

Characterisation of the livestock production system and potential for enhancing productivity through improved access to the forage seed value chain in Mukono District, Uganda

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Contents

Tables	iv
Figures	v
1 Introduction	1
2 Sample description	2
3 Results	3
3.1 Farming systems	3
3.2 Livestock production system	6
3.3 Major income sources	8
3.4 Major feed sources	9
3.5 Gender division of labour and gendered decision-making on livestock, feed-related activities	11
3.6 Problems and opportunities	12
4 Potential interventions	13
5 Conclusion	14
6 References	15

Tables

Table 1: Male and female respondents by farm size, in individual interviews	2
Table 2: Seasonal cropping patterns in Mukono District	5
Table 3: Problems, issues and proposed farmer solutions within production systems in Mukono District	12

Figures

Figure 1: Farm size by household type	3
Figure 2: Land ownership by gender.	3
Figure 3: Dominant crop types cultivated (ha) by gender of household head in Ntenjeru.	4
Figure 4: Dominant crop types cultivated (ha) by gender of household head in Nagojje	4
Figure 5: Dominant fodder types cultivated by livestock producers in Mukono District	4
Figure 6: Average daily labour rates by gender (in USD) for Ntenjeru	5
Figure 7: Average daily labour rates by gender (in USD) for Nagojje	5
Figure 8: Dominant livestock categories by gender of the household head in Nagojje	6
Figure 9: Dominant livestock categories by gender of the household head in Ntenjeru	6
Figure 10: Gendered decision-making on livestock in Mukono District	7
Figure 11: Average number of household members of cooperatives and farmer organizations by gender in Mukono	7
Figure 12: Primary sources of household income in Ntenjeru, Mukono District	8
Figure 13: Primary sources of household income in Nagojje, Mukono District	8
Figure 14: Relative contribution of income sources to household and women's income	8
Figure 15: Gendered decision-making on major sources of household income	9
Figure 16: Gendered decision-making on the sale of livestock and milk	9
Figure 17: Dietary composition of cattle in Mukono throughout the year in relation to rainfall pattern	10
Figure 18: Contribution of dietary dry matter (DM) to the total diet by feed source in Mukono	10
Figure 19: Contribution of dietary metabolizable energy (ME, MJ/Kg) to total diet on-farm in Mukono	10
Figure 20: Contribution of crude protein (CP %) to total diet on-farm in Mukono	11
Figure 21: Gender division of labour in feed production, harvesting, and feeding in Mukono	11
Figure 22: Gendered decision-making on crops and feed in Mukono	12

I Introduction

The Gendered Feed Assessment Tool (G-FEAST) was implemented to characterize the feed-related aspects of the livestock production system in Mukono District, Uganda. The G-FEAST tool uses mixed methods (qualitative and quantitative approaches) to determine if farmers/communities can identify feed as a problem and what aspects of the feed (Lukuyu et al. 2019). Mukono District is located in the central region of Uganda, close to the capital of Kampala, and is considered an urban centre (Uganda Bureau of Statistics 2017). Mukono District is classified as an improved intensive dairy production zone. It is characterized by small farms, improved breeds, good market access, and the common cut and carry feeding system.

The G-FEAST exercise was conducted on 13 February 2020 in Ntenjeru subcounty and 17 February 2020 in Nagojje subcounty. The two subcounties were incorporated, given that Mukono District has many administrative units and the two subcounties would be representative of the district. The tool combined both qualitative and quantitative research techniques to elicit the viewpoints and perspectives of both women and men farmers in the community regarding feeding practices and general livestock production. This report presents the findings of the assessment and conclusions for further action.

2 Sample description

A scoping exercise was conducted with the help of the local livestock officer to identify farmers. Two separate gendered focus group discussions (FGDs) were carried out in each subcounty, one with men only (23 in Nagojje and 25 in Ntenjeru) and another with women only (15 in Nagojje and 25 in Ntenjeru). Additionally, individual interviews were conducted with 18 respondents in each subcounty. The participants were selected to represent different wealth groups in terms of landholding, both male-headed and female-headed households. The composition of the sample is depicted in Table 1.

