At some livestock markets sellers appear to have quite accurate knowledge of local prices.
21. The AfDB *National Livestock Productivity Improvement Project* planned to construct and/or rehabilitate 170 cattle markets and 100 slaughter slabs in 29 Districts. Up to the beginning of 2011, **25 livestock markets and 21 slaughter slabs had been rehabilitated and/or constructed.**

Processing

22. Kampala accommodates 3 *abattoirs*: City Abattoir (KCC Ltd.), Ugandan Meat Industries Ltd. (UMI) and Nsoobo Slaughterhouse Ltd. Given the enormous increase in population in Kampala from 46,000 inhabitants in 1959 to currently 1.5 mill (est.) the City Abattoir is now used far above its installed capacities (by around 200 to 300%, up to 400 animals/d). The UMI abattoir is currently used less than 5% of its installed capacity (150-200 animals/d). City Abattoir is used as a *service abattoir* where slaughter of animals and handling of carcasses and by-products is done under very cramped conditions leaving no space for basic meat hygiene requirements.
23. In 2006 stakeholders that had used *UMI* for their business (both commercial slaughter and service slaughter) moved out of the place and founded a new slaughter enterprise - Nsooba Slaughterhouse Ltd. Currently the UMI abattoir is no longer profitable and is probably subsidised by the new user. The facilities of *Nsooba Slaughterhouse Ltd.* do not meet the most basic requirements for animal and human welfare, slaughter hygiene, meat inspection and food safety. The only allowance for industrial slaughter is a two room slaughterhouse with solid walls, wooden roof construction and water supply. The daily throughput is - depending on the season and the day of the week - around 150 to 200 animals.

24. UMI's slaughter bay does not - by technical layout - allow for halal killing of animals and would need an investment of around 300,000 EUR (est.) to adapt its facilities to *halal requirements* (bleeding place outside under a roof with water supply and drainage system, opening in the wall at the stunning box side). This small investment is seen as a pre-condition to attract stakeholders again in order to increase profitability and food safety.
25. Apart from abattoirs in and around Kampala there are a number of facilities in Uganda where slaughter of animals is done: on-farm slaughter, slaughter on animal markets and *slaughter slabs* at district towns. The former Ugandan Meat Packers Abattoir in Soroti is not operational anymore. Among the slaughter slabs the *Moroto facilities* are one of the most modern and best maintained and may serve as a model for others to be constructed or renovated.
26. The current *marketing system for slaughter cattle* has few incentives for farmers to produce high quality meat in terms of higher live weight, higher quantity of muscles vs. bones (meat/bone ratio), tenderness of meat and quality of hides. If graded according to the EU EUROP grading system the carcasses would be graded as "O" or "P- poor".
27. The current *marketing chain for carcasses* via small scale butcheries with no cooler showcases supports the sale of underweight cattle. The average weight for a quarter (the usual throughput for a small scaled butchery) is around 30 to 33 kg- seemingly the right quantity to be sold during a day for the majority of small scaled butchers.
28. Uganda's *meat processing industry* consists currently (due to the marginalised market share of UMI/Top Cuts for the domestic market) in the main of one company dominating the market for packaged retail cuts and processed beef: "Quality Cuts/ Fresh Cuts" with a daily throughput of 22 tonnes of fresh meat cuts and processed meat covering 85% of the market for those products.
29. Since rental fees in downtown Kampala went up to 3,000,000 USh for a shop of 30 sqm there are only a few *modern middle sized butcheries* in Kampala and almost none in the countryside. **That said the small scaled road side butcheries are the backbone for Uganda's meat retail and will probably remain to be for the foreseeable future.**
30. Kampala accommodates three shopping malls constructed and equipped according to international standards: SHOPRITE, OASIS (with Uchumi supermarket) and NAKUMAT. All three shopping malls accommodate supermarkets of around 1500 sqm with EU style butcher stands - equipped with cooler show cases, fully equipped butchery in the rear. All stands belong to or are rented by "Quality Cuts" and offer the full range of products offered by that company.
31. The *market for beef meat in Kampala* - both the official and informal one - accounts for around 17,210 tonnes per year assuming the per capita consumption to be 20% above national average. The official beef market with inspected meat from abattoirs accounts for 14,300 tonnes per year based on statistics provided by UMI vets. The market for premium processed beef products is estimated to be around 2,400 tonnes per year.
32. The *consumers with higher incomes* available for the purchase of food prefer meat that is offered in a hygienic and attractive way, ready-made for the kitchen in urban households. With a broad variety of retail cuts on offer, they are apparently able and willing to pay higher prices for that type of product compared to the prices in small and medium butcheries.
33. Currently there is no *export* of beef meat from Uganda except a minor quantity of processed meat exported by "Fresh Cuts" to the UN troops in DRC and South Sudan.
34. The *lack of investments* in slaughter facilities (capacities, hygiene measures, HACCP certifications) for many decades makes a low price level for carcasses possible.

Hazards for public health have increased accordingly, causing increasing risks coming from food borne diseases.

35. One of the long standing challenges for the beef sector has been the lack of modern abattoirs that can comply with export standards. *Projected modern abattoirs* need to include their high investment costs into market prices for final products.

Veterinary services and diseases

36. In the livestock sector, Sanitary and Phytosanitary (SPS) problems are a major constraint to growth and a barrier to trade due to the presence of endemic World Organisation for Animal Health (OIE) notifiable diseases. In addition to limiting trade possibilities, livestock diseases also reduce animal production and productivity. Animal diseases have negative impacts on income generated by the livestock sector and directly impact on poverty and food security.
37. The Directorate of Animal Resources of the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) headed by the Commissioner for Livestock Health and Entomology is responsible for the provision of veterinary services and the control of animals and their products. Central services count upon relatively limited staff and well balanced services located within the National Animal Diseases Diagnostic and Epidemiological Centre (NADDEC), the Coordinating Office for the Control of Trypanosmosis in Uganda (COCTU) and research institutions such as the National Agricultural Research Organisation (NARO) and the National Livestock Resources Research Institute (NALRI). Epidemiological surveillance services are housed at NADDEC. Field veterinary services include 112 District Veterinary Offices which, due to the recent Ugandan decentralisation are administratively accountable to district administrators while technically they report to the ACLHE. The chain of command of the MAAIF/CVO-DVOs is therefore lost or weak, resulting in a low rate of reporting and sometimes difficult communication.
38. Veterinary legislation is comprehensive but obsolete and needs to be updated to meet current international requirements. Trans-boundary animal diseases and zoonoses hamper the access of live animals and their products to international markets. The prevalence and spatial distribution of major animal diseases is not known in detail. The Government commissioned an Animal Health Master Plan which established the strategies for the **control of major animal diseases**, which have been endorsed by the MAAIF but **not yet enforced due to a shortage of funds**. In spite of the efforts of the Government, international organisations and NGOs, there is no harmonised national animal identification and traceability system.
39. There is an urgent need to re-establish the chain of command within the Veterinary Services and to review, improve and, above all, enforce animal health legislation. The OIE offered to help in these sectors, which the Government accepted. A comprehensive review of the animal health legislation, which involves also the technical and administrative chain of command, is ongoing.

Proposed Strategy

40. Well known technological potentials for improvement exist in all fields of livestock production. The sector strategy should support changes in technology, and develop larger farms and larger commercial units as far as it is socially acceptable. Since for most cattle farms there is no clear distinction between milk and meat cattle production, improving milk processors is also beneficial for the meat sector. Improved credit or capital access is needed for more working capital and investment. The share

of the informal market should be reduced as it entails hygienic risks. There is potential that contract production will stabilise the industry. Horizontal and vertical integration will be beneficial.

41. The low input traditional production system provides the possibility for considerable improvements to increase weaning rate from 0.46 calves weaned/cow/year to 0.70 in modern beef cattle farms, or from 0.34 saleable cattle/cow/yr to 0.67 in modern beef cattle farms. This output increase of nearly 100% is possible by in the main applying well known veterinary measures. There are many examples of farms in Uganda and the region where these techniques are applied. This huge on-farm productivity increase could finance an intensive veterinary programme with **dipping, deworming, vaccinations and trypanocides** according to the risks in the region, and the necessary infrastructure (dip, fence ...).
42. The strategy is based on vertically integrated commercial cattle farms and feedlots with contract to processors ("farm to fork") and purchasing from smaller farmers for finishing /fattening at the larger ones. It is based on the following elements:
 - Improved animal health control including vaccination and movement control with animal identification (this is on the one side an on-farm activity, on the other side a country-wide or region-wide Governmental task)
 - Use of agro-industrial by-products and of silage for finishing and in feedlots
 - Improved livestock management
 - Establishing a trading system based on quality grading
 - Producing selected breeding bulls like Boran, Bonsmara with commercial breeders and establishing a herdbook
 - As milk and beef can be produced at the same farms: larger farms serving as a milk collection centre for smaller ones
 - Improve abattoirs with appropriate food safety standard
 - Provide investment support for modernisation and productive investment in beef ranches, beef farms, feedlots, and processing (abattoir, cutting, processing).
43. The strategy is to finance eligible investment in the sub-sector through an **equity fund**. **The funds purpose is to help establish sustainable, viable ventures** that otherwise would not have been established due to the perceptions of the risk involved and lack of credit facilities to help finance, alongside the own funds of the participating proprietor, the development of beef ranches /farms and feedlots for mixed beef – dairy ranches / farms with MCC, and of higher standard structures in slaughtering, processing and retailing. Using the example of a beef farm, under the programme, **financing would be eligible for such investments as on-ranch roads, firebreaks, fencing, water supply, stock handling and animal health control facilities, ranch buildings, breeding stock and an initial procurement of feeder steers for fattening, according to a realistic business plan.**
44. With the growing population and with economic growth, there is a danger that Ugandan livestock producers are unable to satisfy the growing demand for beef. Also because of the difficulties in complying with international sanitary and phytosanitary standard requirements, Uganda is not a net exporter of live animals and livestock products internationally. There is however seemingly increased informal and formal exports of live animals and meat products from Uganda to lucrative regional markets particularly South Sudan and the Democratic Republic of Congo. Per capita meat consumption in the region is often below that of Uganda (data from FAOStat, 2007, kg bovine meat/capita/yr): Burundi 1.71, DRC 0.49, Rwanda 2.48, Uganda 3.46 (based on extrapolated old cattle figures, census showed higher number). No data for South Sudan, Sudan has 8.40kg.
45. Uganda's beef is produced under halaal slaughter with independent halaal certifiers. This is a requirement of some markets like that of the Middle East and Arab countries. Due to availability of raw materials and cheap labour, abundant supply of water and

power, the cost of production is lower in Uganda compared to Uganda's neighbouring countries.

46. Export at viable prices needs favourable natural and climatic conditions, large and well structured farms, low land prices and modern slaughtering plants. Problems are inefficiency of veterinary services, inadequate feed, water in the dry seasons and high interest rates. The potential to improve productivity of the cattle sector, combined with the increasing demand for beef, as disposable incomes improve, are both expected to drive productivity improvement from the national cow herd. After supply satisfies demand for beef in Uganda, then the development of an export market for beef will progress.
47. The large beef export countries have production systems based on low-input year-round grazing systems. Barns do not exist. Typical productivity indicators of steer production in those countries are (example of Argentina): Age and weight at start of finishing 210 – 260 days and 130 – 180 kg LW, age and weight at end of finishing 575- 759 days and 380 – 450 kg LW, duration of finishing period 300 – 500 days, daily weight gain 500 – 650 days, dressing percentage 57 – 59% (carcass weight divided by live weight in present), number of weaned calves per 100 cows per year 75 – 80 head.
48. Agro-industrial by-products and crop residues are not sufficiently used. There is e.g. potential to use molasses for fattening. The available national quantity would be sufficient to fatten over 10% of all slaughter cattle per year (5 kg x 90 days per animal) depending on cost. Agro-industrial by-products could cover up to 20% of annual feed needs if properly collected and stored. However, a large part of it is of low quality (maize, millet and sorghum stover make up 63% of these products, measured in dry matter). Feedlots shall be established near agro-industries where cheap by-products are available.
49. In the veterinary field, a clear and effective strategy for the control of Transboundary Animal Diseases (TADs) as well as diseases important for trade and public health should be implemented as soon as possible. The mission proposes a multi-step project approach based on the need to acquire/update knowledge on the nine priority diseases of ruminants identified with MAAIF and then draft and adopt tailored animal diseases control/eradication strategies allowing the access to export markets. The proposed project would be divided into 2 phases, the first of which (mapping of animal diseases, adoption of control strategies) would last 18 months and would have a total estimated cost of EUR 550,000. The second phase (implementation of control strategies and adoption of measures to strengthen trade capacity) is subsequent to the conclusion of phase 1 and would last not less than 3 years. In the Food Safety field the mission proposes also a project to support upgrading of standards.

1. INTRODUCTION

1.1 CONTEXT

The overall objective of the present mission is "to contribute towards obtaining an insight into the beef value chain in order to design interventions that lead to commercial sustainable solutions that contribute to better performance through a public-private partnership with focus on small and medium enterprises".

Livestock products in Uganda play important roles in many families, including raising household incomes and providing protein. The contribution of the livestock sub-sector to total GDP is 5% and 14% to agricultural GDP. The Agricultural sector that includes food and cash crops, livestock, and fishing activities grew by only 0.9 percent in 2010/11 (due to poor rainfall) compared to a growth of 2.4 percent realised in 2009/10. The sector had a total contribution to GDP at current prices of 23.8 percent in the fiscal year 2009/10 compared to 22.5 percent in 2010/11. The GDP of the livestock sector grew annually at a constant 3% from 2006/7 to 2010/11.

Animal diseases play a major role in the improvement of animal productivity and therefore in the availability of suitable product for human consumption, of acceptable quality and quantity for both local and external markets. The national Government and the international community (led by the European Union), which is the largest donor worldwide - understood these constraints to reduction of food insecurity and development of livestock production and trade, and embarked on large disease control programmes.

1.2 PROJECTS

Eradication of rinderpest started in the '60s with the JP15 project, then continued by PARC in the late '80s and '90s followed by PACE from 1999 to 2007 and completed by SERECU from 2006 to 2010. Freedom from Rinderpest was officially achieved more than 35 years ago from the first eradication programme, with the 2010 declaration of worldwide freedom from the disease. Uganda was declared free from rinderpest during the 76th General Session of the OIE, held in Paris in May 2008. The EU contribution to the global eradication of Rinderpest cost more than 300 million EUR but thanks to this unique achievement various countries in Africa and the entire world were able to resume regional export of live animals and their products. Rinderpest was the first animal disease eradicated from the globe. The attention of National Governments and the international community is now focused on the progressive control of FMD and the fight against other transboundary diseases and zoonoses, such as CBPP, PPR, HPAI and RVF in order to create a conducive animal health environment for export.

The Study on developing an export oriented meat industry in Uganda was sponsored by Norway (NORAD)/Nortura and completed in 2007. The study resulted in the implementation of the Uganda Meat Export Development Project (UMED IP – Interim Programme) from 2009-2012 funded by NORTURA and the Government of Uganda. The objective of this project was to prepare the country to export beef to the lucrative markets of Europe by the establishment of Disease Free Control Zones, putting in place an enabling legal framework, improvement of livestock production systems, putting in place the relevant infrastructure to enable attainment of the required EU standards, formation of the Uganda Meat Producers Cooperative Association (UMPCU) and the Uganda Meat Export Company (UMEC). However, the UMEC was not yet formed. The national production is for the moment insufficient for larger exports. The responsibility for creating a favourable environment rests with the Government including funding of the creation of disease free zones. The UMPCU Project relationship with the Uganda Beef Producer Association should be strengthened in

the interest of cohesive sector development. The latter represents large farms while UMPCU represents smaller and medium producers.

There are 31 primary cooperatives in the national union (Uganda Meat Producers Cooperative Union). Each local cooperative has more than 30 members minimum, with at least 10 cattle per member. 68 members are registered per primary cooperative but 38 are active members with about 1100 real members in total in the country. If each represents on average 150 cattle this adds up to a UMPCU cattle population of $1100 \times 150 = 165,000$ head. The programme changed its strategy in April 2011. Europe is no longer the immediate target for meat export as funding for establishing the DCZ is not available. Sufficient cattle numbers for off-take is necessary to interest large foreign importers and investors to guarantee a supply over at least 2 years. Therefore, priority targets for meat export are now Sudan, DRC, Egypt and Near/ Middle East.

Four parallel and independently controlled development projects were established under the coordination of the Programme Committee for the *Uganda Meat Export Development Programme*. These are: (1) Establishing DCZs; (2) Organising livestock production in the DCZs; (3) Developing animal health and meat hygiene services; and (4) Establishing and developing the UMEC; see Table 1.1 below. The second project is presently running with a Norwegian budget. For the first one (DCZ) MAAIF is presently conducting a stakeholders' analysis, as to how DCZ would be accepted.

Table 1.1: NORAD related projects or project components

Development projects	Responsible	Budget, USD	Duration
1. Establishing Disease Control Zones (DCZ)	MAAIF	5,600,000	2 years
2. Organising livestock production in Disease Control Zones	UFMC	2,073,600	3 years
3. Developing animal health and meat hygiene services	MAAIF/MOH	11,800,000	4 years
4. Establishing and developing the UMEC	UMEC	480,000	4 years
Total budget, 4 year programme	UMED	19,953,600	4 years

The National Livestock Productivity Improvement Project (AfDB Project) ran from 2005 to December 2010. There was a restocking component which worked well according to the principle of 'share the gift' as implemented by Irish NGO "Bothair", "Heifer International" and others, the first female calf is given to a member of the farmer's group. They re-stocked also some Government farms. There were problems finding private sub-contractors for the livestock markets and slaughter slabs. Different livestock infrastructures were rehabilitated or created (slaughter slabs, markets, water dams). Future AfDB support will go towards infrastructure.

The older WB Livestock Services project (1991-98) aimed to: (a) establish a national animal disease control programme and a tsetse fly control programme. To complement the disease control programme and improve animal nutrition, funds were also made available to support expansion and improvement of areas under forage in the smallholder sector; (b) credit for establishment of about 60 private veterinary practices; and (c) technical assistance and training to prepare and help execute a programme to streamline MAAIF's organisational structure, reduce its staffing levels, and strengthen its financial and management information systems.

2. FARM PRODUCTION

2.1 NATIONAL CATTLE POPULATION

The national livestock population amounts to 11.4 million cattle, 12.5 million goats, 3.4 million sheep, 3.2 million pigs and 37.4 million chickens (UBOS 2008). The table below shows that a lower cattle stock increase was assumed up to 2007 where only the old census figures were extrapolated. As the census is based on the responses of households an uncertainty remains.

Table 2.1: Development of cattle numbers

	2002	2003	2004	2005	2006	2007	2008
Cattle	6,328,000	6,519,000	6,567,000	6,770,000	6,973,000	7,182,190	11,408,750

Source: Ministry of Agriculture, Animal Industry and Fisheries

93.6 percent of Uganda's cattle herds are indigenous; Ankole (29.6%) and Zebu/Nganda (70.4%), whereas 0.8% are beef exotic/cross breeds and; 5.6% are dairy exotic/cross breeds. In terms of distribution, the eastern region (23%), Karamoja (20%) and central region (19%) have the highest number of cattle followed by the south western (16%) and the northern (14%) regions.¹ Beef Breeds of commercial producers are Boran, Bonsmara, Brahman, Boran x Ankole, Boran x Zebu and their Holstein crosses.

After a decline in livestock production in the 1970s, there has been a steady increment in livestock production since 1986. The greatest concentration of livestock is found in the "cattle corridor", extending from South-Western to North Eastern Uganda. Livestock is predominantly used for supporting rural households (80% owned by smallholders). About 165 large ranches account for 2% of cattle (largest up to 3,000). About 130 ranches are organised through the Uganda Beef Producers Association (UBPA).

2.2 PRODUCTION SYSTEM

Smallholder farmers own about 90% of all cattle. Pastoralists, who are mainly found in the North-Eastern districts where human population density and rainfall are low, and in Western Uganda, where people were given freehold and leasehold title to their land, are increasingly practicing mixed farming. In the other areas of the country, agro-pastoralism and the mixed farming system dominate, alongside approximately 50 fattening farms and thousands of dairy farms, mainly located in Mbarara district and around Kampala.² Carcass weights are low with 150 kg (Source: FAOStat) or 138kg (Source: Mostly from 'City' abattoir in Kampala)³. The consultants estimate that kill-out is approximately 45%, (carcass weight as a % of live weight).

The main livestock production systems include (a) extensive systems such as communal grazing, transhumance, semi-nomadism and agro-pastoralism which forms 90% of cattle production; (b) intensive commercial systems such as beef ranching and zero grazing for dairy cows, and (c) intermediate systems (emergent farms with some supplementation, some improved fodder).

Cattle farming, for both dairy and meat production, is the biggest livestock enterprise in Uganda for both food production and income for households. Cattle are raised throughout all regions of the country, usually by smallholder farmers. Cattle enterprises have more recently been expanding due to a comprehensive Government of Uganda national strategy plan for

¹ Source: "Invest in Uganda's Meat Sector" (www.ugandainvest.com).

² Source: FAO Livestock Brief, Uganda

³ Report on survey of cattle carcasses in Uganda 23rd to 29th of May 2010. By Morten Røe

the livestock sector which includes animal health, animal nutrition, training and delivery, research, and enhanced market systems (FAO, 2005). Productivity of cattle enterprises has been increasing over the past years due to improved production systems and techniques, but still falls below increasing demand for cattle products, which has been growing at an average annual rate of about 2 per cent per year.

However, most of the ruminant livestock in Uganda are indigenous and are raised in the traditional system. **The inherent features of indigenous livestock are survival rather than productivity, hence their small body size.** Factors such as diseases, parasites, inadequate nutrition and water scarcity in the dry season coupled with their small body size and low milk yield mean that they grow slowly and often attaining market weights at 5 years of age or more.



Figure 1: An F1 Holstein x Ankole cow with a calf by a Holstein X Bull

An F1 Holstein x Ankole cow with a calf by a Holstein X Bull, being milked at 2pm having been milked at 6am that morning. The calf is waiting to feed. This scene reflects the system of farming that will produce most of the beef from the Dual Purpose Herd in Uganda. Note: The Valley Tank in the background with pasture cleared of bush with adequate shade for protection from the sun.

Cattle are the main source of meat in the country and are reared on rangelands which occupy 84,000 km². The improved cattle breeds are kept under intensive management, mostly on small scale and medium sized farms and zero grazing. The indigenous breeds are mainly kept under extensive system. The traditional breeds are East African short horn, zebu, long horned Sanga, Ankole, Turkana, and Toposa. The exotic breeds are Brahman, Boran, Bonsmara for beef and Holstein, Jersey for milk production. Constraints are:

- Production related constraints (diseases, low genetic potential of indigenous beef breeds, inadequate feeding and water)
- Marketing constraints owing to inadequate infrastructure for marketing of livestock and its products at the primary, secondary and tertiary markets
- Institutional constraints arising from weak enforcement of policies, laws, regulations and standards has led to spread of diseases and production of sub-standard products
- Lack of access to capital to facilitate investment in improved methods of livestock production.

The cattle produce both beef and milk, the cost of maintaining is shared between the two products, which can then be offered in the market at lower cost. For the purpose of the present study mixed dairy-beef farms are therefore also considered. Intensive livestock

production is common in areas with higher population densities, with dairy cattle ownership being an important characteristic of economically progressive farmers in these zones.

The greatest concentration of livestock is found in the so called "cattle corridor", extending from South-Western to North Eastern Uganda (see map in Annex 15). Livestock is predominantly used for supporting rural households (80% owned by smallholders, i.e. herds of 20-100). About 165 large ranches account for 2% of cattle (largest up to 3,000).

Table 2.2: Uganda Household Livestock Ownership, 2008 (from NDP2)

Type of livestock	Uganda	Central	Eastern	Northern	Western	Karamoja zone
Exotic						
Cattle	700,030	221,700	141,860	9,800	317,850	8,820
Goats	151,839	44,028	22,081	9,273	51,037	20,827
Sheep	25,240	3,920	4,090	3,450	5,930	7,840
Chicken	4,609,310	3,709,500	282,940	127,650	481,500	7,730
Local						
Cattle	10,643,620	2,209,620	2,345,610	1,631,030	2,212,210	2,245,140
Goats	12,278,220	1,620,128	2,577,249	2,686,402	3,380,297	2,014,144
Sheep	3,385,130	265,680	315,270	565,060	561,450	1,677,660
Pigs	3,184,300	1,307,460	699,680	340,460	778,350	58,360
Chicken	32,834,580	6,820,930	10,413,170	7,516,770	6,728,620	1,355,090
Other poultry*	2,006,860	331,530	716,250	541,320	335,670	82,080

Source: MAAIF & UBOS (2009), The National Livestock Census Report 2008

Draught cattle occur mostly in North and East Uganda as soils are lighter there and also due to tradition. Adding steers and bulls to the supply of draft animals will be largely a by-product of a triple purpose herd. Having oxen will allow a farmer to open up 16+ acres per pair of oxen per year, far more than is possible by hand hoe. Oxen can add value to the meat value chain because they are better fed and receive more health care. The tougher beef from older oxen would become more tender for cooking, aside from boiling, if chill facilities were made available to hang the carcass sides for up to 2 weeks.

Pure Holstein as Draught Animals in the North West

The farmers from Masindi mentioned that the oxen in the North-west were being supplied from the Holstein crosses in the South. The large frame of the Holstein was the initial attraction to the farmers up North. Now however, they find that the most work they can get out of these **purer** Holstein is two seasons which is only one year. Now, northern farmers are beginning, to select from or cross Holstein cows with the Boran as the progeny have the size, hardiness, easier to keep in good condition, better shoulder and the hump for pulling to take the collar and yoke. This requirement for better quality draught oxen also favours beef production requirements by selecting for beef bulls.

