Characterisation of the livestock production system and potential for enhancing productivity through improved feeding in Masaka TM in Masaka district of Uganda.

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The Feed Assessment Tool (FEAST) is a systematic method to assess local feed resource availability and use. It helps in the design of intervention strategies aiming to optimize feed utilization and animal production. More information and the manual can be obtained at www.ilri.org/feast

FEAST is a tool in constant development and improvement. Feedback is welcome and should be directed feast@cgiar.org. The International Livestock Research Institute (ILRI) is not responsible for the quality and validity of results obtained using the FEAST methodology.

The Feed Assessment Tool (FEAST) was used to characterize the feed-related aspects of the livestock production system in Masaka district using a case of Gulama Dairy Farmers Business Association. The assessment was carried out through focused group discussions and completion of short questionnaires by three key farmer representatives owning small, medium and large scale farms in April 2011. The following are the findings of the assessment and conclusions for further action.

Farming system

The farming system is primarily a subsistence based, mixed crop/livestock system. Farm sizes in the area are around 4 acres (1.6 ha) on average with most of the land being used for cropping. A typical household size is 6 people who live permanently on farm on average per year. Households in the area commonly grow a variety of food crops including; coffee (Coffea Arabica), maize (Zea mays), beans (Phaseolus vulgaris), bananas (Musa acuminate), cassava (Manihot esculenta), and vegetables. Farmers grow Napier grass (Pennisetum purpureum) as their main forage crop. Most farmers grow fodder legumes such as Lablab purpureus and Mucuna pruriens as well as fodder trees and shrubs such as Calliandra calothyrsus. The average area of land used for production of food crops is shown in Figure 1 and fodder crops in Figure 2.

Each household also raises a variety of livestock species including cattle, goats and pigs for various purposes. Cattle are kept mainly for milk, cash income from animal sales and manure. On average most households have two or three milking cows. In addition, many households have 2-3 goats. Indigenous chickens are kept by households to meet household meat, egg and cash needs. Improved cross bred type cattle are kept by more than 80% of households and they are popular due to their high...
milk production potential. Nganda types of cattle are kept by about 20% of the households. Cross breeds comprise mainly of Friesian, Jersey breeds and the local Nganda cattle. Goats are also raised by 10-20% of the households for quick sale when funds are required. Labour for cattle management is generally available all the time at approximately 50,000 Uganda shillings per month. In addition to this price workers are given meals, milk and some health care cover. This total price package is considered very expensive. Livestock oriented labour is mainly needed during the dry season while the crop oriented labour is required mainly required in the wet season. Herding labour is more costly in the dry season because herdsman moved over longer distances in search of fodder and water for the animals. This high cost of labour is considered to be due to many rural people migrating to town to look for better paying jobs. Rainfall levels are generally adequate to support cropping activities; however, rainfall unreliability is increasingly becoming common (Table 1). Water is not a major constraint in the area and no large scale irrigation is carried out.

![Average area (ha) per hh of dominant arable crops](image1)

**Figure 1:** The average area of land utilised for the various food crops grown in Masaka district

![Average area (ha) per hh of dominant forages](image2)

**Figure 2:** The average area of land utilised for the various fodder crops grown in Masaka district
Table 1: Cropping seasons that occur in the area

<table>
<thead>
<tr>
<th>Name of season</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
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<th>May</th>
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<td>Long wet season</td>
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<td>Short wet season</td>
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<tr>
<td>Dry season months</td>
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**Major income sources**

Milk sales are the primary contributor to household income. An average of 52% of all household income comes from the sale of milk. Crops, mainly maize, beans, bananas, groundnuts and cassava make an important contribution of approximately 38% to household income. The contribution from sales of indigenous birds and eggs is considered relatively minor at 10% collectively for some households (Figure 3). The contribution of these sales varies substantially throughout the year based on climatic conditions. Sale of animals generally occurs in an ad-hoc manner when funds are required quickly or undesirable animals such as bull calves and unproductive old cows need to be culled.