Table 1: Male and female respondents by farm size, in individual interviews

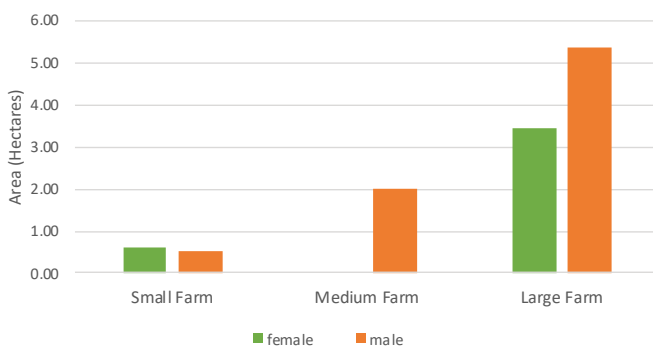
Individual interviews	Male respondents	Female respondents
Small farm size (0–75 ha)	3	3
Medium farm size (0.75–3 ha)	3	3
Large farm size (3 ha and above)	3	3
Totals	9	9

3 Results

3.1 Farming systems

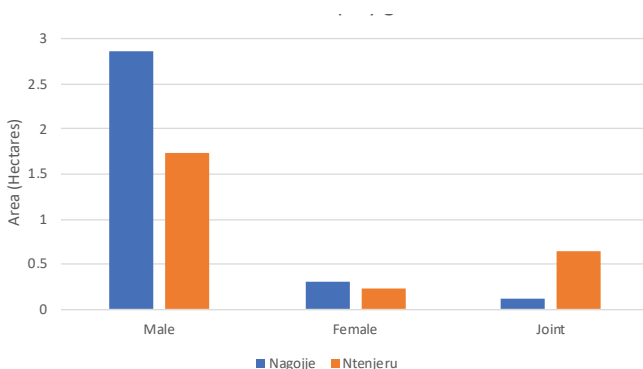
The farming system is primarily an improved intensive mixed crop/livestock system. Average farm sizes in Mukono are about 1.21 ha (3 acres), with most of the land being used for crop production (both food and fodder crops). The average household size is six people per household. Figure 1 illustrates farm sizes by gender of the household head. We can observe that across the three landholding categories, men and women own land. The largest proportion of female-headed households falls in the large farm category.

Figure 1: Farm size by household type



Common land tenure systems include leasehold and freehold systems whereby farmers have bought from the government (both local and national), communal land (Mailo land) where land is owned by the community, and the Bibanja system whereby land is owned by the Kabaka (King of Buganda). Figure 2 illustrates land ownership by gender within a household. The results indicate that the man owns most of the land (both Ntenjeru and Nagojje sites). However, there are some households in which land is owned jointly by the man and the spouse. In other households, women own less than 0.5 ha. In both focus groups (men and women), there was consensus that women can own land just as men can. Therefore, the land tenure system does not affect the participation of women and men in livestock and fodder production.

Figure 2: Land ownership by gender



Households in the study area commonly grow a variety of food crops as shown in Figure 3 (Ntenjeru) and Figure 4 (Nagojje). Dominant food crops include bananas (*Musa acuminata*), maize (*Zea mays*), broad beans (*Vicia faba*), and cassava (*Manihot esculenta*). Other crops grown include coffee (*Coffea arabica*), cocoa (*Theobroma cacao*), and sugarcane (*Saccharum officinarum*). Maize is the most-cultivated crop (on average, 1.6 ha under cultivation). Female-headed households are more likely to cultivate bananas, maize, and broad beans and less likely to grow coffee, cocoa, sugarcane, and cassava.

Figure 3: Dominant crop types cultivated (ha) by gender of household head (up to 5) in Ntenjeru

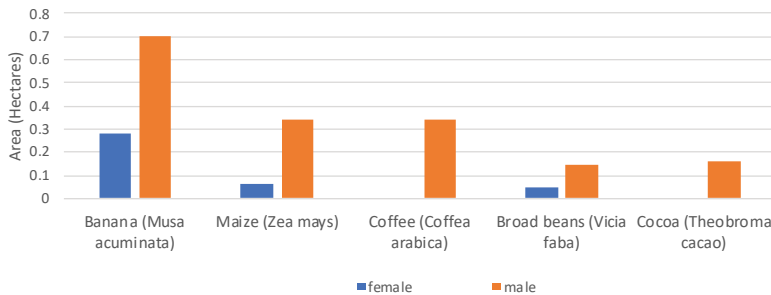


Figure 4: Dominant crop types cultivated (ha) by gender of household head in (up to 5) Nagojje