Another aspect of the northern farmers' effort to obtain a serviceable draught animal from Holstein breeding is the fact that they choose to select in favour of bulls rather than steers. This is not a strategy that improves planned beef breeding as the draught Holstein bulls or steer oxen are run with the cows at night, unless the farmers have a deliberate policy of increasing milk and using a Holstein draught bull for draught work

These calves are in demand for breeding as the large Dual Purpose Cow herd are being managed in favour of Holstein milk genes to the detriment of the beef sub-sector.



Figure 2: Mostly F1 Ankole X Holstein cows weighing approximately 400 to 500kg

Being gathered for afternoon milking from a herd of 30 cows. Cows calve all year round and are not grouped for breeding, thus ensuring good cash flow throughout the year from milk sales. Even under good grazing conditions this herd has reportedly a calving rate of 50 to 60% only producing 15 to 19 calves per year.

Karamoja

The mission visited pastoral areas of Karamoja to ascertain whether there is potential for commercial livestock production and marketing in that region and the quality of cattle available for off-take. Since the enforcement measures by Government at improving security in the 6 districts of Karamoja, the number of animals per person decreased dramatically, from a ratio 10 to 1 to a ratio 1 to 1, which makes the region less suitable for the development of a commercially oriented beef sector. Moreover, the very fragile and hostile environment, prone to recurrent droughts and scarcity of water, animal fodder, and the intention of the Government to settle the pastoralists in the region are not conducive to the inclusion of Karamoja in the commercialisation of the beef subsector. This is further supported by the small size of zebu cattle bred in the area, whose live-weight seldom exceeds 150/180 kg when presented at the market, depending on the margins available from the Zebu cattle enterprise. Livestock production in Karamoja is based on a definitive pastoral production system.

To commercialise cattle production in the Karamoja it would be necessary to invest in rangeland improvement and management capacity building, advisory services, better availability of quality pasture and water and improvement of animal size and growth rate to capitalise on the proposed investment. These activities are seemingly not coherent with the current Government plans for the region. A further option to improve the pastoral production sector is to establish drought mitigation and prevention mechanisms based on both physical and financial prevention. While the first group of actions is well known and tested (water catchments, pasture improvement, fodder banks, etc.), the latter is still green and allows for creative and innovative solutions. It is the case of the Index Based Livestock Insurance (IBLI), which has been successfully tested and implemented in Marsabit, Kenya, as a pilot programme.

Ranches

About 165 large ranches account for about 2% of the 11.5 million cattle in Uganda. These are large-scale commercial systems practicing modern animal husbandry methods. The largest ranches are up to 25,000 ha and 3,000 cattle, with a capacity to increase the number of cattle substantially. The ranches are owned partly privately, partly by business corporations.

About 130 of the ranches are organised in the Uganda Beef Producers Association (UBPA). By 1970 there were over 560 ranches, 3,000 privately owned dairy farms and a thriving small scale sector. The supporting infrastructure included 475 dams, 428 valley tanks, 7,500 boreholes, 2,100 dip tanks, 43 quarantine stations and over 170 well-equipped livestock markets. There were established cattle movement routes and holding grounds. Due to political instability both the production and marketing infrastructure collapsed and the cattle population decreased.

2.3 SYSTEM DEVELOPMENT AND HERD MANAGEMENT

With increasing population there is a trend that pastoral systems are being superseded by settlements and in turn the development of agro-pastoral systems. With increasing population land becomes more limited and production has to be intensified. The poor productivity of traditional systems with only 0.46 calves weaned per cow and per year can be considerably increased to 0.70 weaned calves, by improved disease control, feed quantity and quality and water in dry seasons. Present veterinary input is low and insufficient in view of the many threats from disease (mostly tick-borne diseases, infectious diseases). This requires that contacts between herds are minimised by better fences between private farms and avoiding cattle being moved in pursuit of feed and water in the dry periods.

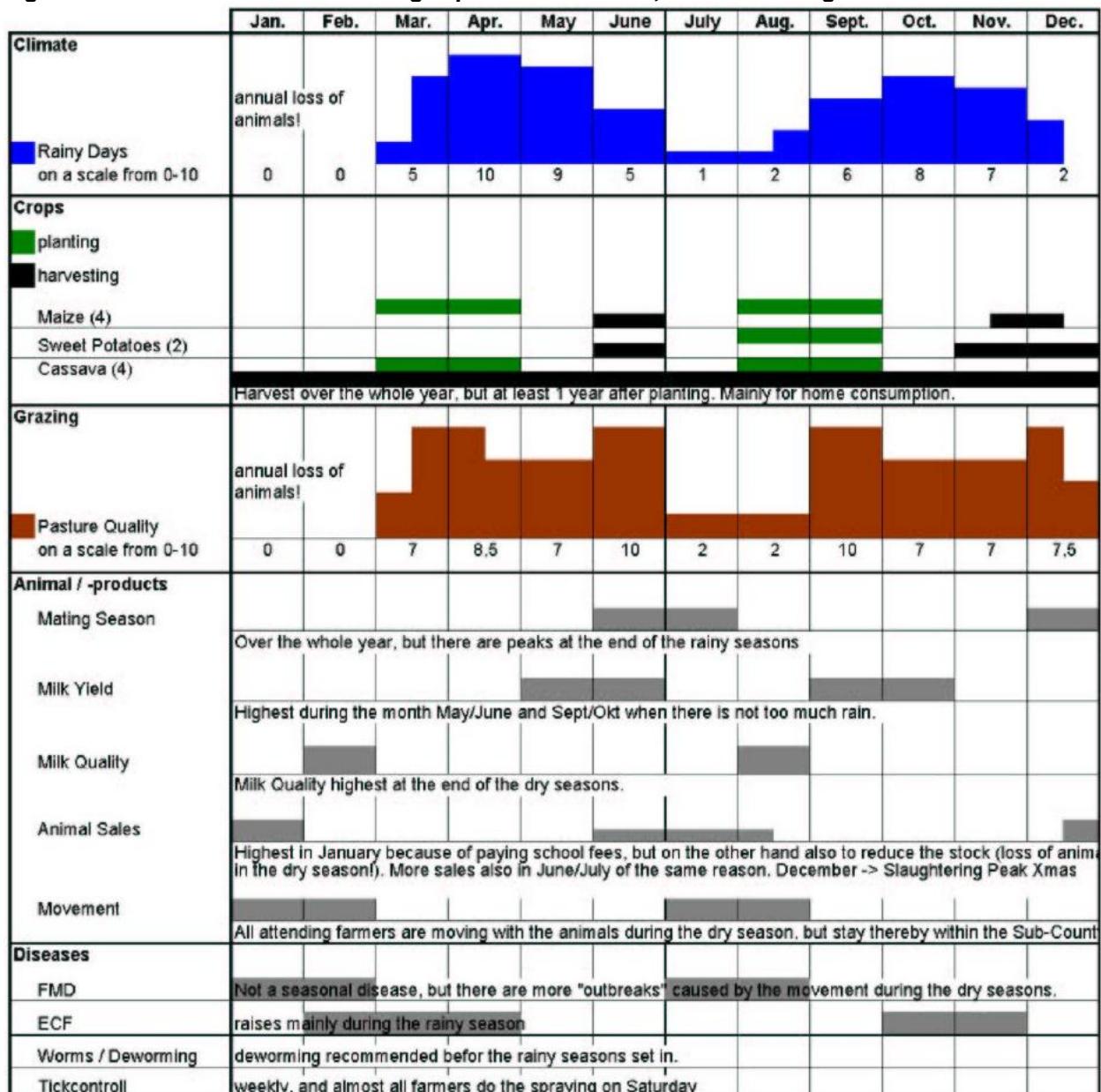
The Bahima in South Western Uganda used to move with their Ankole cattle, but nowadays most of them are settled. The Ankole cattle with their huge horns play a key role in the livelihoods of these families. This importance is reflected in the status of the cattle. These animals are multi-purpose animals, kept for milk and meat production, as a saving's bank or for the purpose of dowry. Latterly, cattle farmers own their private land where they can graze their herds, which are still accompanied by a herdsman and guided by him to watering points. Responsibilities are shared between family members and hired workers. The cattle herd is kept on pasture throughout the whole year. The only supplementation is salt which is provided to the animals in the kraal. (See Figure 3).

Parts of Uganda are judged to be overstocked in terms of the livestock numbers that they should be supporting. In such areas, livestock development activities shall focus on intensifying production systems and developing other fodder resources (stover, by-products, forage maize and lablab and silage made from the same) or import livestock feed and fodder from surrounding districts that have sufficient land for their production. In areas with more extensive livestock production systems that are experiencing overstocking, attention needs to be paid to strengthening the institutional mechanisms, both formal and informal, through which common pasture and other livestock-related resources are managed, or to attribute land to individual farms and stock straw for the dry season and purchase supplementary feed.

Constraints to cattle production are low livestock productivity, endemic diseases, inadequate feeding, scarcity of water for livestock and inadequate infrastructure for livestock markets, abattoirs, and dip tanks. Veterinary care improvements will be beneficial to farmers, particularly if they are using exotic breeds or cross breeds. The local Zebus do not need as

much veterinary care, beyond worm and tick treatments, and are therefore lower maintenance.

Figure 3: The seasonal calendar of agro-pastoral activities, South-West Uganda



Source: African Journal of Agricultural Research Vol. 3 (8), pp. 542-548, August 2008. Lifestyle and herding practices of Bahima pastoralists in Uganda

Different production systems and management levels have been analysed by the Consultant and its financial results assessed (see Annex 12 Tables). Gross margins per cow and year increase from about 100 USD /cow/yr for traditional herds to about 280 USD/cow/yr for commercial producers (including home consumption and family labour). Smaller commercial units would have to produce beef and milk to provide for a sufficient income. Milk production requires milk collection which is not provided for in remote places where on the other hand land prices are lower. Land price is another criterion for beef production. Per cow and year between 0.3 and 0.7 cattle can be sold according to calving and mortality rates. Veterinary input is too low in the traditional systems with only 0.3 cattle sold annually per cow (about 7 USD/cow with followers and year for the veterinary costs) leading to greater disease and risk of mortality. As mentioned above feed and water shortages are crucial in dry periods and add

to livestock losses by depleting cattle reserves of energy and increase their susceptibility to disease and mortality.

The initial main improvement measures in herd management are veterinary input and control of tick-borne diseases as well as improving feed and water resources in the dry seasons. Smaller farms use a hand sprayer, medium farms a spray race and larger ones a dip to control ticks. Where the number of cattle enable an economic scale for tick control, dipping is the cheapest and safest method but needs a larger initial investment in dip and regular checks of the dip solution to ensure adequate strength of the solution. Other veterinary measures required are; deworming, vaccinations and trypanocides. When improved disease control, feed and water resources can be constantly assured crossbreeding with improved breeds is possible. There is a good local market for improved breeding animals e.g. Holstein in both dairy and beef herds, Boran and Bonsmara, etc. Bulls should be tested for brucellosis. Management improvement is also required to collecting and feeding maize stover for the dry season, as well as buying agro-industrial by-products where viable and producing silage from forage maize and lablab

Ranching is characterised by high fixed costs and high initial investments, a long-term commitment to a particular type of production and high costs for personnel in relation to the return from the ranch. The high fixed costs stem from the investments necessary to develop and utilize natural fodder. The costs of animals are the primary outlay. To build up a ranch requires either a high level of buying, or slow stocking with animals born on the ranch, and at least ten years of low return have to be bridged. Another costly item is the procuring of water. Productive grassland management is difficult unless water is available on private fenced farms and rotational grazing depends on adequate water availability in every paddock. On communal lands watering places are required within 4-5 kilometres, which will stress calves especially if already stressed for other reasons, e.g inadequate milk intake. (See Annex 9 Effective Calf Weaning at 6 to 7 Weeks).

The watering places should have a reserve capacity of 50 per cent, so that sufficient water is left even in dry years to maintain the rotation. There is also the investment in fences and the cost of their maintenance, as ranching / livestock farming without fencing is normally not a viable activity. Fences reduce labour, facilitate the control of animal densities, permit the separation of sexes and age groups, simplify veterinary care and breeding, and make it possible for cattle to graze at night. On the other hand, they are expensive in relation to the return from the fenced-off areas, especially as wide use is normally made of long-lasting iron or wooden posts, which have to be transported and impregnated against termites.

The result of investment is a long-term commitment to a particular type of production. Benefits arise from access to agricultural and veterinary progress. Innovations are much more easily applied in ranches and privately owned livestock farms with secure tenure than with transhumant pastoralists. Crossbreeding leads to faster growing cattle; finishing with cheap agro-industrial by-products (where their inclusion in feeds is found to be viable); forage maize intersown with lablab is possible, along with supplementary feeding leading to:

- More milk in lactating cows
- Better calf growth rates and less mortality
- Earlier slaughter age
- Faster return on invested capital
- Profiting from seasonal price variations
- Returns from sale of improved breeding cattle.

In traditional pastoral systems and fenced farms young steers and heifers don't put on weight during the dry season unless they receive a balanced supplementary feed. Age at first calving varies widely according to feeding and management, see <http://www.fao.org/Wairdocs/ILRI/x5442E/x5442e06.htm>: Nganda cattle, Age at 1st calving 42

months, Ankole 51.3months , Zebu 51.7 months, 1/2 Jersey 29.4 months, Friesian 40.0 months. Trail et al (1971) reported a conception rate of 79% in Ankole, Boran and an unspecified zebu-type cattle in western Uganda where feed and water were abundant and diseases were controlled.

2.4 DISEASE SITUATION AND CONTROL

The animal diseases control system established in the colonial era, based upon community dip-tanks managed by public authorities and proximity veterinary services collapsed completely. Few communal dip tanks are still operational and are mainly found in private farms and ranches. Most of farmers spray their animals or apply pour-on acaricides. For vaccination and treatment of animals fixed crushes are used, most of which are badly designed and in various states of repair, representing in some cases, a risk for animals, veterinarians and livestock owners.



Figure 4: Badly designed cattle crush

The Government is in principle responsible for vaccination campaigns for major infectious diseases, basically FMD and PPR, while prophylaxis for other diseases is under the responsibility of livestock owners. Unfortunately, at present, veterinary services are not in the position to implement comprehensive vaccination programmes for FMD and PPR. They only vaccinate when an outbreak occurs, even if both diseases are endemic in the country, procuring the vaccine on a case-by-case with a consequent delay in administering it, which sometimes exceeds 5-6 weeks.

The control of other animal diseases is left to each farmer and therefore is implemented according to their financial and technical capacity. The mission calculated the cost of a comprehensive farm veterinary care programme⁴ at 60 US\$ per year per cow with followers using spraying or pour-on acaricides, which could drop to about 45 US\$ in case dip-tanks are used, depending on herd size or scale. This amount is about 30 times higher than the amount spent in 2007 (less than 2 US\$ per head) as identified by an OIE study carried out in 2009⁵. A network of about 500 officially registered veterinary pharmacies and veterinary drug selling points are scattered over the territory, guaranteeing access to quality drugs and skilled advice almost everywhere. The National Drug Authority is responsible for licensing drugs and selling points and surveying their work. Illegally imported and non-registered veterinary products are not frequent in the country, due to the relatively low price of legally imported and genuine products and their wide availability. Adulterations of powder drugs are

⁴ Comprising vaccinations for FMD, CBPP, LSD, Brucellosis, Anthrax/Black Quarter; Treatments for ecto and endo parasites (ticks, gastrointestinal, liver and blood parasites); curative treatments for at least one episode of ECF and protection against broad spectrum infections. Detailed data available upon request.

⁵ Cost of National Prevention Systems for the control of animal diseases and zoonosis in developing and transition countries, OIE, 2009

reported, especially in livestock markets where non-authorised drug dealers are present. The mission noted with surprise that the price of drugs (antibiotics and oxytetracycline, 20% of which from a reliable laboratory) at the livestock market (non-registered sellers,) was about double that of the price at the registered drug shop in the neighbouring village, about 500 meters from the market. Nobody could give us a convincing answer about this.



Figure 5: Drugs sold at the livestock market (non-registered sellers)

The veterinary epidemiological surveillance and diagnostic service is centred on the National Animal Diseases Diagnostic and Epidemiological Centre (NADDEC). Passive surveillance is carried out by District Veterinary Offices, who report monthly to the central veterinary services (Assistant Commissioner for Livestock Health and Entomology) through local Government authority, to whom they are administratively accountable. The Assistant Commissioner reports every 6 months to the OIE about the disease situation in the country. The diseases reported to the World Animal Health Information Database of the OIE in the period 2005-2011 are listed in Annex 16. The rate of reporting has increased greatly in recent years (an average of 8 reports per year per DVO), even if some DVOs still have a very low rate of reporting. Data are received on hard copies, entered into a Microsoft Access® database and kept at NADDEC level. No processing or statistic analysis is done on the data. The return of information to DVOs is also quite erratic.

Active epidemiologic surveillance campaigns are carried out by the epidemiology unit at NADDEC in collaboration with laboratory staff and depend on the availability of funds. Active surveillance is generally carried out in specific areas in the framework of projects funded by external sources. There is no harmonised and comprehensive strategy for the control of animal diseases in which these spot investigations can be placed. The major diseases which are the object of active searches are FMD, PPR and Brucellosis. Even if the information covers only part of the country, it is interesting to note that the average prevalence for the above diseases in live animals is respectively up to 65, 10 and 12%. Tick-born diseases (mainly ECF) and haemo-parasitosis (Anaplasmosis, Babesiosis and Trypanosomiasis) are also widely spread with seasonal peaks reaching more than 47% prevalence in areas favourable to the specific vectors.

These data are still insufficient to design a comprehensive and reliable control and where possible and eradication strategy, but represent a good starting point and suggest a deeper and broader collection of samples is required in order to contribute to the set up of a sound disease control strategy.

Diagnostic capacity at NADDEC is good; the veterinary laboratory is well equipped and staffed with competent professionals. They can carry out all necessary tests (ELISA, PCR, CF, IAg) for the detection, isolation and identification of protozoa, bacteria and virus, provided that they are supplied with the appropriate reagents and diagnostic kits. The laboratory receives support from various projects and donors, the major of which is JICA, and is engaged in 3 OIE twinning programmes with the Animal Health Institute at Pirbright, UK, for the upgrading of diagnostic skills and capacities for PPR, Blue Tongue and Goat Pox respectively.

The field diagnostic capacity is still not adequate. Only four District Laboratories are operational (Nakasongola, Mbale, Mbarara and Moroto) thanks to external aid from JICA in the case of the first three labs and the EU/private funds in the latter. Most of the remaining district veterinary labs and/or diagnostic units are now dismissed due to obsolescence of the equipment, lack of technical staff and of operational funds. Few district laboratories still carry out basic parasitology and entomology.

2.5 BREEDING (SEE ANNEX 6)

The cow herd is predominantly managed as dual purpose dairy and beef enterprises. The emphasis is on dairy genetics with over 90% of AI inseminations being Holstein-Friesian including a small number of Jersey and Guernsey, mostly from imported semen. Hence, the beef product is predominantly a by-product of the Dairy Industry. The following are the major indigenous cattle breeds found in Uganda:

- The Ankole Long-Horn (Sanga, Nsagalla)
- The East-African Short-Horn (Zebu)
- The Intermediate, nondescript breeds (Nganda)
- Exotic crossbreds and purebreds (dairy, beef). See also section 2.1 above.

The Ministry of Agriculture Animal Industry and Fisheries estimated the exotic/crossbred cattle population at 1.3 million, accounting for 17.3% of the total cattle population in the country (MAAIF, 2006) compared to 4.4% in 1997. Small numbers of exotic tropical beef breeds exist on commercial ranches, most notably Boran. Boran is still the most popular imported beef breed in Uganda, especially for the commercial ranching sector. The optimum proportion of genes from imported tropical breeds is different for different production systems. Commercially managed ranches are able to optimise production from animals with a higher level of imported genes than would be suitable for a traditional production system. Bonsmara are e.g. bred in Ssembeguya estates.

There is considerable conjecture about the origin of Sanga, but the common view is that they are derived from an original cross between Zebu and some hump-less cattle. The short-horned Zebu (ZSH) are predominant in the North and East of the country whereas the Sanga (Long-horned Ankole, ALH) predominate in South-western Uganda. Along the boundaries of the areas of distribution of these two types there has been considerable interbreeding leading to intermixtures which in most places has led to the emergence of fixed intermediate types such as the Nganda. It is said that Zebu cattle migrated later into tropical Africa than humpless taurine cattle and is therefore less adapted to some diseases.

The Ankole have lost favour with the dairy farmers in the South-west who now favour Friesian (Holstein) crossed with Ankole. (see Figs. 1&2 above) The Acholi, Langi, and Iteso people have a strong traditional attachment to Zebu cattle. They are low maintenance -- tolerating ticks, heat and poor feed quality. They are also used for animal traction; their humps make them easy to yoke with the simplest of yokes. However, their small size (about 200 to 250 kg) limits their work endurance, and their milk production is very poor (about 1-2 litres/day) under low-maintenance care. HPI and Send-A-Cow have been doing some

crossing with AI. A few farmers have crossed Friesian semen on Zebu cows to increase milk production (800 and 1,200 USh/liter in Gulu and Kapchorwa respectively). The DVOs reported that most of these crosses were having serious calving problems. Friesian calves tend to be large-boned. A farmer strategy in western Uganda with the Ankole cattle, which are larger than Zebus, is to severely ration feed to the cow at the end of the gestation in order to limit the size of the calf.

Constraints in breeding are lack of improved bulls, inappropriate AI services and lack of on-farm herdbooks for animal event recording (births, deaths) for remedial action by management. Due to presence of tick-borne diseases dairy crossbreeding should be restricted to a maximum of 66% HF genes except in mountain regions where 75% HF are possible (Kigezi, Rwenzoris). 100% exotic dairy genes would need zero grazing systems which are expensive and only profitable with a good milk price, cheap fodder and high annual milk performance. This is the prevalent system among the smaller milk producers with 1 to 5 cows using Napier grass, Coriander or another pasture legume.

Breeding emphasis by farmers is on genetics for milk production although the production is dual purpose milk and beef.

Natural Service and AI (See Annex 7)

During field work in Masaka, Mparare, Kihuru, Lyantonde, and Mubende Districts only natural service was found to be used on the farms visited as they had relatively large enough herds to justify keeping their own bulls. In one instance two neighbouring farmers in the Kyanamukaaka Beef Breeders Association swapped bulls when related heifers were entering the herd. The Kyanamukaaka Cattle Farmers Association is affiliated to the Uganda Meat Producers Cooperative Union (Ltd). All the bull calves were castrated by surgical means on these two farms.

Castration

It is reported that up to 70% of the bull calves are castrated throughout the country mainly by open castration as well as elasticated rings and burdizzo. But it is reported that unplanned matings are still a problem.

The castration of unselected and unwanted bulls for breeding should be encouraged through the Advisory service and extension messages broadcast on the radio services throughout the country in the proposed weekly farming programmes. Communal radio stations are prevalent and listened to throughout the country and offer a very good medium for livestock production discussion groups and dissemination of advice to livestock producers.

Bull Selection for Import

The cost of a hybrid breeding bull in Uganda is quoted at approximately 1.5 million to 2 million UGS which is a premium over beef prices. Purebred Boran bulls imported from Kenya by some ranches visited are reportedly being purchased for 5 million UGS to 7.5 million UGS (2,000 US\$ to 3,000 US\$). The investment is being made with the view to selling improved Boran breeding stock, bulls and heifers. This is a positive move to improving breeding quality for beef production in Uganda. However, while bulls are selected on the basis of subjective appraisal for functional traits such as good feet, legs and body conformation it is not clear if the Boran bulls are being procured on the basis of measured Estimated Breeding Values (EBVs) and how many functional traits are actually being measured, if any, in Kenya where most of the bulls are reportedly purchased. From desk research Kenyan breeders are essentially measuring weight for age and it is not apparent if EBVs are measured. (See Annex 6 on Estimated Breeding Value and other Breeding Topics)

2.6 FEEDS AND NUTRITION

2.6.1 Rangelands

Uganda has an abundance of grazing resources which form 44% of the total land area – 107,000 km². These grazing resources contribute nearly 98% to the feeding of ruminants which include cattle, sheep and goats and game. This abundant grazing resource has deteriorated and the once predominantly traditional pastoral grazing system has changed into agro-pastoralism. Conflicts over resource use have arisen between the indigenous pastoralists and the agro-pastoralists.

About 85% of total milk and meat marketed in Uganda come from indigenous livestock, which thrive on natural pastures in the rangelands. However, the rangeland pastures are of low quality because of poor management coupled with overgrazing and encroachment by bush or weed, drought and water shortage. The pastures are characterised by poor yields especially in the dry season. The carrying capacity of grazing lands in Uganda has never been established with certainty, although they have been estimated to range from 0.7 ha/TLU for high rainfall areas to 2.7 ha/TLU for dry areas. An unpublished 1992 estimate by Mugwera placed the carrying capacity in Ha/LU at:

- Northern Uganda = 1.42
- North west = 1.36
- North East = 3.8
- Central = 1.2
- South East = 1.5
- South West = 1.63
- Mean = 1.82.