![Figure 3: The primary contributors to household income in the area](chart.png)

**Livestock production system**

The livestock production system is focused on milk production. Improved dairy breeds, namely Friesians and a few Jerseys dominate livestock holdings as shown in Figure 4. Milk produced on the farm is sold to MADDO dairies at an average price of 600 Ugandan shilling (UGS), (0.2 USD; ranging from 500-800; 0.21-0.33 USD) per litre. The average milk production per cow per day in the area is 12 litres. Management of the cows varies with type of cattle. Indigenous local breeds are normally grazed while improved cows are confined and fed in cattle sheds throughout day and night. Generally households with larger land holdings tend to graze cows while those with smaller land holdings confine their cows in a small fenced area (sometimes with a cattle shed). Goats are normally tethered in homesteads and along the road side for grazing. The common feeding strategies in the area...
include grazing, feeding chopped green fodder and or crop residues especially maize 
Stover. Many farmers have adopted communal silage making and a few are conserving forage as hay.

Artificial Insemination (AI) services are readily accessible for all farmers in the area from GGulama and Kingo dairy farmer business associations (DFBAs) and is becoming the preferred method of reproduction. The price of semen varies significantly and AI services cost UGS 30,000 – 40,000 (13-17 USD per service) per service. Farmers pay UGS 30,000 for any repeats. Farmers consider this price expensive. Farmers would like to be trained on heat detection to improve conception rates. Service providers use bull catalogues to decide which semen to give. The type and quality of semen is given to farmers depending on the provider’s perception of the farmer’s management capabilities.

Veterinary services are not easily accessed. The price of veterinary treatments depends largely on the nature of the problem. For example east coast fever (ECF) vaccination costs UGS 80,000 (34 USD) which is considered unaffordable to most farmers. Farmers vaccinate animals against common diseases such as trypanosomosis, caprine bovine pleural pneumonia (CBPP), foot and mouth disease (FMD) tuberculosis, and lumpy skin disease (LSD). Veterinary services are provided by private health technicians and government animal health workers. Farmers individually buy acaricide and spray animals themselves to control ticks.

**Figure 4: Average livestock holdings per household in Masaka in Tropical Livestock Units (TLUs)**

**Major feed sources through the year**

The diet is primarily composed of green forages, crop residues, legumes and concentrates as shown in Figure 5. The contribution made by these feed sources to the diet varies throughout the year.

During the main part of the wet season (April-June) and (September -November), green forages, legumes and grazing compose the largest part of the diet. During the dry season (January – March and
July- August) crop residues are found in the diet in larger quantities. Surprisingly, larger quantities of concentrate feeds are fed during periods when there is plenty of forage. Grazing, purchased feeds, naturally occurring and collected feeds, cultivated fodder and crop residues contribute 48, 32, 8, 6, and 6% of the total diet on farms (Figure 6). Concentrates contribute 99% of the total purchased feed. The contributions of total ME (MJ/kg) and crude protein (CP; %) are shown in Figure 7 and 8 respectively. Supplements such as maize bran and dairy meal can be purchased for 200 UGS (0.1 USD) per kg and 40,000 UGS shillings (17 USD) per 70 kg bag respectively.

Figure 5: The dietary composition of cattle in Masaka, Uganda throughout the year in relation to rainfall pattern.

Problems, issues and opportunities
According to farmers, the main constraint to production in this area is animal diseases, especially tick borne diseases and lumpy skin disease. Insufficient feed for feeding animals especially during the dry season is the second most important problem in the area. In addition, there is need for farmers to access seeds for establishing high yielding forages. Water scarcity is the third most important problem especially in the dry season. Other problems include unavailability of animal health providers. Farmers also consider fluctuation of milk prices in the dry and wet season as a major problem to sustainable incomes. Farmers attribute price fluctuation to the monopoly of the milk processor in the area. Although not listed as a major problem concentrate feeds are considered to be very expensive and significantly increase the cost of milk production. A summary of problems and farmer proposed solutions are shown the (Table 2).
Table 2: Problems, issues and proposed farmer solutions within the production systems