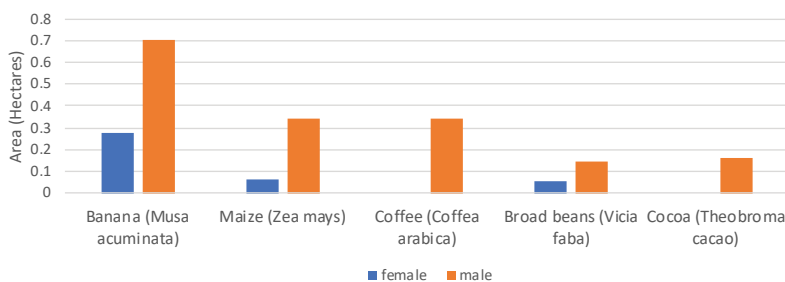
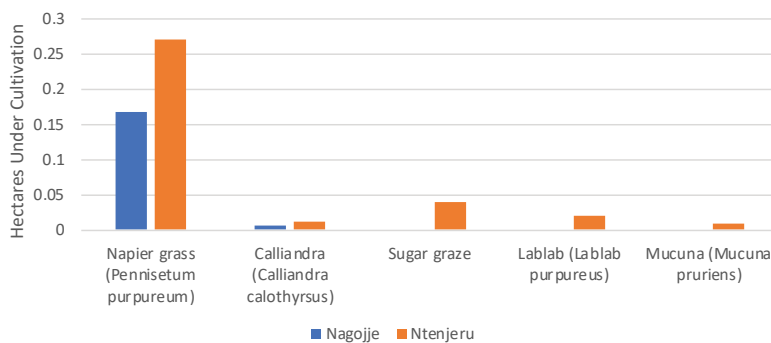


Figure 5 indicates the most dominant fodder crops cultivated by livestock producers in Mukono District. Napier grass (*Pennisetum purpureum*) is the most commonly grown fodder as cut and carry, an average of 0.17 ha and 0.27 ha in Nagojje and Ntenjeru respectively. Sugar graze and Calliandra (*Calliandra calothyrsus*) are grown on less than 0.05 ha as cut and carry forages. Other notable planted forages include Lablab (*Lablab purpureus*) and Mucuna (*Mucuna pruriens*).

Figure 5: Dominant fodder types cultivated by livestock producers in Mukono District



Rainfall levels are generally adequate to support agricultural activities during the two major cropping seasons. However, over time, unpredictable weather patterns have threatened reliance on rain-fed agriculture. Table 2 shows the rainfall pattern by season.

Table 2: Seasonal cropping patterns in Mukono District

Name of cropping season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry season (Kyeya)	■	■				■	■					■
Low rain season (Mwaka)			■	■	■	■						
Heavy rain season (Nkirimwaka)								■	■	■	■	■

The first season for farmers is called Mwaka, which is characterized by low rainfall. It starts in March through to May. The most common farming includes ploughing, seeding, weeding and some partial harvesting. The second cropping season is Nkirimwaka and is characterized by heavy rainfall with an average intensity score of 4 (FGD data). Nkirimwaka starts in late August and runs through to November. Major farming activities include seeding, sowing and weeding. The dry season (rainfall intensity below 1), Kyeya, runs between January and February and later between June, July, and December. During Kyeya, some farmers prepare their land for cultivation and others harvest crops from the previous season.

Labour is not always available as and when required at an approximate minimum daily rate of UGX10,000 and a maximum of UGX30,000. The costs vary with activity and labour becomes scarcer during the planting season. Labour costs are higher in Ntenjeru than in Nagojje because of rural urban migration. The migration of the youth from Mukono is over 60%. Additionally, there is a difference in the wage rate paid to a man compared to a woman. Figure 6 shows that, on average, a man in Ntenjeru would earn as much as USD20 compared to a woman (USD4). A similar trend is observed in Nagojje (Figure 7). This could mean men are paid more because they work longer hours than women or they do a better job in some activities than women do.

Figure 6: Average daily labour rates by gender (in USD) for Ntenjeru

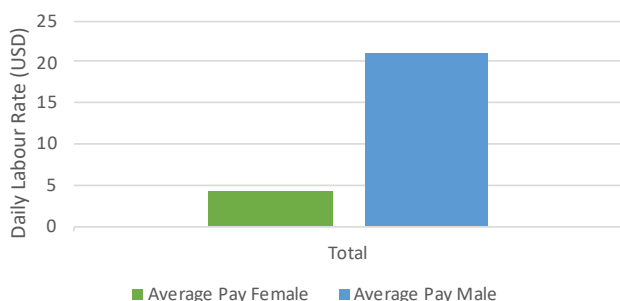
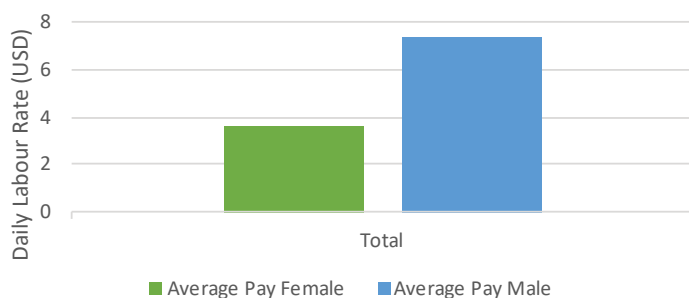


Figure 7: Average daily labour rates by gender (in USD) for Nagojje



3.2 Livestock production system

Improved dairy cattle are the most dominant type of livestock kept by farmers in Mukono District (see Figure 8, Nagojje; Figure 9, Ntenjuru). The most dominant breeds are Friesian and Jersey, and their crosses. Farmers also rear local dairy cattle (Ankole) for milk production. Other livestock types kept include sheep, fattening and draught cattle (Ankole), pigs, and poultry. Most cattle are kept for milk production, ghee, and sale as fattened cattle (FGD data). Sheep, pigs, and commercial poultry are mainly kept as a source of income through the sale of live animals and their products (eggs).