Their assumption of one LU = 350kg. Ref: *Dry Land Husbandry in Uganda* – OSSREA 1999

Uganda's rangelands are found mainly in the "Cattle Corridor" that stretches from the North-East through Central to the South-West of the country. In addition, there are other scattered drylands areas throughout the country, especially in the North. These areas cover over 84,000 km² (approximately 1/3 of the country's total land area) and are most affected by land degradation, loss of biological diversity and adverse climate conditions. Pastoralists and agro-pastoralists occupy and derive their livelihoods mostly from rangelands, which hold 80% of the national livestock herd. Frequent and severe drought conditions in these areas increase scarcity and competition for water and pasture leading to pastoralists' mobility, increasing their exposure and vulnerability to disease and conflict, not only with the people but also with managers of Protected Areas (Wildlife Conservation Areas, Forest Reserves and wetlands).

Low pasture and range productivity is caused by:

- Irregular and uneven rainfall distribution as a result of climatic changes, resulting in seasonal fluctuation in quantity and quality of fodder resources
- Over-grazing and localised over-stocking due to uneven distribution of livestock
- Uncontrolled bush fires
- Deteriorating rangeland conditions leading to shrub and weed encroachment
- Poor management of community owned rangeland resources
- Termites are a problem and could be controlled by fungi or the aardvark (where soil is not firm as they dig large caves) but these measures are not tested or widespread in Uganda and it is unclear if it can essentially control termites.

Overgrazing, especially in Southern Uganda is frequent. Pasture improvement is a strategy for someone who has the land tenure. This includes seeding after burning, especially legumes like Desmodium, Stylosanthes and Siratro.

Rangelands are becoming increasingly fenced to reduce disease risks and overgrazing. A large perimeter ranch fence is 3 meters high and has 13 lines of barbed wire. Fences are however not respected by people and even an electrified security fence might be necessary.

Communal grazing and dipping organisation has failed and individual ownership of a dip tank is becoming more important where the herd is large enough. Smallholders do not have the capacity to invest in a plunge dip and water tank. As a result livestock productivity is low with a weaning rate of 46% as compared to 70% or more in local ranches. Droughts should be mitigated by reducing the herd size in time or by purchasing stover, by-products and possibly growing forage maize for silage

2.6.2 Bush encroachment (see Annex 21 Pasture Management and Fencing)

Lantana camara is an invasive species and has covered large areas in Uganda. It colonises new areas when its seeds are dispersed by birds. Once it reaches an area, *L. camara* spreads quickly. It coppices so well that efforts to eradicate it have failed. It is resistant to fire, and quickly grows in and colonises burnt areas. Lantana is toxic for ruminants.

The price of complete bush clearing is prohibitive with 500 US\$/ha for full bush clearance in savannah by digging out the roots. To clear a forest will cost 1000 US\$. The advice to crop two years for bush clearing is not realistic as if you crop at all you will continue to crop as it is more profitable. Cropping is a 'one-way street'.

Over-stocking and suppression of bushfires are causes of bush encroachment. Bush encroachment control aims at increasing the long-term carrying capacity of the pasture through physical, chemical or biological eradication of excessive woody biomass ("debushing"). Generally, there are not only negative but also some positive bush-grass interactions, there is an optimal density of bushes that makes for the maximum carrying capacity of the rangeland. Hence, debushing is not aimed at complete eradication of woody biomass, but at reduction of bush density down to the optimal level. As a result of debushing down to this optimal level, grass biomass production increases significantly. Woody plants are a natural part of dynamic savannah systems, with positive and negative interactions between woody and herbaceous vegetation, i.e. bushes and grass. It has been shown that below some optimal density (which depends on long-term average rainfall), bushes may have a positive impact on grass growth, while an increase of bush density above this level leads to significant suppression of green grass biomass production and, thus, the rangeland's grazing capacity for livestock.

Drought grazing reserves have to be created by deferred grazing, planting of dryland grass pastures and drought-resistant fodder crops, re-seeding with preferred grasses and increasing the herd flexibility. Bush-encroached areas have to be thinned systematically to restore the grass sward, using controlled fires to prevent re-colonisation of invader bush. Fire is an ecological factor in a savanna, as it affects woody plants, especially bush recruits (saplings), more than it affects grasses, if the fire is not sufficiently hot (see Annex 21.4 & 7) thus tilting at the grass-to-bush balance. Mature stands of bush are predominantly being controlled by hand labour and slashing with a panga, late season fire when there is sufficient heavy vegetation to generate the required heat intensity. There is also some control using mechanical, chemical and biological means, but cost is prohibitive Charcoal production, where trees are suitable, also provides a means of bush clearing with the sale of charcoal helping to recoup some of the costs (See Annex 21.6).

2.6.3 Improved forage

Forage development was part of the World Bank financed Livestock Services Project (LSP) in the 1990s. The strategy was to establish national capacity to produce pasture seeds locally by contract growers. The project registered remarkable achievements in pasture seed production. Unfortunately, by the time the project ended in June 1998, no provision for sustainable production and marketing of the seed had been created. As a result, pasture seed capacity broke down and currently the country is faced with a pasture seed shortage.

Activities would be to strengthen access to fodder machinery / equipment, strengthen pasture, seed outgrower schemes and set up on-farm demonstrations. There could be potential for export for forage seed. Lablab seed is understood to be available in sufficient quantities to include it in forage maize (see Annex 23 Table 1 and Annex 21 Availability of Seed).



Figure 6: Napier Grass and Coriander at Entebbe's NAGRIC & DB

Feeding and Nutrition

Improved fodder production is feasible. Napier grass, Lablab and Coriander are grown e.g. on the land toward the back of the Entebbe Bull Station for feeding. Maize Stover and other crop residues are also used in the winter with a protein mineral lick. The raw materials are put through a shredder and a ration mix prepared with added calcium and phosphate from shells processed around Lake Victoria.



Figure 7: Forage Shredder cutting up Maize Stover and Napier grass

In Brazil, which has become the largest beef exporter, large areas of improved pastures were established on the beef ranches. The triple combination of improved legume-based pastures, superphosphate and selected tropical cattle results in profitable increases in beef production. New, better adapted forages are selected for planting and pasture lifetime is extended and old, degraded pastures are rehabilitated. With improved and fertilized legume-grass pastures the meat yield is increased substantially by higher stocking rates, reduced time to reach slaughter weight, higher calving percentages and earlier mating of heifers.

2.6.4 Forage conservation

While there are good local grasses with high nitrogen, good hay preservation is very uncommon. In view of the needs for a building to stack hay (if no baler is used), the risk of rain during hay drying and the problem of termites which may eat the hay, silage is preferred.

In many regions, heavy termite infestations exists. Experience and studies have indicated that termites will not eat well preserved silage. It is suspected that due to the low pH of well preserved silage that the acidity may discourage termites from damaging silage. Pit silos have been filled where termites were visible on the sidewalls while filling, but no detrimental effects have been observed while the silage was being removed during the dry season.

Forage cultivation needs tractors and equipment. Ultimately oxen could be also used but the implements are not very powerful. Oxen for ploughing cannot be used on heavy soils.

Feeding Specification to Maximise Production from a Holstein Cow

The minimum crude protein required in the diet of these animals is 16% and preferably 18% and 11.5 ME with a body condition score of 3 or 4. The feed quality can be supplied in the form of the extracted by-product oil cakes where cost is not prohibitive due to price fluctuations and transport costs. It can also be supplied by Forage Maize Silage (see Annex 8 - Feeding Maize Silage) produced on farm with some protein supplementation, again in the form of Urea mixed with Molasses or a legume under sown with the Maize Silage, such as Lablab.

Note: Maize Stover is only 9 MJ per kg DM. While it can be used to maintain dry cows with a body condition score of 3 with a urea and molasses mix fed on the pasture with some grazing in the dry periods. It will not maximise the genetic potential of these animals during lactation or significantly increase body weight in dry cows, if they are thin. The urea-molasses mix will improve the Rumen Micro Flora and will increase the digestibility of the fibre and the protein content to 8 to 10%. Intercropping with Lablab in food maize and forage maize could improve Crude Protein to 10 to 14% and an inclusion of Urea will bring the effective Crude Protein to over the 16% Crude Protein necessary for milk production (see Annex 8).

2.6.5 Agro-industrial by-products

There is a lack of feeding systems that promote integrated use of natural pastures, commercial feeds and crop residues /industrial by-products to facilitate supplementation. Some by-products need treatment as they can have toxic effects as gossypol in cotton seed cake.

Large amounts of agro-industrial by-products are available but most of it is stover of low feed quality. For the higher quality by-products like molasses, cake and brewer's mash the problem of transport and storage has to be solved. These industries prefer to sell regularly and in larger quantities. The sugar factory is for example ready to sell molasses for 150 USh ex factory for quantity and forward purchasing with a contract. But the molasses depends also on the Government policy; if there is an ethanol fuel policy to replace car fuel then they will produce fuel out of molasses. Presently the molasses goes to illicit distilleries. Not much molasses is sold to Kenya due to the transport constraint. Bagasses are used by the Sugar cane factory to produce power. The following table shows agro-industrial by-products without bran assuming that bran is used for mono-gastric animals. It shows that up to 23% of cattle feed requirements can be covered by these products, depending on availability, cost of the product and the cost of transport.

Table 2.3: Available agro-industrial by-products in Uganda

Residues	Tonnes	DM	Tonnes DM	% of Total
Wet brewer's grains	52,700	0.25	13,175	0.3%
Solv. Ext. Cottonseed cake	20,246	0.88	17,816	0.4%
Solv. Ext. Groundnut	16,240	0.88	14,291	0.3%
Sesame oil cake	47,520	0.88	41,818	1.0%
Solv. Ext. Soybean Meal	109,116	0.88	96,022	2.3%
Solv. Ext. Sunflower cake	70,043	0.88	61,638	1.5%
Bagasse Sugar Cane	80,000	0.6	48,000	1.2%
Bean haulm	83,071	0.9	74,764	1.8%
Cassava peels	121,873	0.25	30,468	0.7%
Chick pea haulm	10,528	0.9	9,475	0.2%
Cow pea haulm	12,497	0.9	11,247	0.3%
Groundnut haulm	61,505	0.9	55,355	1.3%
Maize stover and cobs	1,384,662	0.9	1,246,196	30.0%
Millet straw	1,265,148	0.9	1,138,633	27.4%
Pea haulm	5,080	0.9	4,572	0.1%
Pigeon pea haulm	40,248	0.9	36,223	0.9%
Banana peels	2,132,966	0.25	533,242	12.9%
Potatoe peels	16,925	0.25	4,231	0.1%
Rice straw	36,153	0.9	32,538	0.8%
Sesame seed	84,849	0.9	76,364	1.8%
Sorghum stover	293,223	0.9	263,901	6.4%
Soybean straw	291,667	0.9	262,500	6.3%
Sweet potato vines	231,189	0.25	57,797	1.4%

Residues	Tonnes	DM	Tonnes DM	% of Total
Wheat straw	21,500	0.9	19,350	0.5%
Total Residues	6,093,084		4,149,616	100.0%
250 kg Iw/TLU	so in 365 days		18,250,000*	23%

* for 10 mill. TLU

The interest in supplementation is demonstrated in the following trial. Purebred Ankole (ANK) and its crossbreds with Boran (AXB) and Friesian (AXF) were assigned to three feeding systems (FS) to evaluate their performance for improved beef production. The bulls, averaging 191 kg live weight and 18 months of age (so about 313 g DWG up to this point), were fattened according to different systems for 120 days excluding a 28 day adaptation period: T1 (Grazing alone), T2 (Grazing + concentrate) and T3 (feedlot finishing with maize stover plus 60% concentrate fed *ad libitum*). The concentrate comprised 70% maize bran, 20% cotton seedcake and 10% molasses. Both genotype and feeding system affected growth and slaughter characteristics. The AXF crossbreds had higher average daily gain (ADG) (620 g/day) than ANK (560 g/day) and AXB (500 g/day). Average daily gain was higher in T3 (850 g/day) than in T2 (550 g/day) and T1 (270 g/day). Hot carcass weight and dressing percentage varied in a descending order of 145, 132, 110 kg and 52, 51 and 50% for T3, T2 and T1, respectively. **The results of this study indicated that the indigenous Ankole cattle have a great potential for beef production when finished in a feedlot even without crossbreeding. Question is feed cost per kg weight gain.⁶**

Feedlots

Feedlotting is attractive as the size of feedlots allows for producing large volumes of homogeneous animals; the (mostly) landless production and use of feed makes feedlots independent from seasons. The size also results in economies of scale on both the cost and return sides (better market position). The high energy content in the rations results in high weight gains and marbling (intramuscular fat), which is in demand by many consumers. Feedlots require proximity to feed supplies. As ruminants have a less favourable FCR as compared to monogastric animals only cheap feed can be used. Better feed gives superior results with pigs or broilers. **Feedlots can be used mainly for drought months as a strategic tool when cattle are cheap.**

Molasses based feedlots were for example established by GTZ in West Africa (Mokwa, Ferkessedougou) but finally failed when cheap subsidized frozen beef was imported for political reasons. The average starting weight of cattle was around 195 kg and the ages varied from 1.5 to 3 years. They were kept in open corrals allowing 4 to 5 m² space per head. In addition to free water and molasses intake each bull was offered 2–3 kg (DM) of roughage and about 2 kg of whole cotton seed including some 30 g of mineral salt per day. The roughage consisted of grass silage, Panicum hay or 3–4 hours' limited grazing on natural pasture (mainly Andropogon).

With a molasses price of 500 USh in Uganda (Source: a ranch in Mubende district) this is however not profitable as for 700g daily weight gain molasses of 3000-3500 USh is consumed. But if the feedlot is nearer to the sugar plant and buys in larger quantities (e.g. for 160 USh/kg with transport) then it is profitable if other low-cost feed is used.

The following table shows the relation between livestock selling price, feed costs and feed conversion ratio in a feedlot. In this table it is assumed that feed costs amount to 66% of total costs including margin.

⁶ From the joint research programme between the universities Makerere and Copenhagen. Search for IGMAFU – MEAT in the internet.

Table 2.4: Relation between livestock selling price, feed costs and feed conversion ratio in a feedlot

FCR (feed conversion ratio)	9	8
kg I.w., USh	2400	2400
Feed costs as % of total costs without cattle purchase costs including margin	66%	66%
Total "acceptable" feed costs per kg I.w. gain	1584	1584
"Acceptable" feed costs/kg	176	198

It is concluded that a feedlot must also profit from a quality and/or seasonal mark-up on the selling price. In Annex 12 a feedlot model is presented where this mark-up is 25% for selling with buying at 0.8 USD/kg. The buying price is not so important, what is important is the difference between buying and selling price. This model in Annex 12 is based on the feedlot model published by the Ugandan Investment Authority. However, the model of the Ugandan Investment Authority is too optimistic and the model in the Annex was substantially changed. In the following Table a sensitivity analysis was made and different parameters changed. Main factors are the price mark-up and the feed price. The sensitivity analysis includes results with cheaper forage like maize silage and pasture, etc. The FCR (9:1) and the operational costs were not changed, but it would also substantially affect the results. The operational costs will change if the feedlot has much transport tasks for purchasing (feed and cattle) and selling of cattle.

The use of hormones to increase weight gains and dressing percentage is common practice in North American feedlots, also in Australian and South Africa. The application is usually done via implants, which are administered on the day of arrival at the feedlot. In some cases, Beta2 agonists are used but not necessarily on all cattle. Among other effects, their administration to the cattle in the last 20-40 days of finishing results in a dressing percentage that is 0.5-1.0 percent higher. These measures, as well as the import of beef produced with the help of these substances, are banned in the EU; the meat imported to the EU must verifiably be produced without the use of HGP.

Approximately 85-90 percent of total costs in feedlots are animal and feed purchases. Thus, feedlots are a cash business which reacts short-term to price variations. Non protein nitrogen sources such as urea or chicken litter can be used to correct a deficiency of ammonia in the rumen fluid.

Table 2.5: Results of feedlot enterprise; sensitivity analysis

Mark-up between cattle buying and selling price	Feed price, US\$/mt	Cattle cull rate	Cattle loss rate	IRR
25%	106	10%	2%	22%
20%	106	10%	2%	11%
18%	106	10%	2%	7%
25%	120	10%	2%	12%
20%	95	10%	2%	19%
15%	95	10%	2%	8%
25%	106	15%	3%	20%

Details, see Annex 12 Tables. FCR = 9, DWG 0.7kg

The GTZ financed feedlot in Ferkessoudougou was in detail analysed⁷ and it was found that it must profit (and it profited) from a quality and/or seasonal mark-up on the selling price. Feedlots are for example common in Zambia as managed by Zambeef or by commercial farmers.

⁷ <http://www.fao.org/ag/aga/agap/frg/AHPP72/72-245.pdf> ; or: "Zur Ökonomik arbeitsteiliger Rindermast in Westafrika. Andrea Bahm". GTZ (now GIZ).

Table 2.6: Composition of ration at Ferkessedougou feedlot

Feedstuff	kg	DM kg	Dig. protein kg
Molasses	4.5	3.6	-
Roughage (grass or silage)	8.0	2.0	0.200
Cotton seed	1.0	0.9	0.150
Cotton seed cake	0.5	0.45	0.200
Total		6.95	0.550

Table 2.7: Comparison of performances before and after introduction of molasses

1.	Rainy season 1	a) natural pasture	0.300 kg average daily gain
		b) artificial pasture	0.500 " "
2.	Dry season 1	a) natural pasture	0.000 " "
		b) artificial pasture	0.100 " "
3.	Feedlot (whole yr.) 2	a) maize silage and cotton seed	0.300 " "
		b) molasses, grass silage or hay, cotton seed or dried brewers' grain	0.700 " "

1 before introduction of molasses. **2** after introduction of molasses, 6-7 kg/cattle/day (Source: FAO)

The regular supply of purchased and farm-produced feed is important for a feedlot, as is the quality of lean cattle. Cattle originating from traditional farms in dry regions may suffer from parasites and may have difficulty to withstand the high rainfall in the centre. Under these conditions only about 90 percent of the incoming fattening bulls reach a normal slaughter weight. The other 10% undergo emergency slaughter or die (about 2 percent). Under high rainfall the fattening of cattle on an earthen floor can be difficult to manage. On the other hand, the trodden mud is an excellent manure. Correctly applied on forage crops, one treated hectare supplies enough roughage for more than 10 fattening bulls throughout the year.

The feedlot can be built around a small hill on which the water storage tank is placed and cheap molasses storage is built into its slope. Feed supplies are transported by tractor and trailer and molasses can be fed by gravity by just opening a tap. Some fattening pens can be modified for the collection of liquid manure. This material goes into an attached biogas digester. The gas produced is burnt in an 18 KVA generator engine. The concrete floor is economically justified because of biogas production, but also because of better growth rates during the rainy season as the formation of mud is no longer possible.

2.6.6 Mixed concentrates

The feed industry is still underdeveloped with limited infrastructure to ensure supply of quality feed all year round. As a result the feed market is flooded with substandard feeds. Up to now there is no legal instrument to operationalise the animal feeds policy, standards or guidelines to guide stakeholders. The feed industry is however of less importance in beef farming as only cheap feed can be used in this sub-sector, and no manufactured compound feed. The only place for compound feed is in early weaning of calves in a mixed milk-beef system where by early weaning more milk can be sold thus compensating for the additional feed costs and providing an extra profit (see Annex 9 Early weaning of calves at 6 weeks).

Calf Nutrition, Feeding and Profitable Early Weaning

The number of calf deaths in cattle herds is significant. As most of the calves are produced from the dairy / dual purpose cow herd, the required calf milk intake may be reduced if it is a bull calf or if milk sale is a priority. Consequently the calf is weak and susceptible to drought and diseases such as ECF.

Even though a calf is stressed due to reduced milk intake, on all farms visited, the calf received no supplementary feed in the dry seasons or inadequate quality of feed to supply nutritional requirements at that age. The young calf up to 8 weeks requires an 18% Crude Protein ration of 11 MJ metabolisable energy with Dicalcium Phosphate added for healthy bone development. As the calf is under sunlight all the time vitamin D synthesis is not a problem. However, shade is important to reduce dehydration.

Chopped maize stover and grasses in the dry period will not supply more than 5 to 7% Crude Protein. Apart from this being insufficient protein, at this age the calf's rumen is not developed and it cannot extract protein from these fibrous feeds because the calf is essentially monogastric at this stage of development. For the same reason the feeding of Urea as a protein supplement to a non-ruminating animal is not recommended as it will cause calf deaths due to nitrate poisoning. A calf needs to be around 250 kg before Urea can be introduced to the diet to supplement protein levels.

On some farms, bull calves have been regarded as a nuisance and treated accordingly hence their losses are greater. In a system with important milk sales the reason behind farmers' attitude to bull calves is cash flow related. Farmers indicate that they want to maximise their daily earnings through the sale of milk and will only feed milk to heifer calves because they want to rear a replacement heifer or expand the cow herd. Bull calves represent a long wait for income and a drain on the farmer's scarce resources in the short term. However, as beef prices have risen, this attitude has begun to change as some farmers have begun to recognise the value of these calves to grow and fatten by fencing off 20 to 30 acre blocks of pasture as a "feedlot". The calves are being traded at about 3 to 6 months of age. Hence, the calf has still to be reared to at least 3 months of age.

Early Weaning at Six to Seven Weeks of Age

The farmers' need for improved cash flow is satisfied to a greater or lesser extent from the sale of milk to a Dairy or a Milk Retailer at prices varying from 200USh per litre to 1,200USh per litre depending on season, weather, and location. As a result there is competition between the calf's nutritional requirements and the farm gate sale of milk.

In view of this competition, the question was asked if it was commercially feasible to feed the calf on concentrate and allow the farmer wean the calf at 6 to 7 weeks of age instead of losing the calf due to inadequate feeding.

The requirements for 6 to 7 week weaning are:

- Calf sucks colostrum from the cow within 12 hours of birth or sooner to receive passive immunity imparted through the immunoglobulins which will last for several months. After 24 hours the intestinal wall or epithelium becomes impermeable to the transfer of the immunoglobulins and the advantage for calf health is lost
- A secure fenced creep area to exclude the cows while allowing the calves to have access
- A calf starter feed containing:
 - 18% crude protein
 - 11 MJ per kg of ME (see Annex 9)

- A small amount (.25 lb) of calf starter feed introduced from 3rd day of age and kept fresh. The calf will eat very little feed initially, but must be presented with feed to get him started
- Calf eating a verifiable 1.5 lbs (0.7kg) of this ration per day before weaning
- Ad lib clean water available at all times to prevent dehydration, especially important if the calf scours
- Range grasses, chopped maize stover or sugar cane residues available ad lib for roughage
- Electrolytes available (farm supply shop and veterinarian) to replace trace elements in the event of scours and for rehydration
- Continue feeding calf starter for 2 weeks after weaning to avoid the double shock of weaning and change of feed
- Feed Calf Rearer ration containing 16% crude protein to 3 months of age. After 3 months the calf will then join the main herd feeding regime (See Annex 9)
- It is recommended that the calf rations are mixed in 10kg batches on the farm to keep cost of feed down.

Advantages of 6 week weaning to the calf

- The calf rumen will develop more quickly
- The calf will be stronger and less susceptible to other challenges to health from its environment as a result of a balanced feed intake
- The calf is more likely to survive to reach maturity and sale
- Calf mortality will be expected to reduce to under 10% especially in small herds where the care for individual animals tends to be better.

Advantages of 6 week calf weaning to the farmer

- The farmer will sell all of the dam's milk from day 42 of the lactation and increase his cash flow over the remaining 228 days of the 270 day lactation after weaning at approximately 42 days (See Table 2 Annex 9)
 - The volume of extra milk sold after 42 day weaning is 1,824 litres over the remaining 228 days of the lactation
 - The value of this milk sold at 600 USh per litre is 1,094,400 USh
 - The cost of home mixed Calf Starter and Calf Rearer fed from 3 days of age to 3 months is 49,791USh
 - The estimated margin of milk sales over feed costs for the remaining 228 days of the lactation is 1,044,609 USh
 - The extra margin of extra milk sales over feed costs, if the calf would have consumed 2 litres per day and 4 litres per day from the assumed 8 litres produced per day by the dam is 223,809 USh and 497,409 USh respectively (see Annex 9).

Feed Supply Depots

For this proposed calf early weaning system at 6 weeks to work the farmer requires that the raw materials are available locally. The farmers' livestock production organisations e.g. the Cooperatives and the Associations may play a role in supplying their members with these inputs, if they invest in storage. It can also be provided by a private feed shop.

It is especially important where farmers do not have transport that input supply is localised and a Livestock Producers Cooperatives could develop supply depots for bags of by-product and molasses tanks. Storage will be required for bags of by-products and a tank for molasses in these proposed feed depots. A secure modular shed will be required of approximately 20 meters wide by 45 meters long and 4 meters to the eaves, initially. The roof should be of an A frame construction. It is recommended that these sheds should be planned and constructed with a view to expansion. Steel frame constructions clad in

galvanized sheeting should lend themselves best to future expansion should business expansion require that to happen. Brick walls to eaves will add to the security and bricks are manufactured in Uganda in local kilns where clays are suitable.

A molasses tank with a capacity to hold 20 tonnes of molasses will be required at each Cooperative Feed Depot or Private Enterprise Feed Depot. The tank will be elevated for the molasses to flow out by gravity into the receptacles that farmers bring to transport the molasses to their farms. A control valve will be required along with a flow metre, however, the molasses should be sold by weight as the density is likely to vary and the sugar cane factory sells the molasses by weight. To fill the Molasses tank, the tanker transporting the Molasses from the Sugar Cane Factory to the Depots will be required to have a pump to offload the molasses into the Storage Tank at the Depots.

The number of viable farmer associations or cooperatives interested in such a development and investment in farm input supply depots will dictate the roll out and size of such a capital development programme.

Livestock Production Extension

A Livestock Production Extension service through MAAIF or through the Livestock Producer Cooperatives will be required to advise farmers and or members on nutrition and feeding of calves and on calf welfare to cut down on calf losses to below 10% annually from in excess of 20%. The radio and written press can also be utilised. Local FM Radio coverage is available and can be utilised to offer advice on the implementation of calf rearing systems once the system is fully developed and the extension people are fully conversant with the message and the result required.