<table>
<thead>
<tr>
<th>Problem (in order of importance)</th>
<th>Main problem</th>
<th>Proposed farmer solutions</th>
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| 1                                | Animal diseases | - Increase number of local drug shops  
                                        - Increase number of service providers  
                                        - Education on control of diseases and vaccinations |
| 2                                | Unavailability of feeds especially during the dry season. Lack of forage seeds. | - Pasture conservation practices such as silage making and hay making.  
                                        - Link seed companies to farmers through DFBA  
                                        - Enhance network between farmers so that those who have e.g. demo farmers share with others  
                                        - Help farmers to start community seed production |
| 3                                | Unavailability of water – especially in the dry season | - Education on water harvesting technologies such as valley dams, underground water tanks etc. |
| 4                                | Limited animal health services. Farmer consider the causes as:  
                                        - Farmers reluctance to pay for services  
                                        - Service providers are overloaded with many cases hence slow in responding to cases  
                                        - They are occupied with other personal tasks such as business. | - Service provider should separate personal and animal health roles  
                                        - Service provider should specialise in technical roles such as A.I., clinical and animal husbandry services rather than mixing them. |

Potential interventions

To mitigate the high incidences of animal diseases attempts need to be made to increase the number of local drug shops, increase the number of service providers and enhance education on control of diseases and vaccinations. Again some of these are outside the scope of what farmers can change themselves and will need institutional interventions to solve them.

One way of mitigating the effects of feed constraints is to produce more feed biomass per unit area. Farmers consider that the main reason limiting this is lack of forage seed and prolonged dry period. Since most farmers have not committed large proportions of their holdings to fodder, there is still scope for producing more fodder from available land. To mitigate the effects of forage scarcity, efforts will have to be made to catalyse community seed production to increase acreage under fodder. Forage conservation is also inevitable to counter the forage/feed scarcity during the dry season. The two interventions need to be commercialised for sustainability purposes.

The variation in price received for milk indicates an oversupply vs the available markets of fresh milk in the area, particularly during the wet season. There is potential to conserve the excess forage that
occurs during the wet season through silage making. This will help alleviate dry season feed shortages and enable farmers produce more milk during the dry season when milk prices are high hence to earn more money. Simple on-farm methods of silage production should be considered. The use of polythene bags or small scale silage pits may be viable options. Grazing forms a substantial amount of forage to households. Improving pasture quality can significantly increase DM available for feeding. Simple methods of improving pasture such as bush clearing, strip and circular sowing are viable options given that farmers own small portions of land.

Currently most of the purchased feeds are concentrates and feed ingredients. As a result attempts to make delivery chains effective and improve access of concentrates will enhance usage amongst farmers. However, as the price received per litre of milk is relatively low, the extra expense of additional concentrate feeds is unlikely to be off-set by the potential increases in milk yields that may be achieved with higher levels of concentrate feeding. Improvement of animal health services will required a top down approach as it is unlikely the farmers can instigate the necessary changes themselves on-farm. Such changes include creating attractive incentives that should attract more service providers and make them concentrate on providing animal health services. Other changes are that service providers should specialise in technical roles such as A.I., clinical and animal husbandry services rather than mixing them. However, this would require farmers to show the willingness to pay for better services.

Key issues
- Limited animal health services providers. The few offering services are overloaded by attending to AI, clinical and animal husbandry services.
- Inadequate high quality forage especially during the dry season.
- High incidences of animal diseases caused by unavailability and high cost of drugs and vaccines.
- The average price per litre received for milk is low and variable throughout the year.

Ways forward
- Improve animal health service delivery amongst farmers.
- Improve farmer training in disease control measures.
- Initiate community forage production either through groups or interested people as a business.
- Enhance training on simple silage making techniques on farms.
- Enhance efficient concentrate feed delivery chains to farmers and train them on optimum concentrate usage.

Conclusion
Milk makes the most important contribution to household income in this subsistence based mixed/crop livestock system. Farm sizes in the area are an average size of 4 acres (1.6 ha) most of which is used for cropping. Every household has at least 1-2 milking cows and 2-3 goats. The primary crops of importance are cassava, coffee, maize and beans. The main constraints to the further intensification and development of dairying in the area are a lack of feed especially in the dry season and high incidence of diseases. Napier grasses are the main types of fodder. Most farmers keep improved cattle. Milk prices are generally unstable and vary throughout the year due to an oversupply in the wet season.