Figure 8: Dominant livestock categories by gender of the household head in Nagojje

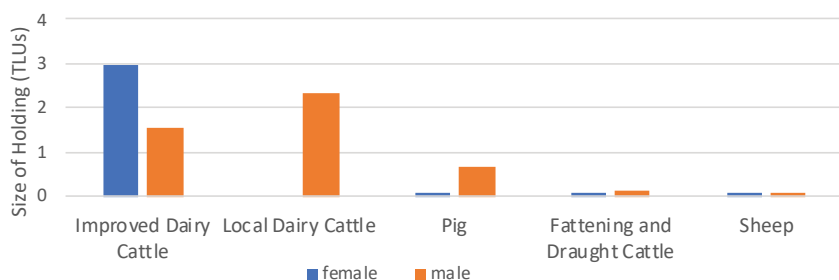
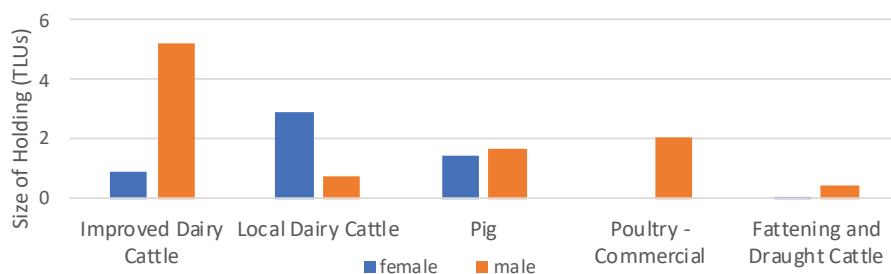


Figure 9: Dominant livestock categories by gender of the household head in Ntenjuru

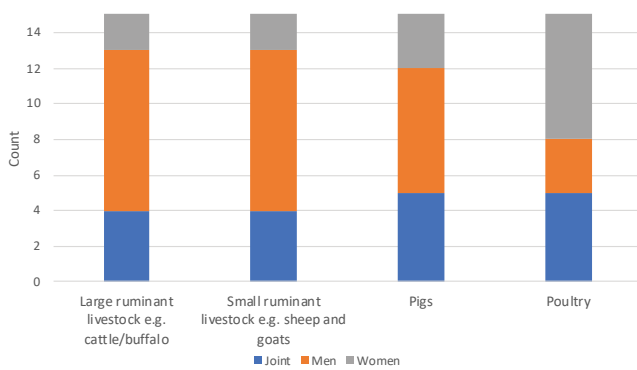


The livestock production system is focused on milk production. Milk is sold in the local market in Nagojje, whereas in Ntenjeru it is sold to the Nampate dairy cooperative. The milk price ranges between UGX500–800 (USD0.21–0.33) per litre.

Female-headed households in Nagojje dominate in improved dairy production compared to male-headed households (Figure 8). On the other hand, male-headed households in Ntenjeru dominate in improved dairy production compared to female-headed households (Figure 9). Similar trends are observed for other livestock types reared. It is apparent that gender does not affect participation in any livestock enterprise. Livestock, especially cattle, are mainly zero-grazed. Farmers provide feeding troughs to feed their animals with cut and carry fodder such as Napier grass. Other livestock species such as pigs and sheep are tethered within the compound. Chickens can be housed or left to free range. Common livestock diseases include East Coast Fever (ECF), tick-borne diseases, lumpy skin, and poultry diseases. Farmers rely mainly on private veterinary officers in the area for animal treatment. Public veterinary services are utilized during vaccination. Farmers compliment veterinary services with traditional veterinary “doctors”. This is common in treating mild coughs and diarrhoea. Dairy cooperatives such as Nampate Dairy Co-op in Ntenjeru have organized training by local vets and have considered establishing Agro-vet outlets to ensure farmers have increased access to veterinary services and input. Artificial insemination (AI) services are readily available with a score of 4 for both male and female focus groups in both sites. However, the majority of farmers (over 80%) often rely on bull services for reproduction. Farmers use their bulls, especially the improved breeds such as Friesians and Jerseys. Some of the challenges associated with bull services is increased incidence of disease and high rates of repeat. Farmers cited that AI services sometimes do not work, with recorded repeat rates of up to three times. Additionally, the services are not affordable for farmers (FGD data).