2.7 WATER MANAGEMENT AND PRESERVATION

Water supply is not evenly distributed and some districts experience water shortages during parts of the year. These are predominantly rangelands with high potential for livestock keeping. Apart from the districts of Mbarara, Rakai, Masaka and Sembabule, the other dry areas have a high potential for deep underground water. If such water sources are tapped it would help to supplement the surface water sources. Presently, due to the inadequate water supply, some cattle keepers either walk their animals long distances in search of water or practice seasonal migration. Congregation of many animals at the few watering points during the dry season leads to environmental degradation of such points and along the tracks. Cattle movements lead to propagation of diseases and reduce weight gain and meat quality.

During the rainy season a lot of water is wasted through run off and underground seepage. Of the over 900 dams and valley tanks which were built in the 1940s-70s, most have outlived their usefulness due to lack of maintenance. It is necessary for water dams that they are enclosed that cattle does not enter, which means that a drinking trough is needed with a pump for filling or by manual labour with buckets. Problem of valley dams is siltation and total wash out due to thunderstorm. Valley dam construction needs 1 week of work of a bulldozer and excavator, or only 1 day for a small one.

Following a severe drought in 1992/93, and uncontrolled livestock movements in the "cattle corridor" (Luwero to Mbarara), a Water Supply component (US\$2.1 million) was added in the WB livestock project (see Chapter 1) after the Mid Term Review (MTR - February 1994). Initially, the MAAIF proposal was to construct or rehabilitate 100 small valley dams/tanks. After the completion of a study in 1997, which concluded that it was more cost effective to build valley dams instead of tanks, a policy decision was taken to construct and rehabilitate 15 valley dams/existing tanks.

The Implementation Completion Report of the WB project states: "Since only three of the total 19 valley dams/tanks being constructed were operational at project completion, and the remaining 16 reservoirs required varying degree of work to become operational, the objectives under this component were partially achieved. Whilst the inclusion of the water supply component was compatible with the project's objectives, the implementation of the valley dams/tanks was problematic from the start. There was no prior preparation of the component's activities or detailed technical, social, economic and environmental appraisal. The only information provided by the MTR was that about 100 valley dams and tanks would be constructed and rehabilitated with the cooperation of the local communities. Following IDA's advice, and based on the results of a technical study in 1997, which showed that it would be more cost effective to build the relatively larger valley dams instead of the smaller tanks, and because of resource and time constraints, a policy decision was taken within MAAIF to construct/rehabilitate only 15 valley dams, instead of 100 tanks. This decision does not appear to have been widely discussed with the districts and the local communities, and led to the perception that funds ear-marked for valley dams were not being properly managed by MAAIF. Contracts for the 15 valley dams were awarded to two firms in September 1997, following a competitive bidding procedure, and the valley dams were to be completed by June 30, 1998. In view of the delays experienced on account of El Nino rains, and an assurance provided by MAAIF that the remaining civil works would be completed within an additional three months, IDA agreed to a final extension of the water supply component until September 30, 1998.

Following negative reporting in the press since October 1998, that questioned the existence of the valley dams and alleged possible misuse of public funds, IDA sent a special mission to the project area. Based on a visit to eleven sites in January, 1999, the IDA mission's main conclusions were that: (a) eleven valley dams and one valley tank did exist, albeit they were at different stages of construction. Because of poor planning and supervision, however, only three valley dams were functional with some defects; (b) in all cases, the possibility of water use by the local population was not adequately considered; (c) the delay in the completion of the valley dams was partly due to adverse weather conditions, but largely due to poor contract management by DAR/MAAIF."

Careful water development can help to prevent environmental damage, control nomadic pastoralism and animal health will be greatly improved and less time will be spent in search of water. Individuals, groups and local communities should be encouraged to set up watering points. Small reservoirs shall be constructed by manual communal labour. The capacities of these reservoirs is likely to be in the range of 2,000 – 5,000 m³ at an estimated cost of 10,000 USD per sub-county. Expected output of water development would be reduced animal movement and the associated environmental degradation and spread of diseases, controlled run off and associated soil erosion, improved livestock production and reduced encroachment of stock into reserve areas. Funding is also needed on the individual farm level for appropriate water harvesting, storage and use technologies.

Also in the AfDB livestock project less was done as planned. The Impact Report states: "The objective of the Project under this activity was to provide 1.96 million cubic metre of water for livestock production in the districts of the Cattle Corridor in order to overcome the scarcity of water for livestock in the dry season through construction and rehabilitation of 10 water dams and 60 valley tanks. By the time of the assessment, 8 valley dams and 2 valley tanks had been constructed with capacity of 2,400,000m³. However the Project did not achieve the targeted number of dams and tanks but achieved the volume of water above the target".

Dams as the major investment have been chosen by the AfDB livestock project over any alternative form of water investment such as valley tanks, boreholes and irrigation. In part this reflects the existence of suitably sited dams requiring rehabilitation, rather than new construction.

The comparison with other livestock water supplies is described for the various situations below:

The basic difference between a valley tank and a valley dam is that the tanks main storage capacity is obtained by excavation of the existing ground and using the excavated material to form a small embankment usually around the perimeter of about 1-2m. In contrast a valley dam is formed by building an earthfill barrier across a valley at a carefully selected, topographically suitable site. The valley dam would impound water runoff from the whole upstream natural catchment basin. The excavation for valley dams is limited only to embankment foundation, cutoff core and spillway channels. Since valley tanks do not obtain runoff from the entire catchment basin they have a limited capacity. In fact, for them to be of a material capacity it would be necessary to construct radial cutoff drainage trenches to direct runoff flow into the valley tank. But even with this enhancement, the capacity of the tank will usually be limited to depths of 2-3 metres as higher depths would make it difficult and laborious to draw off water for domestic and livestock supply. Supplying livestock from such sources is cumbersome. The method of fetching and supplying the water encourages water pollution/contamination, whereas a properly sited valley dam is able to supply water to convenient downstream locations for communal water points and livestock troughs. These locations would greatly reduce on the chances of water contamination. Dams and tanks can only be constructed on heavy soil avoiding seeping, if not plastic sheets have to be used or wells or boreholes. A water tank with the dimensions 30 x 40 x 4 m (for 2000 cattle) may cost 10,000 US\$.

Supply of water by boreholes is more expensive as it involves pumps and power systems which are difficult for the community to maintain and manage. It would need managing contributions and a fund to pay a specialist for maintenance and repair. This seems to be difficult. Besides the location of boreholes would be dependent on natural hydro-geological conditions and thus may not necessarily fit with the livestock distribution patterns. To obtain a water supply of say 5000 m³ would be more expensive than the valley tank option. However, boreholes are necessary for human water provision as its water is clean.

Farm Livestock Water Ponds: The second type of livestock water investment is in farm livestock water ponds. The justification of this type of ponds is that they would be constructed in natural sloping valleys/depressions whose efficiencies would be higher than those of valley tanks. They are formed by part excavation in the reservoir area to form an impounding embankment. In general the material obtained from the reservoir area would be technically suitable to form an impounding embankment up to a height of 4m. Since the contributing catchment basins would be relatively small the requirement for flood spillways and scour sluiceways would be minimal. In addition, their catchment basins would be within areas where communities could easily manage soil erosion. As they would be located within livestock farms/ranches they would greatly shorten the respective travel distances. The water obtained from the ponds would be of good quality suitable for human consumption. As they would be within inhabited areas they would also be quite suitable for promotion of small-scale gardens and nurseries (vegetables, horticulture, trees).

3. MARKETING AND PROCESSING

3.1 LIVESTOCK MARKETING

Transport of live animals to and from markets does not respect the international standards on animal welfare set by the OIE at section 7 (Animal Welfare) chapter 7.3 (Transport of Animals by Land) of the Terrestrial Animal Code. Lorries and trucks used for transporting live animals are also utilised for the transport of other goods. Not all livestock markets are equipped with proper loading ramps and races. Livestock projects funded by EU, ADB and other donors rehabilitated various livestock markets, establishing efficient and properly designed structures, which are in general well accepted by the livestock owners and traders.



Figure 8: Rehabilitated livestock market infrastructure

Animals admitted to market places are accompanied by collective movement permits issued by the DVO of the District of Origin. The permit is in line with the minimum requirements of OIE international standards. Only part of the animals presented to markets are identified.

2.6.1 Marketing structure

The marketing structure involves primary marketing through local cattle markets located in rural regions. Costs incurred are in form of labour for ferrying the animal and payment of token market dues. Cattle traders normally interact with farmers in rural cattle markets to procure cattle. Apart from the producer price, the traders incur transport costs to the main urban areas where the animals are slaughtered and travel expenses (feeding and accommodation). Transport costs depend on the number of cattle on a truck.

The difference between primary and secondary livestock markets is generally one of size and throughput. According to the Meat Production Master Plan (1998) there are an average of 5 primary markets in each LC3/Sub-County. No data is supplied in the Plan on the breakdown of these between purely crop/vegetable/merchandise markets and those which are also livestock markets. However it is estimated that at least one LC3 market is a livestock market, which suggests that 600-650 primary livestock markets exist in the cattle corridor. Livestock markets normally take place once every two weeks or once a month and the throughput varies between 20 and 500 or more cattle, 10 and 80 goats and 10 and 200 poultry per market day.

The markets are managed by private individuals who tender to run the market. These Lessees pay a fee and collect the market levys and care for security and cleanliness and (in principle) maintain the infrastructure. There are market fees and movement permits are issued at livestock markets. A *primary market* is generally one formed by several villages within a Parish. Local farmers buy breeding stock and traders buy animals for slaughter, which are often taken to Kampala. At the smaller markets animals, after purchase, are often driven from the market on the hoof. Traders purchase animals from several primary markets until they have sufficient to fill a lorry. A *secondary market* normally has a larger throughput than a primary market. Traders come with lorries and hope to buy a full load for immediate transportation to large centres such as Kampala. The seller is at disadvantage if he doesn't inform himself before negotiating, if there are few traders present with whom to negotiate, and if he selling under pressure in order to meet an immediate cash need.

However in Districts where there are large numbers of animals for sale and numerous traders, livestock owners are able to bargain successfully with traders to obtain a fair price. Port Masindi is an example of a market which is strategically placed to receive traders from a wide catchment area. These traders, because they do not know each other well, are less prone to collude to try to keep prices artificially low. At some livestock markets sellers appear to have quite accurate knowledge of local prices.

2.6.2 Current marketing chain for cattle

Animals are usually sold from farm gate or animal markets to middlemen who value the animals offered to them. Even though there is a sort of negotiation between the farmer and the buyer that includes assessment of the animal as a whole (age, size, weight, expected carcass weight, expected meat/bone ratio, hide, health status) **the farmer if not properly informed may be in weak position compared to the buyer who stays in contact with the abattoir and has long standing experience with the above criteria**. The farmer may be under pressure to sell his animal due to bills to be paid or the dry season ahead.

A farmer wishing to sell an animal requires a letter from the LC1 to the District Officer stating that the animal is disease free and confirming ownership. The letter allows entry to the livestock market where fees are paid. For example at Port Masindi market the seller pays U Sh 3,000 market fee. The buyer pays a loading fee of U Sh 2,000, a market fee U Sh 3,000 and may have to pay U Sh 500 for a movement permit (these are sometimes supplied free of charge).

Livestock markets exist in cattle keeping districts up to as far as the sub-county levels. In some districts, there is a livestock market in every sub-county. Some sub-counties have two livestock markets. However, all the livestock markets visited in the three districts lacked basic recommended facilities for livestock marketing such as: perimeter fencing, pens for keeping livestock, crushes for veterinary inspection of the livestock brought for sale, tick control and other veterinary treatment centres for animals that are sold to prevent spread of diseases from one area to another; weight bridges, loading ramps and water sources.

Market access by livestock producers is constrained by the following factors: selling in distress; quality of livestock offered for sale; insecurity (in few regions now only); information asymmetry and communication bottlenecks; the lack of value added to livestock products; absence of associational behaviour with regard to livestock marketing; inability to organise farmers against exploitation in the market; location and accessibility of livestock markets; poor coordination and scheduling of livestock markets; poor roads and transport infrastructure; administrative bottlenecks; limited domestic demand for livestock products; poor market infrastructure.

The system of animal trade provides no feedback to farmers in terms of meat quality. Thus prices for cattle are more or less “standardised” ranging from 600.000 UGS (before the dry season) to 1.000.000 UGS after plus a surcharge for inflation or in times of decreasing supply of animals (~200.000 UGS).

It is worth to mention that the current main marketing chain for carcasses via small butcheries with no cooler showcases (est. 5000 to 7000 selling around 130.000 tonnes per year) supports the sale of underweight cattle. The average weight for a quarter (the usual throughput for a small scaled butchery) is around 30 to 33 kg- seemingly the right quantity to be sold during a day for the majority of small scaled butchers. Since the number of road side butcheries is high compared to demand (investments in cooler showcases would extend the financial potentialities of small entrepreneurs) meat must be sold at the day of slaughter. So far the retail market structure for meat forces - at least encourages - farmers to sell animals at the desired low weight.

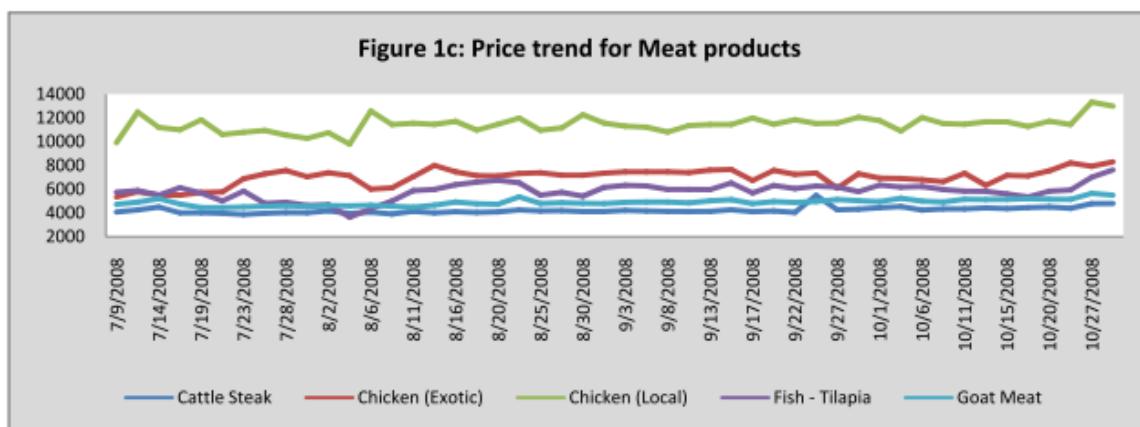
The AfDB *National Livestock Productivity Improvement Project* planned to construct and/or rehabilitate 170 cattle markets in 29 Districts. Up to beginning of 2011, 25 livestock markets and 21 slaughter slabs were rehabilitated and/or constructed.

2.6.3 Costs and returns in cattle trade

The traditional value chain starts at the farm gate when the farmer decides to sell an animal. In that case he will either bring his cattle to an animal market or call a middleman to buy the animal from the farm gate. The price for an average cattle of 300 kg life weight does not vary much in terms of quality - 600.000 UGS is a standard price before the dry season starts, 1.000.000 to 1.200.000 UGS after the dry season. Remarkably that up and down in animal prices is not reflected in ex abattoir or meat market prices.

Figure 9: Price trend for meat products 2008

(MIS Report 2008 (by FIT Uganda website). price in UGX per kg. <http://www.fituganda.com>)



Since there are only few middlemen that keep animals over the dry period (which changes their business to a part-time cattle fattening business) most of those middlemen seem to balance variations in ex farm prices by selling animals at a more expensive price before the dry season and cheaper afterwards. In other words: they increase or decrease their margin acting this way like a buffer for price variations.

Table 3.1: VCA dor sourcing animals

purchase of animal	1.000.000
loading fee at market	10.000
Transport	50.000
lairage fee	10.000
other fees & losses	10.000
total costs sourcing	1.080.000
margin /d	20.000
av price ex lairage	1.100.000
% margin for one transaction	1,9
% margin /d	0,62

Additional costs might be for waiting at the slaughterhouse and for overnight stays.

Middlemen collect animals at farm gate or animal markets and bring them by truck to bigger cities or to the capital Kampala. Costs of that transaction include the loading fee at animal markets, transportation, movement certificate from the local vet and the lairage fee at the abattoir (off-loading, marking, driving: 1000 UGS). Since bigger abattoirs and slaughter houses form a sort of a stock exchange for live stock the middleman may either hire slaughter men in order to slaughter the animal and sell the carcass or sell the animal life to a person that then deals with the slaughter business.

Table 3.2: Returns to livestock transporter for each trip from Migyera to Kampala for 20 h/c per lorry (Report published in May 2003)

Activity	Amount (USh)
TRANSPORTERS INCOME	
1. Transport to Kampala for @ h/c = 20,000/= x 20	400,000.00
TRANSPORTERS EXPENDITURES	
1. Market dues for @ h/c loaded inside the market = 5,500/= x 20	110,000.00
2. Movement permit @ head of cattle = 1,000/= x 20	20,000.00
3. Abattoir fee for @ h/c = 2,500/= x 20	50,000.00
4. Veterinary Inspection fees in Kampala per lorry = 10,000/=	10,000.00
5. Loaders/off-loaders of cattle per lorry = 30,000/=	30,000.00
6. Truck (maintenance fuel) for @ trip = 120,000/=	120,000.00
Sub-Total	
OTHER INCIDENTAL EXPENSES	
7. Traffic Police ⁸	20,000.00
8. Driver @ day = 10,000/=	10,000.00
9. Turn boy @ day = 5,000/=	5,000.00
10. Lorry cleaning	10,000.00
Sub-Total	
GRAND TOTAL	
NET PROFIT (EXPENDITURE LESS INCOME)	19,250.00

h/c = Head of cattle

⁸. The transporter has to bribe the traffic police because government issued a directive that a 20ft-4 tonne Lorry should carry only 15 h/c, but the transporter loads at least 20 h/c in order to break even

3.2 SLAUGHTER

3.2.1 Slaughter facilities - overview

Apart from abattoirs in and around Kampala there are a number of facilities in Uganda where animals are slaughtered:

a) At-the-farm slaughter

This concerns mostly emergency slaughters of sick animals. On average only 6.8 cattle are kept per holding and the valuable cattle are usually retained for sale and not home slaughtered.

b) Slaughter at village markets

Most of the animal markets at village level (held weekly or bi-weekly) provide simple facilities for slaughter of animals and offering meat for sale (slaughter slabs- mostly in the form of a concrete base with steel columns and roof). The local vet is present at market time and may provide ante and post mortem in some cases. It is also likely that he records the number of animals slaughtered and includes the figure into his reports.

c) Town slaughter slabs

Around 80% of all towns in the cattle corridor provide simple slaughter slabs and butcher stands are attached that feed the local meat market (town residents, restaurants and hotels). Even though most of the facilities provide a concrete base with steel columns and roof they are lacking drainage systems for blood and liquid waste, water supply and toilets.

d) Urban slaughter houses

Since Uganda had a more centralized administrative structure in the past with 17 district capitals those former centres are lifted out of the newly installed district centres in terms of infrastructure. Markets are held on a daily basis and a number of slaughter facilities survived the decades of internal unrest- even though only as rudiments of former pretty well organized facilities. Most of those slaughter facilities are in urgent need of renovation and up-grading to topical standards. The local veterinarian is present most of the time in those markets so that the number of animals traded and/or slaughtered is recorded and reported to central administration bodies (MoH, MAAHF).

The AfDB National Livestock Productivity Improvement Project was also involved in the field: The objective of the Project was to construct and/or rehabilitate 170 cattle markets and 100 slaughter slabs in 29 Districts. By the time of the impact assessment in 3/2011, 25 livestock markets and 21 slaughter slabs were rehabilitated and/or constructed.

e) Abattoirs in Kampala

There are three abattoirs in Kampala that feed the capital market: City Abattoir (KCC), Ugandan Meat Packers Ltd. (UMI) and Nsooba Slaughterhouse Ltd. While KCC and UMI deserve the name "abattoir" due to their constructional and technical concept Nsooba is more or less a provisional arrangement causing high risks for the health of employees and food safety of carcasses. However meat inspection is carried out in all Kampala abattoirs even though with different approach and care. Only UMI provides records on number of animals slaughtered and results of *post mortems*.

A unique example in the region and perhaps the continent, Ugandan slaughterhouses – in particular the Kampala City Abattoir - serves also as an animal market place. Live animals destined to slaughter can be sold when they are still on the truck to another trader/middle man who offload them and keep them in the holding facilities waiting for a butcher or another middle-man to buy them. It was reported that some animals are re-loaded on trucks and taken away for farm breeding. A high percentage of the animals presented for slaughtering

(between 60 and 80%) are females, 30% of which are pregnant. However the NORAD carcass weight study did not confirm this phenomenon and it might be a seasonal one.

Transport of animals destined to slaughter is done by non-specialised lorries and trucks which are also used to transport other agricultural commodities. Ante mortem inspection procedures are based upon control of accompanying documents and a quite superficial mass examination. Animals brought to the slaughterhouse are usually in acceptable health conditions.

In case animals with suspicious health condition are detected, they are examined more carefully by the veterinary inspectors, but are neither separated from other animals nor slaughtered at the end of the slaughter shift. On the contrary, in case the trader/butcher brings a suspicious animal to the abattoir, he tends to slaughter it at the very beginning of the slaughter shift, well before the veterinary inspectors arrive. This practice is very risky in case of animals carrying contagious diseases potentially harmful for public health.

Diseases most frequently detected are fascioliasis, tuberculosis, cysticercosis, CBPP and lesions linked to Brucella Spp. infections. Symptoms of brucellosis have been reported also in abattoirs workers, which have been tested serologically giving positive results. Records of lesions detected and diseases found are not updated.

The post mortem inspection is quite superficial and carried out in a hurry, as veterinary inspectors are pressed by the butchers and traders, which are always on the slaughter scene.



Figure 10: Post mortem inspection

3.2.2 Slaughter slabs and slaughterhouses

Slaughter slabs and slaughter houses exist in all districts erected in most of the cases many decades ago with few exceptions (e.g. the Moroto slaughter house). All of them operate under a PPP business model which means that the municipality remains the owner that leases the facilities to a group of private entrepreneurs, usually a group of middleman.

Throughput of a typical town slaughterhouses such as Mbarara Municipal Slaughterhouse is a maximum of 50 cattle per day with an average throughput of 12-15 head per day. Small stock, mainly goats, range from 1-3 head per day. Often butchers are also traders. Blood is collected, cooked and sold for about 250 UGS per kg, burnt horn ash for UGS per kg. There is an incinerator for condemned carcasses. At Municipal slaughter houses meat is inspected for foot & mouth disease, liver fluke and septicemia, though few animals are condemned.

The running of slaughter houses and slabs is put out to tender. The successful lessee charges a fee, typically 4.500 UGS for cattle.

Due to the weak enforcement of law this operating model suffers from investment backlog - both parties in the PPP place responsibilities on each other for necessary investments. And both parties claim to have no financial resources left for improvements which might be true in the case of municipalities. In the case of slaughter slabs/ slaughter houses operators they simply failed to make transfers to reserves. This unsatisfactory situation led to the fact that the overwhelming majority of slaughter slabs and slaughter houses are in poor technical condition:

- Uneven, damaged and slippery floor with many cracks, hard to clean and to disinfect
- Corroded black metal constructions
- Slaughter bay open with no walls to prevent from insects, rodents and dust
- Partly no water supply
- Insufficient drainage system for blood
- No toilets for slaughter men and personnel
- No office for the veterinarian to do necessary desk work (reporting, certificates)
- No weighing bridges for animals in order to make marketing of cattle more transparent.

In addition the missing enforcement of food safety laws and regulations - which are presently under review - does not support the veterinarian on site in his work and his authority. This situation leads also to a certain degree of frustration among meat inspectors. Following they fail to precisely report the number of animals slaughtered and discovered diseases to the next administrative level causing the weak data base available for the decision making process on central level (MAAHF).

The following measures and interventions are proposed in order to achieve improved technical conditions, transparent marketing system for animals and data collection system:

1. Improving the hygienic slaughter of livestock by constructing or rehabilitating slaughter slabs and slaughter houses at sub-county and county level where piped water is available by reconstructing slaughter floors and protecting walls around the facilities, constructing simple toilets and work space for meat inspectors
2. Training for meat inspectors in ante and post mortem inspection
3. Commencing the introduction of a national cattle grading system by installing weighbridges at 10 major facilities and by using weigh-bands at smaller ones so that both buyers and sellers are working from the same information base
4. Providing training for meat inspectors and administrative personnel on the importance of data collection in slaughter facilities and improved data compilation systems

3.2.3 Abattoirs

There are three abattoirs in and around Kampala with different business models, sizes, throughput and technical status, plus one modern abattoir in Soroti that is not operational even though it is in good shape in terms of layout, conditions of the building etc.

Table 3.3: National abattoirs Uganda - overview

National abattoirs	Installed capacity (est., hd)	Daily throughput	Business model	Technical and hygiene status
City Abattoir Ltd., Kampala (KCC)	100-150	250-300	Service slaughter	Overstrained, hygienic risky
UMI Ltd., Kampala	150-200	3-5	Commercial slaughter and meat processing	Underutilized, basic hygiene standard
Nsooba Slaughterhouse Ltd., Kampala	50 est.	150-200	Service slaughter	Overstrained, hygienic dangerous
Soroti Meat Packers Ltd., Soroti	Nn	Nn	Slaughter, processing, canning	Not operational, building fit for further use

Uganda, in particular the capital Kampala, had a number of slaughter facilities in the past that met international standards at the time of construction. In particular the two facilities at Old Portbell Rd., Kampala - the City Abattoir (KCC; constructed 1946) and the UMI abattoir (1964) - were more or less modern standard abattoirs at the time of construction. In particular UMI meets still basic requirements for meat hygiene: plain floor and walls, overhead electric conveyor, top-down hide remover, platforms for slaughter men, scales both for live animals and carcasses, cooler and freezers, ramp for trucks etc.