Through the FDGs, it was observed there was a gendered pattern in terms of access to input and services. The services include disease control, extension, vaccination, and AI services. Men and women equally listed similar input suppliers, implying both men and women are knowledgeable about the needs of their enterprises. The trend is reflected in the decision-making process in either household where men and women make most decisions jointly or individually (Figure 10). This implies that women may not own livestock but are actively involved in production decisions within Mukono District.

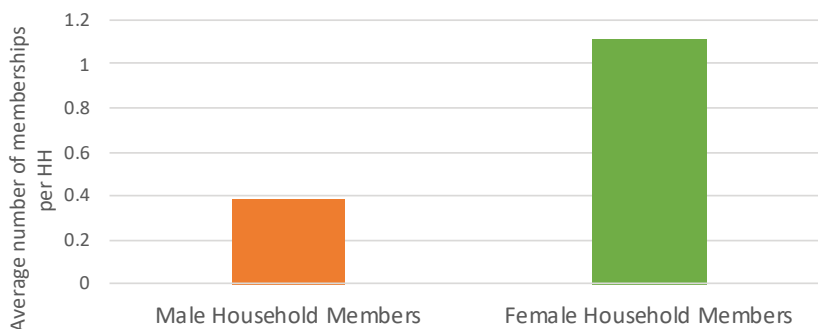
Figure 10: Gendered decision-making on livestock in Mukono District



The main sources of financial service (credit) include VSLAs, savings and Credit Cooperative Society (SACCO), banks, cooperatives, and individual farmers. In most cases, credit is obtained for the purchase of land, the purchase of livestock, farm inputs, and other personal needs. In Nagojje, formal credit sources dominate in the credit share (70%) compared to informal credit sources (30%). On the contrary, informal credit sources in Ntenjeru dominate with a credit share of 70% compared to formal credit sources at 30%. The conditions of accessing credit vary according to the source. Some of the common conditions for obtaining credit for agricultural production include guarantors, possession of the land title, and membership in case of a SACCO or group. Over 80% of the farmers are estimated to have access to credit. On a scale of 0–4, men FGD estimates the ease of accessing credit at 2 and women FGD at 3. In the men FGD, 70% of the participants aspired to access credit, which was similar to the participants of the women FGD (70%) in both Ntenjeru and Nagojje. In both focus groups, there was consensus that women in male-headed households would be more constrained in accessing credit. This is a result of the women not controlling the needed collateral. Youths would also be constrained in accessing credit due to a lack of collateral. In the women’s FGD, men would be constrained in accessing credit, especially from VSLAs, because most men are not members.

Figure 11 shows the membership of cooperatives or farmer groups by gender. Both women and men are members of cooperatives and farmer organizations. However, female household members are more likely than men to belong to cooperatives or farmer organizations. In a random household, at least one female member will belong to a farmer organization compared to men (0.4).

Figure 11: Average number of household members of cooperatives and farmer organizations by gender in Mukono



3.3 Major income sources

Figure 12 (Ntenjeru) and Figure 13 (Nagojje) present major sources of household income in Mukono District. In Nagojje, livestock-related activities (predominantly dairying) contribute 40% to household income compared to Ntenjeru (31%). Dairying contributes the highest share within the livestock category. Income received from the regular sale of livestock is uncommon in the area as indicated by the proportional off-take rate of 1% and 4% for cattle and sheep respectively. Cropping of food crops contributes 45% and 48% in Ntenjeru and Nagojje respectively. This forms the bulk of household income contribution. Other income sources include off-farm business, employment, remittances, and income from labour activities.

Figure 12: Primary sources of household income in Ntenjeru, Mukono District

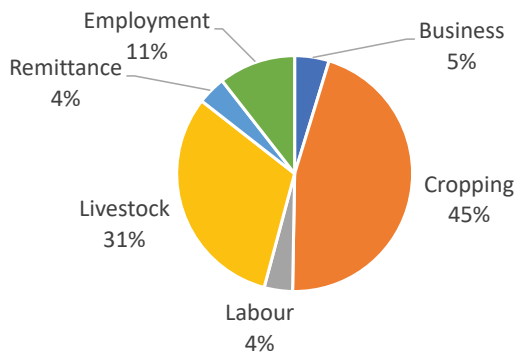


Figure 13: Primary sources of household income in Nagojje, Mukono District

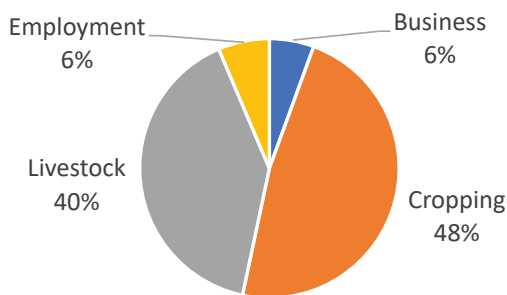


Figure 14 shows the relative contribution of major sources of income to household and women’s income. Dairying, poultry, cash crops, and piggery contribute the greatest share to women’s income. Other income sources for women include off-farm business, food crops, and labour services.

Figure 14: Relative contribution of income sources to household and women's income

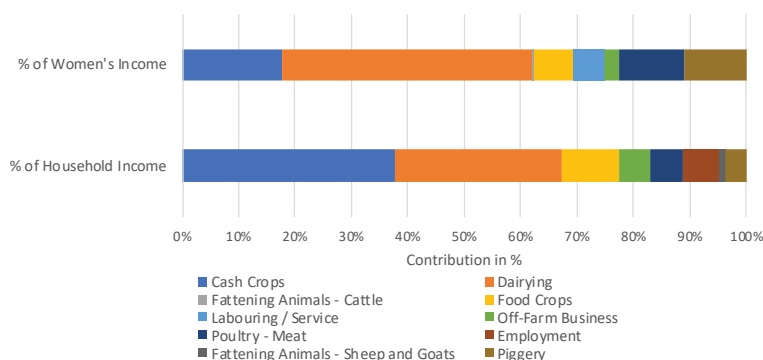
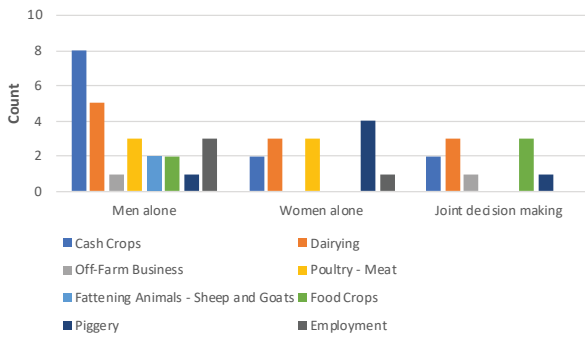


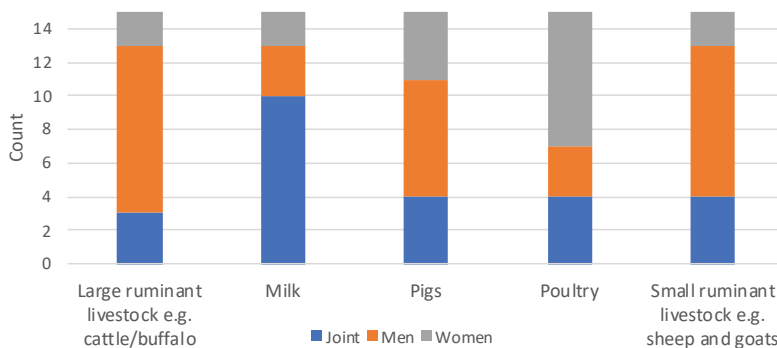
Figure 15 illustrates that men make decisions on income from cash crops, dairying, fattening animals, food crops, poultry, and employment. In some households, the decision for the enterprise is jointly made between the man and his spouse. In other households, women make most decisions on dairying, cash crops, food crops, poultry, piggery, and off-farm business.

Figure 15: Gendered decision-making on major sources of household income



Focusing on income from the sale of livestock, it can be observed that women make most decisions alone on milk and poultry sales. Men make most decisions on large ruminants, small ruminants, and pigs. There is, however, joint decision-making on the sale of livestock and milk (see Figure 16). This implies there is a lot of inclusivity between men and women on livestock-related income.

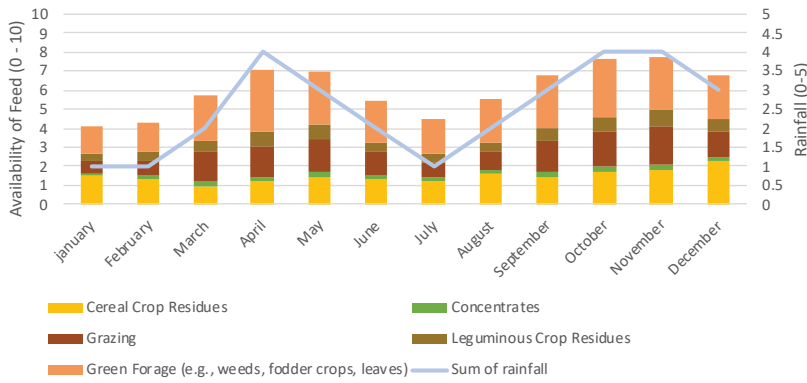
Figure 16: Gendered decision-making on the sale of livestock and milk