Apparently there were no major investments after starting operations in KCC abattoir. Given the enormous increase in population for Kampala from 46.000 inhabitants in 1959 to currently 1.5 mio (est.) the KCC Abattoir is now used far above its installed capacities (around 200 to 300%, up to 300 animals/d).

Table 3.4: Kampala population 1959-2008

Year	Inhabitants
1959	46.000
1969	330.700
1980	458.503
1991	774.241
2002	1.208.544
2005 est	1.353.236
2008 est	1.420.000

In contrast the UMI abattoir is used less than 5% of capacities (installed cap. 150-200 animals/d) due to mismanagement. Stakeholders that used UMI abattoir as a service abattoir founded the third important abattoir in Kampala: Nsooba Slaughterhouse Ltd. Nsooba abattoir is located at the outskirts of Kampala surrounded by slums. All facilities from lairage to slaughter bay do not meet even basic requirements for animal welfare, meat inspection and food hygiene. The daily throughput is estimated to be up to 200 animals (no records available from vet service at site).

This extensive usage of existing capacities in KCC City Abattoir combined with a waste of high value capacities and a lack of investments and renovations over a period of 50 to 60 years led to the current situation where the City Abattoir (in the ownership of the municipality leased to a group of stakeholders) is no longer a hygienic place where meat becomes well inspected and being a place for safe food - it's the contrary. The City Abattoir is now used as

service slaughter house were slaughter of animals and handling of carcasses and by-products is done under very cramped conditions leaving no space for basic requirements of meat hygiene (e.g. division into clean and unclean area, non-intersecting handling of carcasses and by-products, personal hygiene of workers and visitors, ante and post mortem according international standards, proper cleaning of surfaces, separation of condemned meat etc.).

The history and present situation at UMI abattoir is rather different from that in City Abattoir: UMI was constructed and designed as a commercial abattoir still meeting basic hygiene standards even today in the 21st century. The abattoir operated as commercial enterprise until 2005 on a profitable basis (in particular the processing department that traded under the name "Top Cuts") when ownership changed and the facilities were rented to entrepreneurs new to the trade and/or with other intentions than to use the facilities for commercial purposes. Stakeholders that had used UMI for their business (both commercial slaughter and service slaughter) moved out of the place and founded a new slaughter enterprise- Nsooba Slaughterhouse Ltd. Currently the abattoir is not profitable anymore and is probably subsidized by the new user.

As mentioned above: the third abattoir in Kampala is Nsooba Slaughterhouse Ltd. located at the outskirts of Kampala. The facilities do not meet the most basic requirements for animal and human welfare, slaughter hygiene, meat inspection and food safety. The only allowance done for industrial slaughter is a two room slaughterhouse with solid walls, wooden roof construction and water supply. The daily throughput is- depending on season and day of the week- up to 200 animals. All operations (bleeding, de-hiding, chest opening, gutting) are done on the floor, splitting the carcass is done on a wooden frame, meat inspection the same. The abattoir creates a remarkable risk for food safety in and around Kampala and has certainly no place in a future nationwide set-up for safe slaughterhouses and abattoirs.

One specific feature is worth mentioning when it comes to developing a national abattoir scheme for Uganda and its general set-up: the Islamic halal bleeding rite. Even though Uganda is a country with a Muslim minority of around 12% of the total population there is strong influence from their nutrition habits to general national nutrition habits - a phenomenon recognised in Europe also, e.g. at the Serbian-Kosovo border and the domestic regions North and South of it. That influence leads to a preference of halal slaughtered meat even from the side of other religious groups e.g. Christians. The pragmatic consequence for Uganda is that all slaughterhouse operations have to follow that rite - possibly one reason for UMI's failure to keep customers for the slaughter business. UMI's slaughter bay does not allow for halal killing of animals and would need an investment of around 200,000 EUR to adapt its facilities to halal requirements (bleeding place outside under a roof with water supply and drainage system, opening the wall at the stunning box side). On the other hand: EU rules strictly require for stunning animals prior to bleeding. Even though it is possible from the technological point of view to practice both systems in one place entrepreneurs in the meat business should be aware of the domestic and international market expectations.

Even though service abattoirs should have their place in a multi-level national abattoir scheme to be developed (with simple slaughter slabs in smaller districts, slaughter houses in higher populated districts and towns, abattoirs for the domestic market in regions with high animal density - e.g. Western Uganda around Mbarara - or high demand for meat - e.g. in and around Kampala - and finally for exports to neighbouring countries, Middle East or Europe) they have no potential anymore for the requirements of a modern market oriented meat industry in the country due to the fact that they create a high financial burden for the municipalities. The Kampala municipality was aware of that and rented the facilities to a group of stakeholders, a model that needs strict enforcement of food laws and technical standards afterwards, otherwise the new operator avoids necessary investments and observance of hygiene standards.

3.2.4 Abattoir costs and margins

The slaughter business has the following actors:

- The halal butcher, who bleeds the animal according Muslim rite and is certificated by the local Muslim Authority (fee: 5000 UGS)
- The slaughter brigade, that removes the skin, head incl. horns and hoofs, brings the animal up to the overhead rail (if any), removes the rumen and intestines and splits the carcass (fee: 2 kg of meat from the neck and the flank)
- The veterinarian who inspects carcass and intestines (both red and white ones; no formal fee, but up to 0,5 kg of meat)
- The brigades that buy and treat hide, head, horns, hoofs and intestines (see table below).

Table 3.5: Prices for by-products

	UGS/ piece resp. Set
Head	30000
Hoves	14000
Hide	69000
Offal	150000
Total	263000

In any case the middleman's business is complete within 2 to 3 days from the day he was buying the animal. The margin for him is around 3% for the sourcing job and 24 % for the slaughter deal including offal and by-products - around 274,000 USh per animal in absolute figures.

Table 3.6: VCA for slaughter at service abattoirs

purchase of slaughter animal	1.100.000
meat inspection	0
slaughter fee	15.000
man power	1.000
halal slaughter	5.000
other costs	5.000
total costs slaughter	1.126.000
revenues from by-products	-263.000
margin/d	11.000
av price ex abattoir incl offal	1.400.000
% margin /d	0,98

Carcasses are bought by butchers (owners of small butcher shops or road side butchers) and transported to their premises using transport service men with *bodas* or pick-up cars.

Table 3.7: VCA for small butchers

purchase of carcass excl offal	1.137.500
meat transportation	20.000
shop attendant	5.000
rent/d	20.000
packaging materials	500
utilities Water, electr)	1.000
License	160
misc.	1.000
total retail costs	1.185.160
margin /d	214.840
av retail price butcherie	1.400.000
% margin /d	18,13

In contrast to that traditional value chain that favours the middleman with regards to transaction margins and puts the farmer at a disadvantage a commercial slaughterhouse reduces the margin in favour of its supplier due to savings in transportation costs and unnecessary costs for police clearance, guards at lairages and slaughter bay, special fees for halal slaughter etc. The table hereunder is based on the assumption that the commercial abattoir buys animals at 10% higher prices due to improved quality of meat and on a payback period of 10 years. Shorter payback periods would decrease cross margins significantly.

Table 3.8: VCA for commercial abattoirs

purchase of animals	110.000.000
transport	3.000.000
meat inspection	0
running costs	5.250.000
investment costs	5.750.000
man power	7.000.000
total costs slaughter	131.000.000
revenues offal	-26.300.000
margin abattoir	15.300.000
price ex abattoir	120.000.000
% margin /d	11,68

Due to the small margin of slaughter operations a future abattoir should be combined with a processing department for packaged retail cuts, sausages, minced beef etc. The table hereunder provides a cross margin calculation for a 2.7 tonnes per day production.

Table 3.9: VCA for meat processing

purchase of carcasses	18.000.000
transport	0
man power	909.900
running costs	4.050.000
investment costs	1.379.700
Total processing costs	24.339.600
margin processing	5.360.400
price ex factory	29.700.000
% margin /d	22,02

Potential investors should be aware that the market segment for premium beef products and its expected growth rates do not allow for bigger processing capacities and that the processing company must find her own distribution channel in competition to existing ones used by the market leader *Fresh Cuts* and others.

3.3 PROCESSING

Uganda's meat processing industry consists currently (due to the marginalised market share of UMI/Top Cuts for the domestic market) in the main of one company dominating the market for packaged retail cuts and processed beef: "Quality Cuts/ Fresh Cuts". The company runs a meat processing plant around 25 km away from Kampala at Entebbe road. The company offers the full range of meat products (both from beef and pork, small quantities of poultry meat): prime cuts, retail cuts plastic packed, sausages (hot dogs, boiled sausages), ham, minced meat both frozen and fresh etc. With a daily throughput of 22 tonnes fresh meat (15 tonnes of beef; 7 tonnes of pork) the company covers around 85% of Kampala's processed meat market (premium butcher stands in supermarkets with refrigerated showcases).

"Quality Cuts" supplies also a number of butcher shops in the districts with their products. The two company brands mentioned above belong to the same legal entity: "Quality Cuts" is the brand for the domestic Ugandan market while "Fresh Cuts" delivers meat to the UN troops in DRC and Sudan on a contractual basis. The quantity exported that way accounts for 50% of the total quantity of meat processed by the company.

Even though much smaller by market share and throughput there are two competitors for "Fresh Cuts": "Sausage King" and "Your Choice" with estimated daily production of 300 to 500 kg of minced beef, beef sausages and pork sausages. The two companies use the same market channel like "Quality Cuts"- supermarkets with deep freezers, but without own outlets or butcher stands.

Sub-sector snap-shot "Fresh Cuts"

The company "Fresh Cuts/Quality Cuts" was founded in 2006 by Stephan Dyuck from Belgium as a meat processing company. Currently the daily throughput is 15 to of beef and 7 to of pork. The company employs 80 workers that work in one shift of up to 10h 6 days per week depending on the workload. The establishment produces a wide range of meat products- from prime cuts and packaged retail cuts to sausages (hot dogs, boiled sausages, raw smoked sausages) and ham.

The company owns their own fattening farm which supplies the company with 50 animals per month, most of them cows. The second supply chain is through contracted farmers which sell their animals to traders, who let them slaughter and sell the carcasses to the company. The third supply chain is the Kampala carcass market (traders that buy carcasses from City Abattoir or other slaughter places) from which the company buys on a day to day basis.

"Fresh Cuts" and "Quality Cuts" are two brands of one company. While "Quality Cuts" supplies the domestic market in Uganda "Fresh Cuts" delivers the UN troops in DRC and Southern Sudan and Somalia based on a contract with them. The company feeds up 50% of their output to the domestic market in the form of prime cuts, retail cuts and processed meat (minced meat, sausages, ham) of which 85% goes to Kampala butcher shops (e.g. NAKUMATT, UCHUMI) and 15% to shops all over the country. The remaining 50% of throughput is to supply the UN troops.

Most of the carcasses processed are slaughtered in UMI Abattoir including the ones that are destined to feed the UN troops abroad. The UN authorities are aware of general weak hygienic conditions in Kampala abattoirs but accepted the supplies sourcing from UMI facilities due to the fact that UMI provides basic hygiene conditions and that there is no

alternative for sourcing meat products except to import beef from other countries at much higher transportation costs.

To prevent from a too high bacterial contamination "Fresh Cuts" treats all carcasses at the reception point with lactic acid (E270) in order to reduce the total plate count. Contact tests of carcasses and surfaces of processing equipment are made weekly and send to an external laboratory for analysis.

The company estimates its own domestic market share for processed products and packaged meat as of 80%, the rest is covered by "Sausage King" and "Your Choice". The products are distributed through 7 own shops, through butcher stands in all Ugandan supermarkets (ranging from urban shopping mall supermarkets to smaller food shops in district capitals), hotels and restaurants and –with a growing demand- through street side BBQ stands (the latter with quantities of 2,5-3 tonnes/day).

The company is certified against ISO 22000 which includes also a HACCP system. Product quality is supervised by a specific employed person. The facilities are of EU standard and utilised near to 100%.

According to the management represented by the production manager the biggest problem for the company is the shortage of high quality raw material. Even though the company uses its own resources the average carcass weight is between 125-130 kg. The company feeds the Kampala beef meat market with 30 t/week but is facing a much higher demand that can't be satisfied yet.

3.4 RETAIL SECTOR

3.4.1 Per capita consumption of beef

According to the 1992/93 National Household Survey, the per capita consumption of beef in rural areas is about half that found in urban areas. According to the same survey the consumer preference is for beef and goat meat.

Table 3.10: Per capita consumption of animal products

Product	Urban Consumption	Rural Consumption	Price Elasticity of demand
Milk (lt)	31.52	22.43	0.58
Beef (kg)	9.04	6.05	1.01
Goat and Mutton (kg)	0.83	0.85	1.01
Chicken (kg)	1.89	1.76	0.62
Eggs (kg)	18.72	7.37	0.50
Fish (kg)	15.79	8.90	0.86

Source: MPED (1991): Household Budget Survey. 1989/90. Cited by "Uganda's Livestock Industry"

Table 3.11: Per Capita Meat Consumption (kg)

<u>Species</u>	<u>Total no. Slaughtered</u>	<u>Equivalent Weight of Carcass (tonnes)</u>	<u>Full "Carcass" Weight (kg)</u>	<u>Human Population</u>	<u>Per Capita Consumption (kg)</u>
Beef	2,084,000	312,580	150	35,000,000	6.3
Pigs	1,885,000	113,100	60	35,000,000	3.2
Goat	2,750,000	32,100	11.7	35,000,000	0.9
Sheep	648,000	9,072	14	35,000,000	0.3

Poultry	37,500,000	48,750	1.3	35,000,000	1.4
Total		332,622			12.1

Ref: FAO Stat 2010 figures, except for beef, own calculation. Note: FAO calculates carcass weight and not meat without bones.

* UBOS 2008 figure +4% per year: ** 92% traditional cattle with 0.357 cattle sold per cow and year and 8% crossbred cattle with 0.67 cattle sold per cow and year. The traditional cattle is calculated from the two systems presented in Annex12, 2/3 with 34% offtake/cow and year, 1/3 with 39% offtake/cow/yr. For beef 70% of carcass weight was taken.

There are different approaches to determine the actual per capita meat consumption, either from the primary production side (minus exports plus imports), or from the slaughter statistics, or from the consumer side according to a household survey. The consumption is relatively low as shown by the table below. This table uses the figures from FAOStat but for beef it is derived from an own calculation. It corresponds approximately to the results of the 1989/90 household survey if we assume a slight annual increase. The 1989/90 household survey found 9kg urban beef consumption and 6 kg rural beef consumption. Slaughter statistics might be incomplete as not all slaughters are statistically captured.

3.4.2 The market for beef

The official market for beef meat in Kampala accounts for around 15.500 tonnes per year based on figures for animals slaughtered provided by veterinarians from KCC, UMI and Nsooba. The market for premium processed beef products is estimated to be around 2500 tonnes per year based on information from the market leader *Quality Cuts* who covers around 85% of the premium beef market in Kampala. So far the premium segment of the market is estimated to be around 16% of the total inspected market. That percentage may increase over the next five to ten years due to increase in population of around 3.4% per year and based on a predicted growth rate for GDP of around 6% per year. The forecast for the Kampala premium beef market could be assumed to be above 3300 tonnes in 2017. The gap in forecasted demand of 800 tonnes leaves space for an additional daily production of around 2.5 tonnes of premium beef products.

The market for premium processed beef products is estimated to be around 2500 tonnes per year based on information from the market leader *Quality Cuts* who covers around 85% of the premium beef market in Kampala. So far the premium segment of the market is estimated to be around 16% of the total inspected market. That percentage may increase over the next five to ten years due to increase in population of around 3.4% per year. Based on a predicted growth rate for GDP of around 2.9% per year, the probable rate of increase in per capita demand is around 7% for beef meat, 5% for chicken and 3% for pork, assuming that the price of meat relative to other commodities remains stable. That said the forecast for the Kampala premium beef market could be assumed to be above 3300 tonnes in 2017. The gap in forecasted demand of 800 tonnes leaves space for an additional daily production of around 2.5 tonnes of premium beef products. Other quality markets are: Hotels, some restaurants, some institutions like hospitals, oil exploration with 5000 workers. About 50 hotels look also for quality meat.

In the next years, majority of consumers will continue to demand relatively low-value minimally processed food items, as the average per-capita income will not allow the typical household to shift his consumption towards high-value livestock products which satisfy high-income countries' safety and quality attributes. For example, in Kenya, where supermarkets have penetrated the market more than in any other sub-Saharan African country (with the exception of South Africa and, perhaps, Zambia), supermarkets are selling high quality food stuff held worth less than 2 percent of the national urban fresh produce market in late 2003. To reach a 10 percent market share in 10 years, they should grow 22 percent per year in real terms.

3.4.3 Road side butcheries

With an estimated 5000 to 7000 so called road side butcheries (small butcheries) and an estimated throughput of 130,000 tonnes of beef carcasses per year equal to 75% of meat sold - that type of distribution channel for meat forms the back bone of Uganda's red meat supply chain. Even though almost all of the butcher shops of that type show remarkable deficits in basic meat hygiene it is likely that they will remain the main source for meat purchases over the next two decades. They are therefore worth consideration when it comes to investments and interventions in the value chain.

The usual business model for small butchers is based on an estimated throughput of one to two quarters of a cattle carcass per day. This limitation is due to the absence of coolers or cooler showcases forcing the butcher to sell meat the same day it was harvested at the slaughter house or abattoir.

The butchers in Kampala buy their meat from traders at the slaughter houses and abattoirs or buy animals and let them slaughter. Due to the absence of any refrigeration in roadside and small scaled butcheries the butchers prefer (in cases where they slaughter animals) light weight animals that can be sold during one day without keeping meat overnight. Alternatively the butchers buy only one quarter of an animal for their purposes. The meat is bought early in the morning, brought to the shop by small motorbikes with wooden boxes for the carcass and cut in prime cuts to be displayed. The costumer chooses the part of the meat he wants to buy that is then packed in plastic bags.

The butcher shop is leased in most of the cases from a third person (landlord) that makes renovation and up-grading of facilities (e.g. water supply, electricity, tiled walls and floor) more complicated because the butcher himself is not responsible for the constructional conditions of his shop. The prices for base products are given below.

Table 3.12: Prices for meat cuts at road side butcheries

Product	UGS/kg
meat (hind quarter)	8000
Fillet	15000
Liver	12000
Intestines	5000

In the case of butcher stands at animal markets in districts, butchers offer all products including intestines at the same price e.g. 7000 USh in Mubende animal market.

The main hygienic deficits of small scale butcheries originate from the lack of cooler facilities (cooler showcases or freezers for meat that is not sold during the day) and from unhygienic handling of meat. In particular the butcher blocks commonly used in small butcheries are causing the spread of bacteria and contaminants due to soft wood being used for chopping the meat for the consumer. Hardwood blocks are widely unknown among road side butchers and too expensive for that type of small scale entrepreneur.

Interventions/Investments:

- A) Improving meat hygiene by investing in hard wood butcher blocks
- B) Improving turnover and profitability by investing in small scale cooler showcases
- C) Improving meat hygiene by investing in hygiene training for butchers (GHP, GMP, HACCP).

3.4.4 Modern butcheries

In contrast to the enormous number of road side butcheries the number of modern butcheries is rather small for Kampala and almost zero in districts. However there are few modern butcheries equipped with cooler showcases, freezer, hardwood block, electric mincer and multi-purpose delivery vans - the latter with no refrigerator. Those modern butchers are aware of quality and hygiene requirements and buy their carcasses from the UMI abattoir which is able to provide a minimum of food safety standards to the client.

In times when UMI/Top Cuts was fully operational the company supplied a number of butcheries in Kampala city at Dewington Rd. and other places. Since rental fees went up to 3,000.000 UGS for a shop of 30 sqm those butcheries gave up or moved to places outside the city centre where rental fees are around 600,000 UGS for the same store.

Modern butcheries follow a different business model than road side butchers: they use modern standard equipment for their production and are able to keep meat for a period of time under safe conditions (freezers) balancing this way gaps in carcass supply and/or demand. Modern butchers supply private consumers with slightly higher available income for meat and awareness for food safety issues and additionally a number of restaurants, hotels, canteens etc. - the latter using the delivery service by van. The weak point for them is the interruption in cold chain when delivering chilled meat to consumers. Prices for a modern butchery are given below (USh/kg).

Table 3.13: Prices for meat cuts at modern butcheries

Fillet	16000
Minced meat	10000
Oxtail	7000
Roastbeef	13500
Liver	10000
Feet /pc.	6000

Interventions/Investments:

- A) Improving cold chain by investing in cooler equipment for existing delivery vans or in special cooler vans
- B) Improving meat hygiene in investing in hygiene training for butchers (GHP, GMP, HACCP)
- C) Improving turnover and profitability by investing in basic management and marketing training and food safety training (GHP, GMP, HACCP).

3.4.5 Supermarket butcher stands

Kampala accommodates a number of shopping malls and large super markets constructed and equipped according to international standards: SHOPRITE, OASIS (with Uchumi super market), NAKUMAT and KASUMBA Square Mall. All malls accommodate supermarkets of around 1500 sqm with European style butcher stands - equipped with cooler show cases, fully equipped butchery in the rear - in the case of SHOPRITE with a glass wall for better transparency of the meat preparation. All stands offer the full range of retail cuts plus a number of imported products (Italian salami and ham specialties).

Prizes for processed meat in supermarkets don't vary much due to the strong market position of the leading processing company "Quality Cuts" that supplies the same type of consumer: urban population with formal and higher education and consequently with a higher income. That said the price level is more than 50% higher for beef fillet and more than 100% for roast beef compared to fillet/ hind quarter from road side butcheries.

The consumer with a higher income available for the purchase of food prefers obviously meat that is offered in a hygienic and attractive way, ready-made for the kitchen in urban households, with a broad variety of retail cuts on offer and is apparently able and willing to pay much higher prices for that type of product. Additionally the very hygienic butcher stands give the impression of hygienic harvested safe meat - in fact a fiction given that at least a portion of the meat was harvested at the same place where road side butchers buy their carcasses - the City Abattoir, Old Portbell Rd.

Table 3.14: Prices for retail cuts and processed meat at supermarkets

Supermarket NAKUMATT			
butchers stand, fresh meat	UGS/kg	Freezer	UGS/kg
chicken fillet	26400	chicken sausages	22000
pork shops with fillet	24000	frozen chicken	13800
pork roast	24000	chick fillet	13200
beef fillet	22800	wings and breast	12500
roast veal	20900	minced beef	11300
pork shops	19900	beef sausages	10500
pork suckler	19000	pork sausages	8900
pork minced	17400	chicken liver	5000
roast beef	17000		
pork shin	17000		
beef chops	16000		
beef steak 1st qu	16000		
Drumsticks	15200		
t-bone steak	15000		
whole chicken	14400		
chicken legs	14400		
chicken wings	12500		
minced beef (best seller)	12000		
beef shin	10000		

Table 3.15: Retail prices

Supermarket UCHUMI	
butchers stand, fresh meat	UGS/kg
ital. breasola (beef ham, imported)	100000
ital. Salami (imported)	60000
ital coppa (pork ham, imported)	60000
indian chicken fillet marinated	35800
english bacon	35000
garlic salam	35000
roasted chicken	35000
american steak marinated	33000
chicken roast	32000
roasted pork	30000
madagascan lamb shops marinated	23300

pork sausage	22900
lambs cutlet	19200
goat cutlets	19200
spare ribs	18500
veal blanket	17500
goat ragout	17200
lamb mince	16800
short ribs	12000

Table 3.16: Retail prices

Supermarket SHOPRITE	
Butcherie, packed meat, light cooler	UGS/kg
beef fillet	19900
beef schnitzel	15000
Rumpsteak	14900
holland steak	14900
minute steak	14900
beef roast	14500
soft beef stew	13900
beef gulash	12900
Clubsteak	12500
T-Bone	12500
Oxtail	10500
short rib	9900
Leg	9600
beef blade	9500
Neck	9500

Prices for beef fillet range from 19900 to 22800 UGS indicating a flexibility of 14% for the supermarket segment. The price for frozen minced beef is slightly lower than for fresh minced beef indicating a customer preference for fresh meat instead of frozen products. Moreover the temperature inside freezers suffers from power interruptions leading to the fact that in many cases frozen products are offered in "soft status" indicating the core temperature being above standard (usually -10°C).

The tables above show also an impressive margin for convenience products like marinated meat. For instance prices for marinated chicken meat are 35% higher than for a comparable product without marinade like chicken fillet.

According to the operators of butcher stands in supermarkets minced beef is the *best seller* among beef products indicating that there is number of consumers that are aware of meat hygiene items, in particular in connection to minced meat from road side butchers. Minced beef is obviously the "cash cow" for operators attracting consumers to buy from supermarkets. The price of 12.000 UGS is probably the level from which on customers switch from butcheries without refrigerator to more hygienic establishments. The difference of around 4000 UGS (compared to road side butcheries) is sort of a "safe-meat-surplus" the consumer is willing to pay.