3.4 Major feed sources

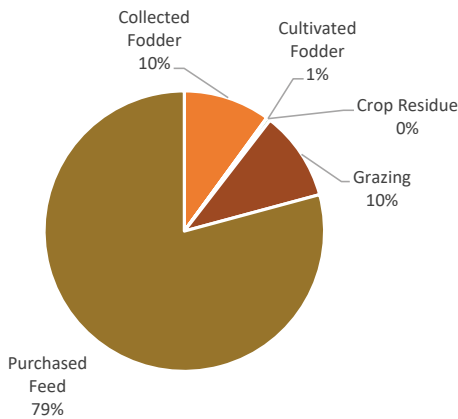
The diet is composed primarily of green forages, grazing, cereal crop residue, leguminous crop residues, and concentrates, as shown in Figure 17. The contribution made by these feed sources to the diet varies throughout the year. Green forages contribute the most significant share to animal diets. Green forages include fodder crops and collected feed. Farmers graze their animals on naturally occurring grass. Grazing and green forage intensities increase during the wet season (March–June) and (September–December) and reduce in the dry season. During the dry season, cereal crop residues and legumes are incorporated into the diet in larger quantities. Concentrates are used in very small quantities and appear higher in the wet seasons compared to the dry seasons of the year.

Figure 17: Dietary composition of cattle in Mukono throughout the year in relation to rainfall pattern



Purchased feed contributes 79% to the total dry matter intake. Purchased feed includes crop residues, green fodder, and concentrates. Grazing contributes 10% to the total dry matter intake on farms, followed by cultivated fodder (1%) comprising mainly Napier grass. Collected feed contributes 10% to the dietary dry matter (Figure 18).

Figure 18: Contribution of dietary dry matter (DM) to the total diet by feed source in Mukono



The contributions of total ME (MJ/Kg) and crude protein (cp %) are shown in Figures 19 and 20 respectively. As observed, purchased feed contributes the highest share in terms of ME (MJ/Kg) at 80% and crude protein at 77%. Cultivated fodder contributes 0% to the total ME (MJ/Kg) and crude protein contributes 1%. This implies that cultivated fodder has a very low nutritional contribution and farmers rely mostly on purchased feed. Collected fodder contributes 10% to the total ME (MJ/Kg) and 11% to crude protein, while crop residue contributes 0% to the animals' nutrition.

Figure 19: Contribution of dietary metabolizable energy (ME, MJ/Kg) to total diet on-farm in Mukono

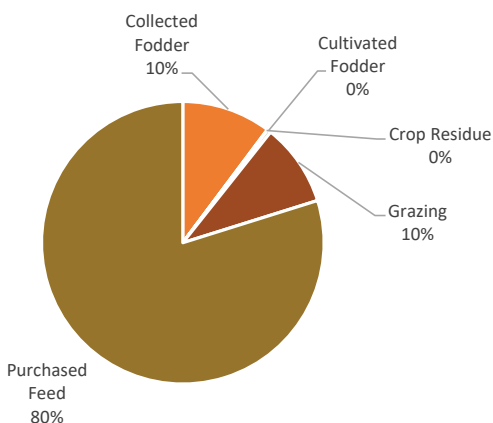
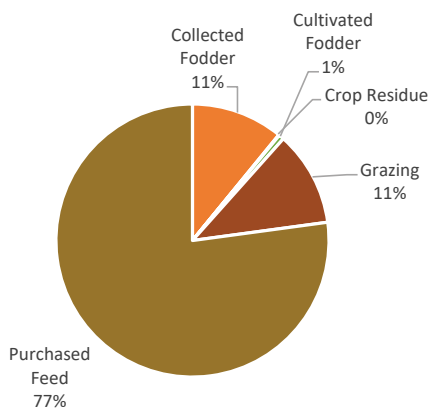


Figure 20: Contribution of crude protein (CP %) to total diet on-farm in Mukono



3.5 Gender division of labour and gendered decision-making on livestock, feed-related activities

Figure 21 shows different activities in forage production and the different roles played by household members. Men dominate in land preparation, planting, processing of feed, purchase of feed, and mixing feed ingredients. Women are mostly involved in land preparation, weeding forage crops, transportation of feed, storage of feed, feeding, and watering. Children and the youth are mainly involved in cleaning, feeding and watering facilities, collection of off-farm forages, feeding, watering, weeding, and harvesting. Results indicate that all household members provide considerable labour in the production and management of forages and livestock.