Current meat prices are about 480% of those 11 years ago, or 360% on a US\$ basis (2001: 2500 UGX/kg; 2012 12.000 UGX/kg - see table below)

Table 3.17: Average beef prices 2001 -2004

Table of average beef prices from 2001 (Kgs)

Item	2001	2002	2003	2004
Beef	2,200	2,500	2,500	2,500
Goat meat	2,500	2,700	2,500	2,800
Pork	2,000	2,200	2,500	2,500

Source: UBPA, 2005

3.4.6 Exports and By-products

Exports are limited because of the prevalence of diseases, lack of an export-standard abattoir and the high demand of the national market (see details in Annex 11).

By-products like hides and skins, horns, hooves, intestines etc. form a remarkable part of the farm-to-fork meat value chain - they form the so called fifth quarter for the slaughter business (see Annex 11).

4. SERVICE PROVISION

4.1 ANIMAL HEALTH

Uganda's Veterinary Services are under the authority of the Directorate of Animal Resources (DAR) of the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). The main functional units of the Veterinary Services are the Department of Livestock Health and Entomology (DLHE), the National Animal Diseases Diagnostic and Epidemiological Centre (NADDEC), the Coordinating Office for the Control of Trypanosmosis in Uganda (COCTU) and the Uganda Wildlife Authority. At District level, the main functional units include the District Veterinary Office (DVO) Services (district departments of MAAIF).

During the last five years several studies and surveys relevant to the animal health sector have been carried out in Uganda. Among the most important are:

- National Development Plan 2010/11 – 2014/15
- Agricultural Sector Development Strategy and Investment Plan 2010/11 – 2014/15
- Animal Health Master plan (2010)
- OIE PVS National Veterinary Services Evaluation Report (2007)
- OIE PVS Gap Analysis Report (2011)
- OIE Cost of national prevention systems for animal diseases and zoonoses in developing and transition countries (2009)
- Several studies on epidemiology of different TADs and zoonoses.

The above studies give a clear and detailed picture of the current status of veterinary services and the measures to take to make them perform better, comply with the standards set by the OIE and contribute actively to the development of a lucrative and sustainable livestock sector, including the beef value chain. The main conclusions of the studies listed above are summarised in the first column of the table at Annex 17. The second column of the same table reports the measures taken to address the issues raised in the studies

At present, 463 veterinarians and 2,608 paraveterinarians are permanently employed by MAAIF divided between central level (including NADDEC) and 112 District Veterinary.

It is worth noting that there is a discrepancy between the conclusions of the Animal Health Master Plan and the proposals done by the OIE PVS gap analysis mission regarding the staffing issue at DAR. While the first report underlines the need to reopen the employment of professional staff in MAAIF, the OIE mission proposed a drastic re-shaping of the veterinary services, by reducing the personnel from 463 veterinarians to 67 and from 2,608 paraveterinarians to 30, and outsourcing animal health actions (excluding those of public health interest) to private practitioners under specific service contracts. The Government has taken an unclear position on the issue, as they approved and endorsed both reports –and therefore the proposals contained therein- but they have not yet started any action towards either the proposals of the Animal Health Master Plan or the OIE PVS gap analysis.

The role of CAHWs in pastoral areas remains of vital importance, in spite of the actual Government policy of settle down pastoral livestock owners and convert them into sedentary agro-pastoralists. NGOs, UN agencies and projects active in the Northern and Eastern part of the Country, especially Karamoja, rely very much on the use of collaboration with CAHWs for their field operations. The number of CAHWs in activity is not exactly known.

Due to the Ugandan decentralisation policy which has occurred during recent years the Directorate of Animal Resources (DAR) of MAAIF lost the chain of command from veterinary headquarters to the field. Indeed, control of animal health activities is in the hands of district administrators who in general don't perceive it as a priority.

Private veterinarians are gathered in the Uganda Veterinary Association (UVA), which is opened also to other veterinarians belonging to both the private and public sector. UVA has more than 700 members, 30% of which are private practitioners dealing with clinical, pharmaceutical and consulting activities. Around 80 veterinarians are effectively involved in private clinical practice.

The privatization fund established under the PARC project and handed over to the PACE programme still exists, amounting to about 400 Million UGX. The fund is meant to reduce the interest rate for bank lending in case of the establishment of new private veterinary practices or existing veterinary activities.

Private veterinarians are involved in epidemi-surveillance activities on an informal and voluntary basis. At present there is no legal basis for the establishment of sanitary mandates prescribing the role of private practitioners in public health related activities, such as inspection of live animals and their products at market places and slaughterhouses, active disease surveillance and official vaccination campaigns.

The Epidemiology Unit is responsible for coordination of active and passive epidemi-surveillance activities. The unit was established under the auspices of the PACE programme. The unit's strategy is composed of seven components:

- Routine disease surveillance covering at least 21 strategic districts
- Epidemiological reporting system
- Active disease surveillance using participatory disease search (PDS), and sero-surveillance on specific diseases of wildlife and livestock, namely HPAI, Rift Valley Fever (RVF), bovine spongiform encephalopathy (BSE) and pest de petit ruminants (PPR) disease monitoring
- Responding to disease outbreak reports and any disease emergencies
- Launching quarantine measures to contain further disease spread from its original focus
- Harmonisation of disease control activities with neighbouring countries within ongoing regional disease control program and direct communication with counterpart in those countries.

The VS adopts specific operations to control animal diseases in the country. These mainly consist of vaccination, movement control, border control/quarantine, dipping and spraying for ticks and treatment of sick animals, among others.

There is not yet an official national animal identification system. Several systems are used in different regions of the country but are not interlinked and coherent. NGOs use to ear tag vaccinated animals; the Office of the Prime Minister launched in Karamoja a double and sophisticated identification system using rumen bolus and ear tagging; Farmers associations and cooperatives have their own identification systems, mostly based on ear tagging; an essay of national branding based on country identification (U), two figures for the District and one letter for the County/sub-County was launched by MAAIF in 2004 but the uptake from the District is slow and limited.

Movement control is based upon movement certificates which are printed centrally under the control of the office of the Assistant Commissioner for Livestock and Entomology, sent to all DVOs who are responsible for issuing them to the traders upon request. Movement certificates cover the displacement of groups of animals within the national boundaries (sub-counties, counties and districts) and indicate the designated stock route, the number of animals and the transport mean. The DVO of the district of destination receives information and copy of the movement certificate. Copy is also sent to the MAAIF senior veterinary inspector responsible for movement control at central level. Eighteen main road check point

operates permanently, provided that funds for paying live expenses of staff (2 policemen and 1 vet or paravet) are available.

In case of export, certificates are issued at the central level. There are 18 border posts approved for livestock export, the main of which are Entebbe airport, Katuna (border with Rwanda), Motukula (border with Tanzania), Bibia (border with Southern Sudan), Busia and Malaba (border with Kenya).

4.2 FEED

Feed Supply Depots

For this proposed calf early weaning system at 6 weeks to work the farmer requires that the raw materials are available locally. The farmers' livestock production organisations e.g. the Cooperatives and the Associations have a role to play in supplying their members with these inputs, if they invest in storage.

Private enterprise certainly has a role to play if individual entrepreneurs invest in this supply opportunity in rural areas and villages.

It is especially important where farmers do not have transport, **that input supply is localised** and the Livestock Producers Cooperatives would seem to provide the best vehicle either to develop supply depots for bags of by-product and molasses tanks or act as guarantors for their members to obtain working capital from the Commercial Banks where private enterprise sets up a farm input supply business.

Storage will be required for bags of by-products and a tank for molasses in these proposed feed depots. A secure modular shed will be required of approximately 20 meters wide by 45 meters long and 4 meters to the eaves, initially. The roof should be of an A frame construction. It is recommended that these sheds should be planned and constructed with a view to expansion. Steel frame constructions clad in galvanized sheeting should lend themselves best to future expansion should business expansion require that to happen. Brick walls to eaves will add to the security and bricks are manufactured in Uganda in local kilns where clays are suitable.

A molasses tank with a capacity to hold 20 tonnes of molasses will be required at each Cooperative Feed Depot or Private Enterprise Feed Depot. The tank will be elevated for the molasses to flow out by gravity into the receptacles that farmers bring to transport the molasses to their farms. A control valve will be required along with a flow metre, however, the molasses should be sold by weight as the density is likely to vary and the sugar cane factory sells the molasses by weight. To fill the Molasses tank, the tanker transporting the Molasses from the sugar cane factory to the Depots will be required to have a pump to offload the molasses into the Storage Tank at the Depots.

The number of viable farmer associations or cooperatives interested in such a development and investment in farm input supply depots will dictate the roll out and size of such a capital development programme.

4.3 AI AND BREEDING ANIMALS

A sustainable AI system is essential for the dairy sector, but in all developing countries sustainability as a Government service has proved impossible. Private sector delivery of AI will occur where it is profitable, and that requires a certain density of dairy animals on the ground. For beef animals AI is only occasionally to foresee. There are a number of beef bulls

for semen production at the Entebbe AI station. AI of beef breeds is more difficult as for dairy cows as the beef cows graze in larger herds and are less in contact with humans than dairy cows.

Artificial insemination is the single most important technique ever devised for genetic improvement of animals in all aspects including milk and beef production. While more than 70% of animals are bred using AI in the developed world, the technology is only to a limited extent available in Uganda. In Uganda AI technology was introduced in 1960 first as a public sector service. Currently private players have come in to offer and improve AI usage.

Liquid nitrogen must be continuously available. Maintenance and replacement costs of AI equipment might be a serious issue. Another constraint are cattle semen prices for zebu beef breeds which are internationally much higher than for dairy or dual purpose breeds. Reason for this is: the much smaller market, the frequent use of natural mating in beef herds as the cows are often kept on large ranges, heat detection being more difficult than in dairy breeds.

The National Animal Genetic Resource Centre and Data Bank (NAGRC&DB) is located at Entebbe. The Station has approximately 30 bulls and is secure with good fence and manned security gate. The facility is clean and aesthetically pleasant with more than adequate space for housing bulls. The manure is used to fertilise the Napier grass produced for zero grazing. There are reportedly 42 Districts with an AI service and 115 AI sub-centres and also eight Districts involved on a Herd and Milk Recording Scheme. This service was planned in 2005.

The NAGRC Station is also used for the training of AI technicians, day courses for Agricultural Students and training courses for farmers planning to AI their own cows and refresher courses for AI personnel. Training in AI is also done in the University at Makerere in the faculty of Veterinary Medicine. Reportedly an AI course costs about 1.2 m UGS per trainee even though the training is reported to be free (see Annex 7).

4.4 CREDIT AND FINANCING

Access to finance is one of the main constraints for farmers and agribusinesses, because of the higher perceived risks by the formal banking and micro-finance sectors, due to (PMA): (i) seasonal nature of borrowing; (ii) low capacity of mobilising savings from agriculture; (iii) the low number of commercial and semi-commercial farmers; (iv) high transaction costs in searching, screening, monitoring and enforcing agricultural loans; (v) the tendency towards 'strategic default' by farmers due to past experience of not suffering penalties following default; (vi) vulnerability to external shocks like droughts and floods.

Present bank interest rate is 30%. Bank interest rate must be at least 6% over the central bank rate which is presently at 23%. Inflation is now 25% and was at 31%. Priority of Government policy is to reduce inflation. This is done by reducing lending which makes it difficult to borrow money from banks. Other ways would be to reduce Government spending or to improve savings.

An Equity Fund for the Agricultural Sector was proposed which will be a structured fund which allows different risk levels. Investments of 3 - 500,000 USD per company is feasible. The problem is that many companies have no book keeping or different parallel books. The sale of the shares later on should be trade sale, to everybody, so there are no restrictions.

The Equity Fund supported companies have to follow the Principles of Responsible Investments (PRI). This means they have to make a plan how to comply in future. PRI aims to help investors to integrate the consideration of environmental, social and governance

(ESG) issues into investment decision-making and ownership practices. This concerns e.g. child labour or minimum wages.

The Equity Fund approach targets commercial producers. It will be a SME financing fund. It can include ranches, feedlots or an abattoir with processing. It is for agribusiness broadly speaking such as farm equipment, feed producers, transport, processing and exporting. The Fund may invest up to one third of the value of a company. The funds purpose is to help establish sustainable, viable ventures that otherwise would not have been established due to perceptions of the risk involved and lack of credit facilities. The Fund shall be a conducive mechanism for channelling development funds to promote private sector development. Through its direct and indirect investments the fund shall be instrumental in establishing and/or expanding private enterprises thereby creating an attractive environment for private investors. The investments shall be associated with change towards modern technologies and shall adhere to high social and environmental standards.

An investment may come in two forms, portfolio management and direct involvement. Following a portfolio management strategy, one takes the performance of an individual company for given, and focuses on mitigating risk by investing in different companies. Generally, it is possible for a portfolio manager to diversify away from all so-called unsystematic risks (risks associated with the project as such) and most of the benefits of diversification can probably be achieved with fewer than 15 investments, distributed over different sectors and/or countries. What is left is the systematic risk, which is related to high levels of corruption, political instability, exchange rate unpredictability, etc. Direct involvement implies operational control with the investment target and expected cash flow. In other words, where the portfolio manager scans for viable projects, the direct investor creates them.

Links should be developed between the Fund and technical assistance to create good business environments. Technical support shall be financed in some conditions. Prior investment a business plan must be available and /or the analysed costs and returns of past business. The assumptions in the business plan must be verifiable. E.g. in case of a feedlot the feed costs and the selling price of the finished cattle must be provable by naming the business partners and by an appropriate market research (present price range on the market).

An existing investment support mechanisms in Uganda is the Agribusiness Initiative (aBi) Trust which is an institution set up by the governments of Uganda and Denmark to support agribusiness initiatives in the country. In particular it is to support the private sector to increase their contribution to the agricultural sector by increasing productivity and competitiveness leading to poverty reduction through economic growth, wealth, and employment creation.

The vision of aBi Trust is of “competitive private sector led agriculture in Uganda” with the mission to “promote private sector driven agribusiness development to enhance wealth creation in the country”. aBi Trust implements its interventions through partners. The aBi Trust has two main categories of core Financial Products (guarantees and investments). The Trust offers guarantees on loans and other financial instruments that support agribusinesses and lenders to agribusiness. The Trust invests to preserve the value of the Trust's indemnity fund against erosion by inflation or by claims; Maintain liquidity to meet all Trust cash requirements, as needed; Increase the value of the Trust's indemnity fund to enable support to larger programmatic activities; Provide Lines of Credit to financial institutions underpinning loans to agribusinesses.

The aBi Trust achieves its mission and vision through interrelated sub-components. The subcomponents are:

- Value chain development leading to improved performance efficiency of actors and value chains (with focus on value chain actors and non-financial service providers) and including trade-related Sanitary and Phytosanitary (SPS) and Quality Management Systems (QMS) (with focus on value chain and specific service providers)
- Financial Services development leading to expansion of financial services by supporting agribusiness in order to increased availability and use of financial services
- Gender for Growth leading to gender equality integration and mainstreaming in all aBi activities.

Further existing mechanisms in other countries are grant programmes like the IPARD programme, the EU pre-accession programme for rural development (Instrument for Pre-Accession Assistance for Rural Development). It contributes to the modernisation of the agricultural sector (including processing) through targeted investments while at the same time encouraging the improvement of related food safety, veterinary, phytosanitary, environmental or other standards, and it contributes to the sustainable development of rural areas.. It includes as objective improving market efficiency and implementing international standards, this by support to investment in agricultural holdings and investments in processing and marketing. IPARD supports by grants amounting to 50% of the eligible investment if the specific criteria listed in the applicable ordinances are met (example of Croatia). The Beneficiary applies the project on the basis of a public tender. The beneficiary has to fulfill different criteria and these criteria could be adapted to Ugandan conditions and to other types of investment support programmes. These criteria are (copied from one country-specific IPARD programme):

- The project idea is in line with the described sectors and list of eligible investments
- The applicant has obtained the approval/permit to commence construction /reconstruction (in case of constructions)
- The applicant is in possession of a Design in Principle and a Detail Design
- The applicant is registered in the respective register (e.g. a Farm Register, a livestock branding or identification database)
- The applicant is in order with tax payments
- The owner of the land, holder of the business and the applicant are the same legal/natural person (or legally binding contracts are concluded over a sufficient period)
- The applicant has no liabilities against the State and/or local authorities
- The applicant is in possession of adequate professional qualifications to perform the planned activity
- The applicant is in possession of personal and/or loan funds to implement the planned investment (and/or the company /investment has a positive cash flow)
- The applicant has not received more than two items of support from the same programme.

All answers must be affirmative. In such case it is recommended to continue with the next stage i.e. to contact the Programme Consultant for evaluation. A logical business plan must be available to prove the feasibility of the investment.

5. LEGAL AND INSTITUTIONAL ENVIRONMENT AND STANDARDS

The livestock industry is regulated by MAAIF under several acts, including the Animal Diseases Act (1964), the Hides and Skins Act (1964), the Veterinary Surgeons Act (1970), the Animal Straying Act (1964), The Animal (Prevention of Cruelty) Act (1957), the Animal Breeding Act (2000), the Cattle Grazing Act (1964), the Public Health Act (Meat and Milk Rules) (1964) and the Code of Meat inspection Uganda (1973). Other laws affecting livestock in Uganda include the Food and Drug Act (1964), the National Drug Authority Policy and Statute (1994) and the National Bureau of Standards (1993 and 1998), as well as Uganda's international obligations (MAAIF, 2005).

The institutional environment is relatively weak demonstrated by slow progress in using funds and tendering outsourced activities. The AfDB Livestock project Impact Report presents an underuse of operational budget and an overuse of budget for management and coordination, see next Table.

Table 5.1: NLPIP Absorption Performance by Component in USD 2001-2010

Expenditure Component	US \$	% Absorption
Livestock Restocking and Genetic Improvement	6,317,874.630	49%
Animal Health	6,519,882.230	49%
Water Supply and Forage Development	12,725,551.910	93%
Livestock Marketing Infrastructure and Information Systems	7,319,510.710	124%
Project Coordination and Management	6,381,365.190	265%
Total Expenditure	39,264,184.670	81%

5.1 ANIMAL HEALTH

The animal health sector is well equipped by the necessary legal and certification tools to provide adequate information to potential importers of animals and their products and to regulate the veterinary profession and the animal health sector in the country. However, most legislation concerning animal health, meat and food hygiene, and other relevant legislation associated with animal health, food safety and trade, are outdated and not in line with OIE standards. Most of them were issued in the early sixties and seventies. Enforcement regulations are generally inadequate or absent.

There is a need for the animal health authority to revise its laws to comply with the international standards for implementing procedures to minimise risks and hazards due to the importation of microorganism contaminated products. However, the veterinary authority doesn't have appropriate capacities to critically and efficiently review the existing legislation.

The OIE actively collaborates with MAAIF by making available a senior legislation expert for the review and upgrade of the national legislation on animal health, trade and food safety. The OIE expert already visited Uganda in 2011, agreed upon an action plan and will undertake other missions starting from March 2012 in order to complete his assignment, which is expected to end in December 2012 at the latest.

5.2 FOOD SAFETY

Veterinary inspections at slaughterhouses are the responsibility of veterinary officers belonging to MAAIF, supported by properly trained technician. All establishments visited had adequate staff. Ante and post mortem visits are carried out diligently but quite in a hurry and under pressure from butchers and traders who are allowed to enter and stay in the slaughtering area.

There are neither national plans for residues control nor a laboratory equipped for this purpose. Therefore no samples are taken at the slaughterhouse for testing meat for heavy metals, hormones and other contaminants.

Uganda's national standards and quality infrastructure is still in its infancy. In order to attain international standards and socio-economic development, a national quality infrastructure acts as an impetus for the success of all the economic activities. It comprises of standards and technical regulations, quality assurance, metrology (science of measurement), inspection, certification, laboratory testing and accreditation. In order to enhance the competitiveness of local industries, promote fair trade, protect the health and safety of the consumers, including prevention of trade in sub-standard products and to coordinate the provision of standardization services in Uganda; Government in 1983 promulgated the Uganda National Bureau of Standards (UNBS) Act, Cap 327; as amended in 2010.

Public Institutions

Uganda National Bureau of Standards (UNBS)

The UNBS was established in 1989 as a statutory body under of the Ministry of Tourism, Trade and Industry. It is the apex body for standardisation in Uganda and its stated mission is to promote industrialisation, fair trade and consumer protection through the provision on standards, testing, quality assurance and metrology services. The Bureau coordinates the process of standard-setting in Uganda, although for food items the standards adopted tend to be equivalent to Codex or to regional standards. UNBS carries out periodic awareness-raising or training programs related to quality or food safety management. It operates four laboratories—for microbiology, chemistry, building materials, and electrical matters—while a fifth, for testing petroleum products, is being developed. Only the microbiological lab is internationally accredited.

UNBS serves as both the national enquiry point on WTO SPS and TBT issues and the Codex contact point in Uganda. It serves as the secretariat for a multi-sectoral national Codex committee and its officers periodically attend the meetings of the Codex General Principles Committee. UNBS is the local agency which is most actively involved in the process of harmonizing standards at the level of the East African Community and is a member of the African Regional Standards Organisation.

UNBS operates a voluntary Product Certification Scheme, in which some fifty local companies have participated. Some 108 products, of which half are processed food products, currently bear the Uganda Standards Certification Mark, signifying that their production operations and the products themselves meet certain specifications. UNBS also plays some role in the enforcement of food safety standards. For those food products carrying mandatory standards, the UNBS attempts to inspect imported consignments, having inspection staff at 14 of the 52 official entry points. The Bureau also has a tiny (2 person) market surveillance team that essentially responds to tips on fraudulent, mislabelled, or otherwise problematic food being sold in local markets. The UNBS is not involved in the inspection of exported products, with the sole exception of maize sold within the region. The UNBS has a total staff of 115, of which some 85 are professionals, including scientists, engineers and technicians.

Ministry of Agriculture, Animal Industry and Fisheries

The Ministry of Agriculture, Animal Industry and Fisheries has various departments with specifically defined roles and responsibilities in relation to food safety and agricultural health. These include the following:

The Department of Livestock and Entomology is responsible for the development of policies and regulations on animal diseases, the development of veterinary inspection procedures, and the inspection and certification of imports and exports of animal products. The Department coordinates national programs to manage rabies, CBPP, Rinderpest, and Food and Mouth Disease, and is involved in the implementation of regional animal disease control programs. It provides technical support to the 700 to 800 veterinary officers working at local levels, in part to inspect and certify animal products. The Department is also the designated competent authority for honey.

The Department of Animal Production and Marketing ensures compliance with the Animal Disease Act and Regulations. The department is responsible for formation of standards regarding the quality and safety of livestock and livestock products. In this area it provides training, supervision, and other technical back-up to local governments related to plans and programs for livestock and livestock product handling and marketing.

The Crop Protection Department is responsible for formulating and enforcing regulations related to seeds, agro-chemicals and the management of phytosanitary risks. It seeks to undertake surveillance and diagnosis of crop pests and diseases and to work with other national and international agencies to control the outbreak of migratory plant pests and epidemic diseases. The Department carries out inspections of imports and exports of planting materials and plant based products, mostly checking for pests and diseases. Where interceptions are made, tests might be conducted at the Kawanda Agricultural Research Institute. The Department issues phytosanitary certificates when these are required for exports. Crop protection officers are located at MAIFF headquarters, at zonal stations, and at an increasing number of border/entry posts. The Department is the so-called competent authority responsible for the inspection and regulation of horticultural commodities for local and international markets. A new draft Bill would designate the Department as the National Plant Protection Office (NPPO).

The Department of Fisheries Resources is responsible for the inspection, certification, and control of fish and fish products consumed locally and abroad. It is responsible for enforcing fisheries regulation, including carrying out inspection of factory premises, processing lines, landing sites, fish transport and export points for adherence to safety and quality requirements, as well as maintaining a national fish inspection and quality control system. The DFR issues a certificate for each consignment of fish prior to export. The Department is responsible for regulating and overseeing the emergent development of aquaculture in Uganda. The DFR, in collaboration with local government (District Councils), directs fisheries resource conservation and management initiatives. Budgetary and other constraints have inhibited the effectiveness of the DFR in pursuing its multiple responsibilities. A major institutional reform in fisheries sector management is underway. The National Fisheries Policy, approved by Cabinet in 2004, calls for the formation of a Uganda Fisheries Authority, an autonomous agency in government, with a governing board appointed by the Minister of MAAIF. The UFA would take over many of the sector management functions of the DFR, including those related to quality and food safety management.

Ministry of Health, Environmental Health Division

The Ministry of Health's Environmental Health Division is the lead Government agency on matters of food hygiene and safety. Its role primarily relates to policy formation in this area and the coordination of actions cutting across various government agencies as well as local government authorities. It has no implementation functions per se, as food establishment inspection and licensing is done by health officers working for local councils. The Division

carries out no market surveillance work, yet periodically collaborates with the UNBS on limited programs to gauge the safety of certain product items. The Division does not directly work in areas related to Uganda's external food trade.

Given other pressing health matters, the Division receives less than 5% of the Ministry of Health's annual budget. Most of this allocation goes to pay the salaries of its small staff, with little funding available for operational field activities. Only one of its ten staff members has a suitable background to do risk assessment work, plus any such work would be constrained by the fragmented and incomplete nature of existing epidemiological and laboratory testing data related to food borne illness. The Ministry's Health Education Department likewise has little or no funding to carry out campaigns on food safety and hygiene.

The Division's mandate is provided under an antiquated Food and Drug Act of 1964 which doesn't cover current issues in the field (i.e. risk management, traceability, etc.). The Division, working in conjunction with other agencies and stakeholders, recently drafted a Food Safety Bill which has been presented to the Cabinet for comment. The Bill makes provision for the Division to serve as a central secretariat on food safety issues, to be supported by technical working groups dealing with specific topics.

Private institutions

Many private sector institutions also play key roles in the management of trade-related quality, food safety, agricultural health, and other standards in Uganda. Obviously, individual farmers/fishers, traders, and agro-food processing companies play the most central and active role in generating raw materials and finished products that meet commercial and/or regulatory requirements for quality and safety. Yet, there are also an array of private service institutions which either assist these supply chain players to improve their methods or products or which provide conformity checks on management systems and/or products via inspection, testing, or certification services. While the existing market for such services is relatively underdeveloped in Uganda the depth and breadth of such services will certainly expand over time in response to growing demand (and the ability to pay for services). Several of the relatively larger private providers of standards-related services are subsidiaries of international companies, for example, *Chemiphar* is an affiliate of a Belgian company. It operates a laboratory that is internationally accredited to carry out microbiological and chemical testing for many of Uganda's principal agro-food exports. It is the only laboratory that is authorized by the European Commission to carry out tests of fish consignments being directed to the EU market. A local subsidiary of *SGS* has been active in Uganda since 1990. It performs quantity and quality testing and certification for certain products, provides fumigation services for grain and coffee, and provides advisory services to clients seeking to adopt quality, food safety, or environmental management systems. *Total Quality Management Leadership Ltd* has, since 1995, provided training for industrial and other companies in ISO 9000 and ISO 14000 management systems.

Promotion of GHP/GMP

With respect to food safety and agricultural health, application of *good practices* (GHP/GMP) involves a wide range of common sense tasks as well as less intuitive ones. They include application of basic hygiene and sanitation requirements such as the use of clean containers, physical segregation of the dirtier processing tasks from the less dirty ones, and the maintenance of personal hygiene all through the process of handling food. Good practice could also mean putting in place an appropriate physical structure with adequate facilities for storage and grading or the application of recommended production and post-harvest practices. Instituting a proper record keeping and traceability system, application of HACCP, quality management systems and recommended practices for plant and animal health are all examples of good agricultural and manufacturing practice. The table hereunder provides an overview of the status of good practice for food safety in the meat sector in Uganda.

Table 5.2: Promotion of GMP in meat industries

Item	Status
Basic hygiene & sanitation requirements; appropriate physical structures for sanitation, storage & grading	Not applied by slaughter slabs and most of the abattoirs applied by some processing plants. no functional system of inspection & audit
Proper record keeping & traceability requirements	Rarely applied
Segregation of plant layout & operations in conformity with standard operating procedures	Applied by some meat processing plants
Application of HACCP for food safety	HACCP system rarely applied among processors
Application of quality management systems such as ISO 9000	Only one meat processor applied
Availability of guidelines for good practice through the full supply chain	Limited availability

Standard-Setting

Standard setting in Uganda is the responsibility of the UNBS and the policy-guiding National Standards Council. Many standards are demand-driven, with requests coming from industry groups, individuals, government and public interest groups. UNBS has ten technical committees with representation from industry, universities, consumer groups, and regulatory agencies. Examples of committees include those for agricultural and food products, chemicals and the environment, textiles and apparels, building and construction, and metrology. The committees develop and deliberate on draft standards which are then subject to public comment before they are endorsed by the NSC.

Between 1993 and 2005, UNBS issued 720 standards, of which 239 are related to food and agricultural products, either technical specifications of products themselves or associated with their processes of manufacturing. Three-fourths of Uganda's standards are based on international or regional standards. Codex Alimentarius standards are commonly used as a basis for Ugandan food standards. All food and agricultural product standards are ostensibly compulsory, even though many such standards relate to quality parameters rather than food safety. A code of hygiene for the food and drink manufacturing industry is also compulsory, although its enforcement is intermittent. The UNBS implements a Product Certification Scheme whereby it permits qualified manufacturers to place a quality mark on its packaging to signal compliance with certain criteria and satisfactory inspections.

Legislation

Uganda's body of legislation which pertains to food safety, agricultural health, and compliance with international SPS and TBT matters is in a state of transition, with many areas covered by obsolete legislation, other areas facing a legal or regulatory vacuum, and a large queue of draft bills and policies positioned at various points in the national legislative process. As regards the SPS Agreement, the relevant legislation is the National Bureau of Standards Act plus regulations made in relation to the UNBS (i.e. on import inspection) and in relation to the Agricultural Seeds and Plant Statute (1994), the Control of Agricultural Chemicals Act (1964), the Crop Protection Act (1964), the Food and Drugs Act (1964), the Animal Disease Act (1964), the Food Quality Assurance Rules (1998), and the Fish (Quality Assurance) Rules 1998.

At present, there is a broad range of pending legislation—some in the form of draft bills and others are bills which have been approved by Parliament and are awaiting executive approval. Some draft legislation was introduced to Parliament more than five years ago and actions are still pending. For example:

- After nearly a decade of technical discussion a draft Food Safety Bill (2003) was prepared to include clearer responsibilities in food safety oversight and provisions related to codes of good practice, control of pesticide residues in food, food additives, and measures to ensure the safety of food imports and exports. This Bill was based on a model FAO food law
- A draft Plant Protection and Health Bill (2003) seeks to update legislation to reflect the International Plant Protection Convention. It has been sitting in the Parliamentary Sessional Committee on Agriculture for some time
- A draft Control of Agricultural Chemicals Bill will separate the regulation of chemicals and fertilizers, seek to ensure pesticide-related safety throughout the food chain, and make other adjustments in the current legislation
- A draft Biosafety Bill and associated Biosafety Regulations have been under preparation and discussion for several years.

5.3 DEMANDS OF EXPORT MARKETS

At present, export of livestock and livestock products from the less developed regions of the world to high value markets is greatly constrained - and made virtually impossible in many instances - by nontariff barriers based on the occurrence of a range of so-called "epizootic" or "trans-boundary animal diseases" (TADs). These diseases mostly do not occur in the developed world and therefore great effort is expended in ensuring their continued exclusion through improved management of both legal and illegal trade. The reason is that these diseases are capable of causing serious losses to the agricultural and tourist economies of developed countries and some are also capable of causing significant human disease, e.g. Rift Valley Fever.

Import requirements are set primarily by importing countries or by supranational institutions such as the European Commission of the EU. Beef import requirements set by importing countries are generally guided by the WTO sanitary and phytosanitary agreement, known as the SPS Agreement. Animal health standards recognised within this SPS agreement are determined by the World Organisation for Animal Health, the OIE and food safety standards are determined by the Codex Alimentarius Commission, a body jointly managed by the United Nation's (UN) Food and Agriculture Organization (FAO) and the World Health Organisation (WHO).

Import requirements are generally meant to ensure an acceptable level of protection to animal and human health, and also safeguard export status of the importing country. The key

objectives of the SPS Agreement are to protect human health, animal health, and the phytosanitary status of importing countries and preventing WTO members from imposing arbitrary or unjustifiable restrictions to trade owing to diverse public and private sanitary and phytosanitary standards.

The SPS Agreement acknowledges the Terrestrial Animal Health Code (OIE Code) as the international reference for sanitary standards for trade in animals and animal products. The OIE Code sets guidelines and recommendations to minimise the risk of the spread or introduction of animal disease through international trade in animals and animal products. The Codex Alimentarius is recognised as the international standard body within the SPS Agreement. Its focus is on the protection of human health through trade in animal and plant products. For beef trade, the Codex contains guidelines to abattoirs, meat processors, and meat packers, ante-mortem inspection of animals, slaughter, post-mortem inspection, and guidelines for the handling, production, processing, packaging, and shipment of meat.

Access to export markets of livestock and livestock products requires at times significant investments to meet veterinary requirements largely intended to protect the importing country's animal and human populations. Furthermore, the exporting country must meet additional product quality requirements with respect to production, marketing and processing. Generally, compliance with international or regional standards is often achieved by developing countries at a great cost.

Gaining access and maintaining presence in high value markets such as the EU market is often costly as standards and expectations keep on growing due to consumer pressure in the targeted high-value markets. Other growing beef markets such as the Middle East and Asia may require that some international standards be met (as a hygienic abattoir at minimum) although their national standards are sometimes less exacting. Unfortunately the prices fetched are lower and the competition is strong. Veterinary requirements of high value regional markets are in most cases bench-marked on EU standards even though the prices are relatively lower.

The OIE recognises that it would be desirable to embark on a national or regional eradication of serious trans-boundary animal diseases (TADs). However, if eradication is not feasible or is yet to be accomplished, the OIE advocates establishment of either disease free zones or compartments of production that are free of disease in order to reduce the risk of introducing or spreading disease or infection to importing countries.

A disease free zone is a clearly defined area within a country based on the absence of the particular disease. The financial burden of maintaining such zones is high and often there are questions regarding equitability and sustainability. Compartmentalisation on the other hand is the export from specific establishments with a high level bio-security management system in place. It requires private sector investment and it the important question is probably only suitable for large commercial farms.

A relatively new development is known as commodity-based trade (see Annex 19). With this scenario exports are allowed irrespective of the disease situation, but, the product (commodity) must be rendered safe and the product shall not pose a significant risk to animals or humans. An example of this is certified frozen de-boned meat from FMD affected areas. Although this concept is currently accepted by the OIE and endorsed by various Regional Economic Communities, countries have not yet started commercial exchanges based on the commodity-based trade concept.

The development of appropriate livestock production systems, zoning, animal identification and traceability systems and the sustainability of such systems needs an integrated approach from all the stakeholders in the entire livestock industry. The concept of regionalisation is recognised by the WTO as expressed in the SPS Agreement. This concept

is an acknowledgement of the reality that it is difficult to achieve whole country freedom from some diseases due to presence of either wild reservoir hosts or the inevitable risk of introduction of disease from neighbouring countries. Geographic zones in clearly defined parts of a country containing livestock with a distinct risk status with respect to a specific disease can be established.

Relevant surveillance, control and bio-security measures must be applied in accordance with the OIE's Terrestrial Code for the purpose of facilitating international trade. The Code provides clear guidelines on recognition of a country, zone or establishment within a country to be free from a specific disease/infection and the criteria for maintaining or regaining such disease-free status.

A credible group or individual animal identification system is a requirement for the verification of the residence status of an animal or group of animals in a given geographic zone. All animals within that zone should be identified in a unique way such that their history can be verified. Animal movements into and out of the zone should be authorised and controlled by the official veterinary service. Documentation regarding such movement controls must be kept and made available for auditing when required. The identification, movement controls and the related information system must ensure full traceability of individual or groups of animals. In view of international requirements, Brazil has e.g. established a traceability system which is applied throughout the supply chain. Since 2002, the Ministry of Agriculture has implemented SISBOV, a national program to establish a database for individual identification of bovine and water buffalo. Out of 27 Brazilian states, only 16 are considered foot-mouth disease-free areas, and 15 of them are only free with vaccination. Only the Santa Catarina state is considered free of foot-mouth disease without vaccination. The establishment of a DFZ and a cattle traceability system in Uganda is a medium to long-term activity.

In the livestock sector, SPS problems are a major constraint to growth and a barrier to trade due to the presence of endemic OIE notifiable diseases. In 2006, Uganda reported confirmed clinical cases of African Swine Fever, Brucellosis, Foot and Mouth Disease, Lumpy Skin Disease, Rabies and, in 2007, an outbreak of Peste des Petits Ruminants.

Export at interesting prices needs favourable natural and climatic conditions, large and well structured farms, low land prices⁹ and modern slaughtering plants. Problems in Uganda are efficiency of veterinary services and high interest rates, besides the fact that the growing national population will probably absorb the largest part of the production. When the potential is given active foreign marketing is necessary. The large beef export countries have production systems based on low-input year-round grazing systems. Barns do not exist. Typical productivity indicators of steer production in those countries are (example of Argentina): Age and weight at start of finishing 210 – 260 days and 130 – 180 kg LW, age and weight at end of finishing 575- 759 days and 380 – 450 kg LW, duration of finishing period 300 – 500 days, dairy weight gain 500 – 650 days, dressing percentage 57 – 59% (carcass weight divided by live weight in present), number of weaned calves per 100 cows and year 75 – 80 head.

Farms with low level costs can be observed (<USD 145 /100 kg LW) in South America (Argentina, Brazil, and Colombia), Australia and the Ukraine. The cheapest producers are Ukraine and Brazil with about 100 USD/100 kg l.w. Farms with high level of costs (>USD 350/100 kg LW) are exclusively from Europe. Costs are partly covered by subsidies.

⁹ In 2004 in Argentina e.g. 1500€/ha for cropland, and 400€/ha for grassland.

6. PROPOSED PILLARS OF THE VALUE CHAIN APPROACH

6.1 STATUS OF THE COMMERCIAL BEEF INDUSTRY IN UGANDA

The commercial beef industry is small comprising only about 0.8% of the cattle stock, a limited number of commercial beef farms, and one processor covering the greatest part of the market. There is however a larger semi-commercial dairy industry which is dual purpose, milk-beef and shall be considered in this context. In 2008, 0.8% of cattle are beef exotic/cross breeds and 5.6% are dairy exotic/cross breeds, according the UBOS household sample census. The present rate is probably higher as crossbreeding is popular. However, all cattle are producing beef and the overall rate of milk production is low. On average only 8.5 litres of milk are produced per milked cow per week (UBOS, 2008).

The low input traditional production system provides the possibility for considerable improvements to increase weaning rate from 0.46 calves weaned/cow/year to 0.70 in modern beef cattle farms, or from 0.34 saleable cattle/cow/yr to 0.67 in modern beef cattle farms. This output increase by nearly 100% is possible by mostly applying well known veterinary measures. There are many examples of farms in Uganda and the region where these techniques are applied. This huge on-farm productivity increase finances the intensive veterinary programme with dipping, deworming, vaccinations and trypanocides according to risk in the region, and the necessary infrastructure (dip, fence ...).

If dry season feed is improved calving rate will increase further from 0.8 in the commercial herds without dry season supplemental feeding to 0.9-1.0 calves born per cow and year. The low veterinary input in traditional herds leads to considerable loss risk, i.e. while in a given period the majority of farms have few to medium losses only there is a significant part of farms with considerable losses, mostly through TBD. Productivity and loss figures are presented in Annex 12, including data from other countries (see Annex 14).

The traditional agricultural commodity value chain encompasses farmers, traders and livestock markets up to rural slaughter slabs and butchers or to city slaughterhouses and street butchers. A minority of products is sold in supermarkets (see Annex 4). Meat is mostly sold unrefrigerated within hours in street butcheries.

Live animals are transported to metropolitan area where they are slaughtered and beef is offered for sale. The beef is offered for sale largely in its fresh state and consumers seem to prefer this type of beef. The street butchers operate at lower cost than supermarkets and can therefore sell at a lower price. There is lack of an orderly marketing system in the beef sub-sector and much activity goes unrecorded. Information like export prices for beef, potential areas, market preferences, including grades and standards in these markets, on transport charges, are lacking.

With the growing population and with economic growth, there is a danger that Ugandan livestock producers are unable to satisfy the growing demand for beef. Also because of the difficulties in complying with international sanitary and phytosanitary standard requirements, Uganda is not a net exporter of live animals and livestock products internationally.

The traditional agricultural commodity value chain encompasses farmers, traders and livestock markets up to rural slaughter slabs and butchers or to city slaughterhouses and street butchers. A minority of products is sold in supermarkets. Meat is mostly sold unrefrigerated within hours in street butcheries.

The different value chains in the beef sub-sector are (see Annex 4):

- a. Traditional value chain in the district: From farmer, to livestock market, trader, abattoir, street butcher
- b. Traditional to the capital: From farmer, to livestock market, trader, abattoir, street butcher
- c. Improved 1: From farmer, to trader , abattoir, processor, supermarket
- d. Improved 2 (proposal, hardly existing so far): From farmer, directly to processor with its abattoir, supermarket
- e. Export 1: Farmer, livestock market, trader to Sudan
- f. Export 2: Farmer, processor, high value export market (presently UN troops in neighbour countries:

Kampala accommodates 3 *abattoirs*: City Abattoir (KCC Ltd.), Ugandan Meat Industries Ltd. (UMI) and Nsoobo Slaughterhouse Ltd. Given the enormous increase in population for Kampala from 46,000 inhabitants in 1959 to currently 1.5 million (est.) the City Abattoir is now used far above its installed capacities (around 200 to 300%).

Apart from abattoirs in and around Kampala there are a number of facilities in Uganda where slaughter of animals is done: on-farm slaughter, slaughter on animal markets and *slaughter slabs* at district towns. The former Ugandan Meat Packers Abattoir in Soroti is not operational anymore. Among the slaughter slabs the *Moroto facilities* are one of the most modern and best maintained and may serve as a model for others to be constructed or renovated.

The current *marketing system for slaughter cattle* has few incentives for farmers to produce high quality meat in terms of higher life weight, higher quantity of muscles vs. bones (meat/bone ratio), tenderness of meat or- last but not least- quality of hides. If graded according to EU EUROP grading system the carcasses would be graded as "P - poor".

The current *marketing chain for carcasses* via small scaled butcheries with no cooler showcases supports the sale of underweight cattle. The average weight for a quarter (the usual throughput for a small scaled butchery) is around 30 to 33 kg - seemingly the right quantity to be sold during a day for the majority of small scaled butchers.

Uganda's *meat processing* industry consists currently (due to the marginalized market share of UMI/Top Cuts for the domestic market) in the main of one company dominating the market for packaged retail cuts and processed beef: "Quality Cuts/ Fresh Cuts" with a daily throughput of 22 tonnes of fresh meat cuts and processed meat covering 85% of the market for those products.

6.2 OPPORTUNITIES, KEY CONSTRAINTS, WEAKNESSES AND THREATS HINDERING THE DEVELOPMENT OF THE COMMERCIAL BEEF INDUSTRY

Commercial beef farming is feasible with gross margins of about 200 USD/cow/yr. Interesting is the sensitivity analysis which shows that less favourable conditions as assumed are bearable (see Annex 12). An increase of the calving rate from 80 to 90% would bring a substantial extra profit but would need dry season supplementary feeding. Factors in the sensitivity analysis are: Investment costs (e.g. electric fence, bush clearing), labour costs (absentee ownership needs a ranch manager with adequate remuneration), selling price of young stock (there should be a mark-up on quality and higher weighed breeds are used), land costs. Bush clearing is only possible strategically but not as large scale operation which costs up to 1000 USD/ha if done properly with eliminating the roots.

Early weaning of calves is beneficial in milk-beef production. Instead of daily drinking 4 litres of milk (which can be sold for 2200 USh) the calf consumes 1 kg of concentrate mix costing

880 USh/kg (see Annex 9). On the farms, where acreage allows, it is recommended to produce forage maize silage with Lab lab undersown, approximately one acre producing 6 tonnes of DM. Cost of production is 1 million USh to 1.2 million USh per acre. Estimated cost per kg of dry matter is US\$ 0.084.

Seasonal price variations can be used in purchasing lean cattle for finishing as the silage is available when the rangelands are poor. Fattening is a speculative business where the farmer profits from price variations.

Agro-industrial by-products are not sufficiently used. There is e.g. potential to use molasses for fattening. The available national quantity would be sufficient to fatten over 10% of all slaughter cattle per year (5 kg x 90 days per cattle). Agro-industrial by-products could cover up to 20% of annual feed needs if properly collected and stored. However, a large part of it is of low quality (maize, millet and sorghum stover make up 63% of these products, measured in dry matter). Feedlots shall be established near agro-industries where cheap by-products are available if a mark-up on cattle selling price can be charged.

The main constraints are:

- *Low Livestock Productivity*: Most of the ruminant livestock in Uganda are indigenous and are raised in the traditional system. The inherent features of indigenous livestock are survival rather than productivity, hence their small body size. Factors such as diseases, parasites, inadequate nutrition and water coupled with their small body size and low milk yield mean that they grow slowly and often attain market weights at 5 years of age or more.
- *Endemic Diseases*: Most of the communal dip tanks are out of use. Vaccination coverage is relatively poor. Timely availability of vaccines at the Districts and the facilitation of District field staff with allowances and logistics (vehicles, fuel, etc.) are still a major problem. Vaccine quality in relation to the specific diseases and strains needs verification.
- *Inadequate Feeding*: About 85% of total milk and meat marketed in Uganda come from indigenous livestock, which thrive on natural pastures in the rangelands. However, the rangeland pastures are of low quality because of poor management coupled with overgrazing and encroachment by bush or weed, drought and water shortage. The pastures are characterised by poor yields especially in the dry season.
- *Scarcity of Water for Livestock*: Water is scarce especially in the dry season. The lowest runoff volumes (<10mm) are in parts of the districts of Mbarara and Mubende to the southwest, Luwero to the middle belt, and Kotido and Moroto to the northeast, while the incidence of non perennial streams are in parts of Kitgum, Lira, Soroti, and Kumi in the northeast of Uganda. In order to avail water for livestock and human consumption, interventions such as building dams to trap surface water and drilling to utilize underground water are necessary. Livestock have to cover long distances in search of water with all the associated health and productivity risks.
- *Inadequate Infrastructure for Livestock Markets, Abattoirs, and Dip tanks*: Most of the 600-650 primary livestock markets in the cattle corridor lack basic facilities -- fencing, crushes, loading ramps, weighing bridges or toilets. Some 80% of towns and trading centres in the corridor have inadequate basic slaughter facilities -- concrete slabs with drainage channels, means of restraining animals, pits for solid waste and water. This is further worsened by lack of disease control zones and quarantines, breakdown of district veterinary laboratories, lack of quality abattoirs and outdated / poorly enforced livestock regulations and meat standards.

One of the long standing challenges of the beef sector has been the lack of a modern abattoir that can comply with export standards. *Projected modern abattoirs* need to include their high investment costs into market prices for final products.

In the livestock sector, SPS problems are a major constraint to growth and a barrier to trade due to the presence of endemic World Organisation for Animal Health (OIE) notifiable diseases. In addition to limiting trade possibilities, livestock diseases also reduce animal production and productivity. Animal diseases have negative impacts on income generated by the livestock sector and directly impact on poverty and food security.

The following *SWOT analysis* identifies the internal and external factors that are favourable and unfavourable to achieve the objective of a modern beef sector.

Strengths

- Tradition in cattle keeping
- Many rangelands available for fodder production and large areas well-suited for ruminant rearing
- Partly favourable agro-climatic conditions for ruminants (bi-modal rainfall)
- Open market – general access to inputs
- Potential of domestic market for milk and meat
- Potential for regional export
- Dynamic development of the meat processing sector as driving force to the production sector
- Good veterinary faculty, skilled veterinary professionals
- Clear and reliable drug import and marketing system
- Presence of natural barrier for zoning and compartmentalisation.

Weaknesses

- Native breeds are not very productive
- Low performance in milk and meat production
- Lack of experience with specialised beef ranching /farming
- Lack of modern forage processing equipment
- Modern machinery not applied
- Lack of knowledge on modern farm management
- Lack of knowledge on Codex alimentarius standards
- No regular education for farmers or limited regular vocational training offers
- Many small (semi-)subsistence farms, small and fragmented plots, low working productivity
- Weakness in rural infrastructure, particularly difficult access in remote areas
- Weak linkages of primary production with markets
- Market standards are not established (carcass classification)
- Limited access to good genetics & animal health services
- Lack of producer organisations
- Weakness of extension & advisory and of veterinary services
- Lack of credit facilities, insufficient financial support for the sector
- Implementation of policy and legal frame needs to be improved
- Insufficient enforcement of food safety and livestock movement standards
- Limited knowledge of geographic distribution and prevalence of animal diseases
- Insufficient funding to veterinary services
- Administrative chain of command: DVOs not accountable to ACLE
- Limited diagnostic capacity at peripheral level
- Slow reaction to outbreaks of infectious diseases.

Opportunities

- Increase overall competitiveness and productivity through investments for the application of modern production techniques and technologies and better management practices
- Introduction of new fodder conservation system such as silage
- Increase know-how and skills on better management of livestock and rangelands
- Incentives for structural changes to increase the average size of livestock farms and overall productivity of livestock sector
- Increase crossbreeding together with improved veterinary care; terminal cross-breeding in dairy farms for beef production
- Increase carcass weight and meat-bone ratio
- Improve feed quality and feeding management
- Improve economic conditions for beef production (use of VAT exemption, support to investments)
- Utilise potential of domestic market for milk and meat (i.e. establish brand names for domestic meat products)
- Development of export strategies
- Increase cooperation with meat processing sector to improve market orientation of domestic production (vertical integration, quality products)
- Development of export strategies, including the adoption of commodity based trade
- Possibility of customising diseases control and eradication strategies (use of natural barriers, improved knowledge on diseases distribution).

Threats

- Competition of fodder production with food and cash crop production
- High price of some imported inputs
- Weakness in infrastructure, unreliable or non-existing electricity supply necessitating expensive generators, difficult access in remote regions
- Weakness in government administration with insufficient budget and low salaries
- Insufficient developed milk processing sector influences meat sector
- Financial sector is only very limited
- Insufficient political advocacy for the livestock sector
- Zoonotic risk for public health
- Role of wildlife and pastoral animals in the spread of animal diseases and zoonoses.

6.3 STRATEGIC INTERVENTIONS, ACTIVITIES TO BE IMPLEMENTED, IMPLEMENTATION MODALITIES, TIME-FRAME, COSTS AND FUNDING SOURCES TO PROMOTE INVESTMENTS IN THE COMMERCIAL BEEF VALUE CHAIN

6.3.1 Technological change and vertical integration

The strategy is based on vertically integrated commercial cattle farms and feedlots with contract to processors ("farm to fork") and purchasing from smaller farmers for finishing /fattening at the larger ones. It is based on the following elements:

- Improved animal health control including vaccination and movement control with animal identification (this is on the one side an on-farm activity, on the other side a country-wide or region-wide governmental task)
- Use of agro-industrial by-products and of silage for finishing and in feedlots
- Improved livestock management
- Establishing a trading system based on quality grading
- Producing selected breeding bulls like Boran, Bonsmara with commercial breeders and establishing a herdbook

- As milk and beef can be produced at the same farms: larger farms serving as milk collection centre for smaller ones
- Improved abattoir with appropriate food safety standard
- Provide investment support for modernisation and productive investment in beef ranches, beef farms, feedlots, and processing (abattoir, cutting, processing, retail).