Figure 21: Gender division of labour in feed production, harvesting, and feeding in Mukono

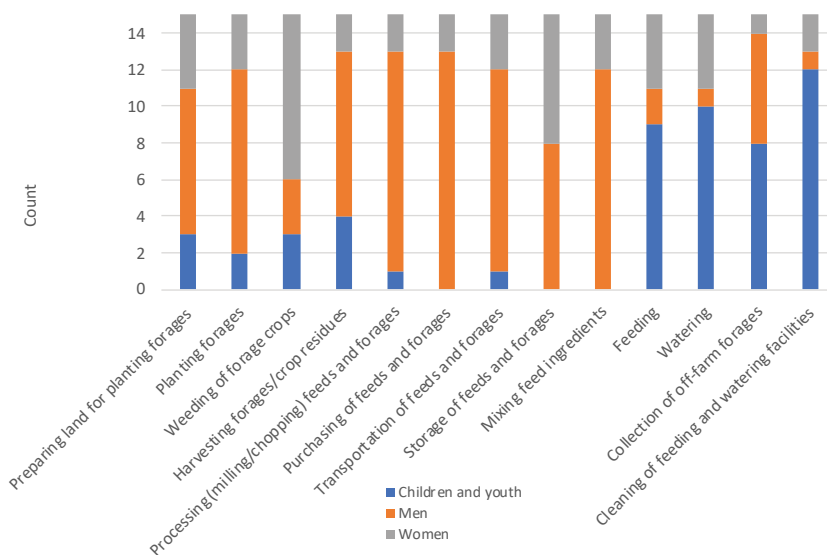
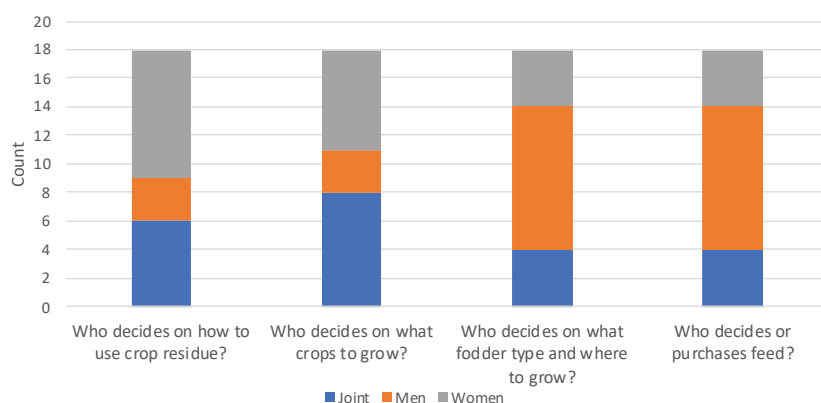


Figure 22 shows the decision-making roles of men and women regarding crops and feed. Concerning decisions relating to feed, (type of fodder, where to grow, and purchase of feed), men make most decisions. Women make decisions on the type of crop to be planted and how to use the crop residues. In some households, these decisions are undertaken jointly as illustrated in Figure 22. It is evident that both men and women in a household make decisions together (joint decision-making) in what to grow, where to grow, and how to grow.

Figure 22: Gendered decision-making on crops and feed in Mukono



3.6 Problems and opportunities

Table 3 summarizes the problems/challenges farmers face and possible solutions, as suggested by farmers.

- The main challenges identified by men in the community are livestock diseases, poor quality breeds, low quality feed, limited access to vet services, lack of knowledge, and theft of animals.
- The main problems identified by women in the community are feed scarcity, diseases, limited access to extension services, and theft of animals.

Table 3: Problems, issues and proposed farmer solutions within production systems in Mukono District

Main problem	Who is affected most? (Small/medium/large farms; men/women; MHH/FHH; etc.)	Proposed farmer solutions	Ranking by Men	Ranking by Women
Diseases/disease resistance	Large farms	Vaccination Control of fake drugs Subsidy on drugs Regular spraying of animals	1	2
Feed scarcity/low quality feed	Small farms, female-headed HH	Adoption of improved high-quality forages Purchasing feed Fodder conservation in wet season Training on animal feeding	2	1
Limited access to vet/extension services	All	Increasing number of extension/vet personnel	3	4
Poor quality breeds	All	Improving AI services Subsidy on AI services	4	5
Theft of animals	All but especially small farms and female-headed households	Imposing high penalties on culprits Use of dogs and employing security guards	5	3

4 Potential interventions

The findings show that farmers rely mainly on purchased feeds which includes crop residues, green fodder, and commercial concentrates and feed ingredients as a result farmers need to be encouraged to adoption of improved high-quality forages, trained on better feeding practices and fodder conservation technologies. This can be achieved through demonstrating these techniques to farmers. Farmer feed collected feeds hence it is desirable to train farmers on better utilisation of locally available feed resources. Diseases emerged as a major challenge to farmers that may require disease management interventions.

5 Conclusion

Farmers in Mukono are inclined towards dairy production in intensive systems; introduction of improved planted forage should be encouraged. Farmers should be exposed to existing forage varieties and offered training on forage production and management. Farmers should also receive training on animal nutrition that will cover the introduction of balanced feed rations for increased livestock production. The efforts should emphasise the incorporation of women and youth to participate in different levels of the livestock feed value chain.

6 References

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