The strategy is to finance eligible investment in the sub-sector through an **equity fund**. The funds purpose is to help establish sustainable, viable ventures that otherwise would not have been established due to perceptions of the risk involved and lack of credit facilities, to help finance, along with participating own funds of the proprietor the development of beef ranches /farms, of feedlots, of mixed beef –dairy ranches /farms with MCC, and of higher standard structures in slaughtering, processing and retailing. Under the program financing would be eligible for such investments as (example of the beef farm) on-ranch roads, firebreaks, fencing, water supply, stock handling and animal health control facilities, ranch buildings, breeding stock and an initial procurement of feeder steers for fattening, according to a realistic business plan.

The **implementation modalities** follow the management guidelines of the Equity Fund. These have to be developed according examples of similar programmes and funds (for example the paying agencies in the IPARD programme or specific equity funds). The implementation modalities include that the Equity Fund management unit is operational, that transparent guidelines are worked out and that risk management is enhanced (e.g. GPS for on-the-spot check-term). The Equity management unit includes a Fund manager, an assistant and specialised short consultant input according necessities (total **costs** 0.4 mill. € per year). **Activities** are listed in the next chapter.

The **time-frame** of the investments is 10 years. Forecasted costs and benefits of different investment examples are presented in the cash flow analysis in Annex12 & 13. **Funding sources** are according to the guidelines of the Equity Fund, e.g. one third of the investment by the equity fund. The investor has to invest at least one third own liquid capital.

Each project has to be scrutinised. Beef ranching is e.g. for less productive soils and in the more remote areas. It includes improved disease control, improved breeds, possibly the introduction of improved grasses and legumes (where land is expensive). Stratification of production is possible (farms for weaner production and farms for finishing) but farmers often prefer to keep the cattle until it has reached its slaughter weight. Dairy ranching is possible if there is the market and management for it. Crop residues shall be used as agro-industrial by-products for dry season feeding. Fodder can be conserved for the dry season. Advantage of silage is that no barn is needed and that termites don't like it. Rangelands can be reseeded with improved grasses and especially legumes after burning. For producing pasture seed, seed outgrower schemes can be strengthened through registration and brokering partnerships with other Service providers (task of the Ministry and /or a respective cooperative). Stakeholders shall be sensitized and trained in pasture seed production. Seeds have to be cleaned after harvesting, graded, dried, tested, stored, and pests controlled.

The investment for a large unit (ranch or feedlot) is up to 1 - 1.5 mill € (see cash flows in Annex 12). These units have been chosen on the basis of existing examples, e.g. the feedlot cash flow model of the Ugandan Investment Authority. The unit size is however determined by land availability (ranch) and by the availability of cattle to finish and feed. An individual market analysis has to show in each case the suitability. The units (ranch, feedlot) in the cash flow show the upper limit. Smaller farms are also eligible and its potential is shown in the gross margin analysis (Annex 12). The lower limit depends on the management and monitoring capacity of the equity fund management unit.

The higher running costs of a modern abattoir may be balanced by the better internal efficiency of the abattoir¹⁰ and by avoiding the cattle trade margin (direct marketing). Targeted markets are: The high quality Uganda market, the regional market (Rwanda, Burundi, DRC, Sudan, etc.), the Arab countries.

Business plans have to be realistic. *Realistic means:*

1. The main issue on the farm production side is adequate disease control. It allows the use of improved breeds growing faster and to higher end weights with a better meat-bone ratio¹¹
2. The main issue in a feedlot is cheap but adequate feed and a mark-up on the kg liveweight price (mark-up between purchasing and selling due to a better meat-bone ratio, due to better disease control, and by gaining from seasonal price variations)
3. A high standard abattoir can only be financed through processing and retailing at higher prices, i.e. the abattoir must be owned by or under contract of a stakeholder of the quality meat business. As long as low cost (and sub-standard hygiene) abattoirs are accepted by the government authorities high standard abattoirs cannot compete easily.

6.3.2 Veterinary services

Poor health remains one of the main factors limiting livestock productivity. The diseases can be controlled economically, however budget and management issues limit the implementation of control programmes. A starting point is to acquire better knowledge of the spatial distribution of major contagious animal diseases to adopt tailored control strategies.

Project proposals in the animal health sector are structured into two phases, the first of which is quantified in 550,000 EUR over a period of 18 months. After phase 1 decision makers and technical staff in Ugandan Government will have a clear and science-based picture on the spatial distribution and prevalence as well as control and eradication strategies for the 9 major animal diseases in the Country, shared and agreed with all stakeholders. Phase two -the implementation of strategies identified during phase 1 for at least 3 priority diseases chosen by MAAIF- should last at least 3 years with a budget impossible to quantify at present. A formulation mission for the whole project proposal will be necessary.

Due to the nature of the proposed actions and the fact that public health and trade implications are very important, the animal health proposals shall be implemented under the responsibility of MAAIF, assisted by external technical assistants on long and short term assignment.

Necessary is also to further increase budgetary and technical support to enhance veterinary services and animal health control, surveillance and inspection.

¹⁰ Presently there is a high number of actors intervening in the abattoirs whose role is not always clear (as internal security staff against larceny).

¹¹ Investment in commercial beef farms should result in higher end weights of crossbreds or of tropical beef breeds, and in better kg price due to better meat-bone ratio as higher weaning rate would not suffice to balance all investments.

6.4 BANKABLE PROJECTS IN RELATION WITH THE AGREED PRIORITY AREAS FOR ACTION, AND MAKING APPROPRIATE COST-PROPOSALS FOR FUNDING

6.4.1 Establishment of an Equity Fund Management Unit

The objective of this project is to contribute to technological change towards commercial production and processing in the beef sector and to service provision in the value chain.

The purpose is to establish the management capacity to scrutinise and select the submitted individual projects and to administer the fund. Getting a company (commercial farm etc.) off the ground and /or expanding it requires money, and raising the right kind of finance is a major difficulty for Ugandan SMEs. The lack of capital is a barrier to growth that can rarely be overcome by recourse to family, friends or banks. The goal of equity capital is to help more businesses achieve their ambitions by providing them with finance (possibly also strategic advice and information) at critical stages of their development.

Costs: 0.4 mill. € per year

Specific human resources requirements:

- International fund manager
- Assistant to the manager
- International short-term consultant input
- National short-term consultant input.

The activities include:

1. Creating the institutional and strategic setup required for implementing the Equity Fund
2. Defining eligible investments and related criteria (see also chapter 6.5 below)
3. Inviting development partners to submit proposals (for a joint fund)
4. Defining procedures, guidelines and documents for the administrative and technical checks of the investment proposals
5. Establishing criteria on presentation of the investment proposals
6. Designing a methodology for review of the investment proposals
7. Defining monitoring indicators
8. Developing administrative and control procedures for the investment scheme
9. Developing risk analysis and on-the-spot check modules
10. Supplying specialised software for monitoring
11. Inviting private investors to submit proposals.

The overall objective is to enhance the rural development of Uganda and to improve farm revenues and employment opportunities. Livestock is given attention in Uganda's *National Development Plan (2010/11–2014/15)*, which seeks annual growth of 5.4 percent in the sector, up from an average of 3.0 percent in recent years (NPA 2010). Beef and dairy cattle and poultry are identified as strategic agricultural commodities for the country that are to receive increased investment levels for accelerated production.

The fund, which will be operated by a professional Fund Manager to be recruited in the global market, would leverage investments by donors (EU and other interested partners, like development banks i.e. World Bank, AfDB, EADB), public or para-statal /semi-private sector

(such as the NSSF¹²), private investors (i.e. investment banks or existing equity funds), complemented by agreement with commercial banks to provide dedicated loan facilities. The latter would allow reducing the risk of the fund becoming a majority share in medium sized enterprises.

6.4.2 Combined commercial abattoir/meat processing plant

This is a sub-project of the Equity Fund Project to be partly financed and monitored by the equity fund. Due to its size it is presented separately.

Overall costs: 14,170,000 USD

EU contribution: One third through the equity fund

Overall objective and purpose:

- To contribute to the development of a commercial beef meat value adding chain by constructing and operating the first commercial abattoir and processing plant in Uganda.
- To improve profitability of small and medium cattle farms by providing supply contracts between farm and abattoir
- To improve overall food safety for beef meat in line with international standards

Description: See annexed plant layout and description (Annex 13)

Project impact: The project aims to improve the link between small and medium farms on one side and the meat processing industry on the other side. The result will be an improved margin for cattle holders due to direct sales to the abattoir, a better feedback for improved animal quality (weighing and grading system), a reduced risk of food borne diseases due to improved food safety measures and increased slaughter capacities for Kampala to meet future demand for quality meat.

Activities:

- Elaboration of a detailed feasibility study for a combined abattoir/processing plant
- Investigate the local situation with regards to animal supply
- Establishing a clear marketing plan (sale of products) with realistic quantities and prices. This plan describes the present place of all relevant competitors.
- Draft a business plan for a combined abattoir/processing plant with sensitivity analysis
- Identify potential international co-operation and investigate funding opportunities.

Overall layout of the plant

- combined abattoir/meat processing plant

Operating model

- commercial private abattoir/ meat processing enterprise

Proposed Site

- industrial area close to Kampala city

Animal sourcing

- preferably by contracted farms from DCZ or DFZ

Product range

- beef carcasses, retail cuts, processed beef (minced beef, sausages)

¹² The National Social Security Fund (NSSF) is a semi-government agency responsible for the collection, safekeeping, responsible investment and distribution of retirement funds from employees of the private sector in [Uganda](#), who are not covered by the Government Retirement Scheme. Participation for both employers and employees is compulsory.

- hides and skins, edible offal

Production quantities (y1-y5)

- cattle slaughtered: 90- 130 animals per working day
- carcass output: 2200- 4800 tonnes per year
- premium beef cuts: 280- 350 tonnes per year
- other retail cuts output: 1000- 1200 tonnes per year
- processed beef output: 460- 580 tonnes per year
- offal/bones: 560- 700 tonnes per year
- hides : 418- 685 tonnes per year

Equipment/room plan

- lairage for 300 animals
- slaughter line for cattle (max. capacity 150 animals/day)
- chillers for 80 tonnes of carcasses, semi-finished products and finished products
- deboning room with equipment
- processing room with equipment
- vehicles for animal collection and delivery of finished products
- offices, lab, waste disposal
- locker rooms, toilets
- generator for auxiliary power supply

All buildings according national UNBS standards, all operations according international hygiene standards. Equipment from Europe or China, used equipment when it fulfills all necessary standards.

Specific human resources requirements

- Meat business manager
- Meat processing technologist (production manager)
- Marketing manager
- Mechanical engineer
- Meat quality controller

Potential markets

- Kampala city, domestic markets, East African regional markets

Potential market segments

- Premium beef market
- Supermarkets, shopping malls
- Premium hotels, restaurants, tourist lodges, hospitals, canteens

Parameters/ assumptions

- Operations start in y1 with 90 cattle per day of 150 kg carcass weight
- Operations in y5: 130 cattle of 180 kg carcass weight
- Due to increased animal quality av. price for cattle increases from 300 to 350 USD; same for carcasses: 4,8 USD per kg to 5 USD per kg
- Quantity of processed products increases from 2000 tonnes per year to 2500 tonnes per year
- Number of employees increases according production from 78 to 99 persons

6.4.3 Veterinary project

This is a separate donor financed project.

The objective is to improve the provision of animal health services and therefore the quality and safety of beef products, a step-by-step strategy is proposed. A cascade of actions would be necessary to achieve this goal:

- a) Upgrade of legislation (complement to the OIE expertise if necessary).
- b) Acquire a better knowledge of the spatial distribution of major contagious animal diseases identified through consultation with animal health officers and beef sector stakeholders, such as FMD; CBPP; LSD; Brucellosis; RVF; PPR; CCPP; Trypanosomosis; tick-born diseases (especially ECF);
- c) Drafting and adoption of a tailored control strategy, based on the results of the mapping exercise;
- d) Cost benefit analysis and risk assessment for each priority disease;
- e) Options for improving health standards for export: Implementation of diseases control strategies; establishment of sanitary compartments (DCZ, DFZ) or adoption of alternative export modalities (Commodity based-approach);

Due to the complexity of the above action scheme, it would be necessary to mobilise further consultancy for the formulation of the project proposals. Data given hereinafter are only tentative and aimed to set benchmarks.

Action a. is ongoing (see chapter above), implemented by OIE. There could be the need for additional support in case MAAIF and OIE would request it, especially in the phase of wide sharing and adoption of new laws and rules.

Action b. would last about 6 months, including sampling design, samples collection, testing in the country with confirmation of positives and buffer in the competent OIE world reference laboratory, and critical analysis of results. A sketch of the proposed action is reported in Annex 18. The tentative cost of action b. is EUR 260,000.

Action c. will be based on the results of the previous action and aims at tailor a specific strategy for each target disease. A strategy working group composed by public and private stakeholders would be established to discuss and draft the strategies. The FAO/OIE FMD Progressive Control Pathway (PCP, see box below) could be taken as a model and adapted to other infectious diseases where possible.

FAO/OIE FMD Progressive Control Pathway (PCP)

The Progressive Control Pathway (PCP) is the approach developed by an FAO team for classifying country progress in FMD risk management. In this approach there are criteria for describing the FMD risk management position of countries that are not-free of FMD. It has lead to a tool that can be applied to measure (and communicate) country progress within regional roadmaps, and aims at starting countries along a pathway of activities from measuring risk to risk management, covering the stages before they could apply for recognition of disease freedom.

The Progressive Control Pathway recognises that differences in risk of infection occur between (and within) infected countries, that countries are at different stages in managing the risk of infection. The PCP applies a risk reduction approach in which each Member State is encouraged to develop national risk reduction strategies that are supportive to the regional effort.

RISK REDUCTION APPROACH

Not a top down prescribed approach: but each MS encouraged to develop national risk reduction strategies that are supportive to the regional effort.



Several accompanying general measures have to be implemented to accomplish with the objectives of action e:

- Establishment of a reliable, harmonised and sustainable animal identification system
- Improvement and enforcement of movement control nation-wide

- Upgrade of laboratory capacity by establishing a residues control unit for export products
- Strengthening of the national epidemi-surveillance system and improvement of certification procedures
- Adoption of export standards based upon freedom from diseases, control of diseases or alternative science-based systems, like commodity-based trade (see description at Annex 19).

For the accomplishment of the last activity is necessary to have a reliable animal identification, movement control and traceability system in place, to have reliable disease surveillance and prompt reaction mechanisms as well as the establishment of compartments in which animal diseases are controlled and may represent and negligible risk for export. Former studies proposed the establishment of a series of fenced areas (4) in areas of the countries with an important density of cattle, i.e. presence of big ranches and existing farm fences.

However, Uganda has a unique advantage as natural water barriers can demarcate a line impermeable to livestock movement from Lake Albert at the West edge to Lake Victoria at the Southern edge, passing through Victoria Nile and Lake Kyoga. Therefore, there would be need of minor investment in road blocks and check points (with no fences) to set up a physical barrier ranging from the Uganda-Tanzania border on Lake Victoria to Lake Albert, which would split the country into two compartments, the Southern of which would comprise almost half of the Ugandan territory, hosting more than 75% of the cattle population in the country. The Southern border of this big disease control zone could be identified with river Kagera, which represents a natural barrier but flows into the Tanzanian territory for most of its length. Talks with the Tanzanian authorities should be initiated to agree upon a common diseases control strategy across the border area, which would benefit also Tanzanian breeders. It is strongly suggested to outsource a socio- environmental impact assessment for the area bordering with Rwanda and DRC (up to Lake Albert), completed by an economic study, in order to identify the best option for sealing the southern border of the disease control zone described above. Probably adapted fencing -permeable to people and managed in collaboration with local communities- would be the most viable and sustainable option.

6.4.4 Food safety project

This is a separate donor financed project.

Title: Upgrading food safety in the commercial beef marketing chain

Overall costs: 2,000,000 USD

EU contribution: 2,000,000 USD

Overall objective and purpose:

To develop Uganda's food safety institutions and implement sectoral policies and strategies that are compatible with international SPS standards (including gender, minorities and environmental standards), and which also enable Uganda to effectively participate in regional initiatives. The specific purposes are:

- To train stakeholders and employees in competent authorities in implementing food safety standards (GHP, GMP, HACCP, ISO)
- To contribute the development of a national carcass grading system for beef carcasses
- To contribute a traceability system of animal origin for food
- To improve overall food safety for beef meat in line with international standards.

Description:

The beef production chain in Uganda suffers from weak links from primary producers to slaughtering, processing and retail actors; low carcass quality and lack of control on food chains. Improving the overall quality of the Uganda's beef meat sector requires the effective application and implementation of a national grading system for beef carcasses, a traceability system for food of animal origin and implementation of food safety systems (GHP, GMP, HACCP).

GHP and GMP is applicable to small scaled meat processors (slaughter slabs, road side butchers) while HACCP and ISO is applicable to commercial abattoirs, meat processing enterprises and retail companies (modern butchers, butcher stands in shopping centers). To ensure full quality control on the food processing and distribution chain, HACCP requires product traceability procedures. There is also a need to implement sustainable monitoring and surveillance programmes, including the use of epidemiological and monitoring data in food safety risk assessment. Additionally, the accreditation of laboratories is required to deliver reliable results for laboratory tests on animal health, food quality, and food safety.

Project impact: The project aims to build the capacity of MAAHF to develop, implement and monitor CAC compatible food safety and food quality assurance standards across all elements of the food chain (production, processing and distribution). The expected impact is expected to improve quality of Uganda's meat products, thereby strengthening local consumer confidence in food safety and expanding meat exports to neighbouring countries. This will contribute to Uganda's products being more competitive on domestic and export markets with the result of significant economic and cross-border benefits.

Activities:

GHP/GMP and HACCP standards application/traceability systems

- Training in such topics as general hygiene, GHP/GMP, HACCP, international food legislation for Executive Officers, private quality managers and academic personnel
- Training in application of traceability systems for abattoirs, meat processors and retail companies
- Increasing the awareness of consumers and the market operators on food safety and quality issues/concerns. Promotion activities will make use of the press, television, internet, seminars and workshops
- Following-up the dissemination of GHP/GMP and HACCP standards among meat industries. This will include support to Uganda's competent authority applying HACCP procedures in specific meat industries and monitoring their performances in the medium term
- Testing the application of HACCP standards, product traceability systems in selected agri-businesses/agro-processing companies, assisting the companies to develop HACCP plans, and monitoring their performances in the short-term
- Organization of an exhibition and conference on best food production practices bringing together suppliers and buyers, with the objective of promoting the collaboration among operators in the food sector.

Carcass grading system

- Testing national cattle breeds with regards of life weight, meat quality, meat-bone-ratio and slaughter yield
- Developing a national grading system compliant with international grading systems(e.g. EUROP)
- Training national grading specialists in live animal and carcass grading
- Developing a beef market monitoring system based on carcass quality

- Organise seminars with stakeholders to promote a national carcass grading system

Veterinary legislation

- Propose amendments to veterinary legislation
- Develop secondary legislation for monitoring, surveillance and disease eradication
- Develop secondary legislation regarding veterinary public health
- Make the legislation visible to the staff of MAAHF and the livestock sector in Uganda through seminars, workshops and an awareness campaign.

Instructions for Veterinary Food Inspectors based on secondary legislation

- Develop reporting system for Veterinary (food) Inspections
- Train Veterinary Inspectors in inspections and reporting
- Inform and motivate the food (of animal origin) processing chain (abattoirs, processing plants, shops, etc).

Monitoring and surveillance system

- Adapt and develop surveillance system and contingency plans for relevant animal diseases
- Develop a disease notification system
- Train the veterinary network (staff of MAAHF and licensed veterinarians) in monitoring, surveillance and disease eradication according to the plans
- Organise exercises in disease outbreaks.

6.5 POSSIBLE STRATEGIES AND MODALITIES FOR IMPLEMENTATION OF THE IDENTIFIED BANKABLE PROJECTS IN THE SHORT (5 YEARS), MEDIUM (10 YEARS) AND LONG-TERM (15 YEARS)

The following strategies and modalities are recommended for the implementation of the identified bankable projects:

(Please note that the points are identified according to its planning horizon (short term with the acronym 5yr, medium term with the acronym 10 yr¹³) and according to its main responsible implementing actor, private or public (PR or PU)).

1. Establish and maintain effective equity fund management (5yr, PR)

1.1. Provide advisory services to potential beneficiaries in the preparation of sound investment proposals and applications or link them with service providers. Provision of Technical Assistance through a dedicated facility, aiming at strengthening the capacity of the selected beneficiaries in the field of

- Business planning, management and accounting (a business plan must contain an executive summary, present the company history and the management team, the products and services, analysis of the market and the competitors, commercialisation, operational management, reminder of the main hypotheses behind the plan, financial projections, capital required, exit possibilities¹⁴)
- Market information and linkages to business opportunities

¹³ No long term activity was identified as the development should start as soon as possible and the 10-year horizon should suffice.

¹⁴ Indicate according to the projections, when and how the investor will be able to exit from the investment.

- 1.2. Encourage linkages with the commercial and investment banking sectors, both through capacity building in preparing business plans, and by reducing screening and monitoring costs for the partner banks
- 1.3. Define minimum and maximum criteria for the interventions (e.g. 30-500 or on maximum 1000 cows per investment) as well as quality criteria (e.g. an excellent and stable management team capable of turning the negotiated goals into reality; solid management procedures; a transparent legal structure where personal and professional assets are not entangled)
- 1.4. The investor to comply with the Principles of Responsible Investments (PRI)
- 1.5. Develop an operational tool for the portfolio management and investment analysis
- 1.6. Establish mechanisms to guarantee legality and regularity of the financial investments. Define specific controlling rights over how the company is managed.

2. Livestock production (beside the purely private sector investments)

- 2.1. Support development of private sector associations for the livestock producers, traders and processors (5yr, PU)
- 2.2. Promote adapted crossbreeding schemes (criss-cross) (5yr, PU/PR)
- 2.3. Support breeding bull production. Establish Herdbook association (5yr, PR)
- 2.4. Support water dam and borehole construction (5yr, PU/PR)
- 2.5. Activities in the fodder and feeding domain are: (5-10yr, PU, PR)
 - Promote fodder plants, fodder conservation and improved pastures
 - Characterise and quantify alternative feed stuffs (crop residues and industrial by-products)
 - Build capacity of farmers, service providers and district staff in feed ration formulation and planning
 - Promote improved rangeland management (targeted burning, reseeding, placing of water dams, control of bush encroachment)
 - Increase use of machinery
 - Set up farmer based demonstrations.

3. Veterinary field (5yr, PU)

- 3.1. Provide an adequate budget and streamline all tendering and staff management procedures
- 3.2. Set up a comprehensive policy on animal health and meat hygiene related to meat export, with support and commitment from all stakeholders. The relevant policy document should be presented by the Government for approval at the highest political level
- 3.3. Review and update all relevant legislation in a holistic food chain approach and in line with OIE and Codex standards and EU legislation
- 3.4. Reorganise animal health and meat hygiene to bolster confidence, with special attention to:
 - Political responsibility
 - One CA (competent authority)
 - An unbroken chain of command

- 3.5. Establish DCZs that will later become Disease-Free Zones (DFZ) (10yr, PU)
- 3.6. Strengthen animal disease control and meat safety activities in line with the new policy and legislation, starting in DCZ 1 and DCZ 2 or the new large zone (see map in Annex 15) (5-10yr, PU, PR)
- 3.7. Develop competent national laboratory support based on available laboratory resources and an upgrading of the National Veterinary Laboratory at the MAAIF (5yr, PU)
- 3.8. Support development and adoption of appropriate traceability systems (5yr, PU)
- 3.9. Establish roles of paravets and support and monitor networks of CAHWs and other service providers (5yr, PU)
- 3.10. Develop sanitary mandates, and launch sanitary mandate contracts (5yr, PU).

4. Food safety

- 4.1. Provide advice and training on food safety to processors and inspection services (5yr, PU)
- 4.2. Enforce national food laws and technical standards (5-10yr, PU)
- 4.3. Improve data base for food borne diseases
- 4.4. Rehabilitation of slaughter capacities (5-10yr, PR)
 - Support investments in commercial abattoirs/meat processing plants to meet domestic market expectations and to increase value added to processed product
 - Enforce food law with respect to existing overworked slaughter capacities (KCC, Nsooba: limit throughput, conditional approval)
 - Promote existing standard slaughter facilities (UMI) in increasing utilization of capacities
 - Support investments in renovation of slaughter slabs in Districts in order to improve food safety and working conditions for meat inspectors
 - Create a system of conditional approval for slaughter facilities with technical and organizational deficits
 - Create a national slaughter slab/ slaughter house/ abattoir scheme adapted to the needs of rural areas, district centres and the capital Kampala based on adapted technical and organizational standards (GHP/GMP→HACCP→ISO).
- 4.5. Support development of commodity standards and certification procedures in line with the WTO requirements (5yr, PU)
- 4.6. Carcass grading system (5yr, PU) (see Annex 20)
 - Enforce draft national carcass grading system
 - Train independent carcass graders in order to stimulate better meat quality
 - Develop feedback system from slaughter house backward to farmers concerning carcass quality (live weight vs. slaughter yield/meat-bone-ratio).