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

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Contents

Tables

Figures

1 Introduction

The Gendered Feed Assessment Tool (G-FEAST) was implemented to characterize the feed-related aspects of the livestock production system in Wakiso District, Uganda. The G-FEAST tool uses mixed methods (qualitative and quantitative approaches) to determine if farmers/communities can identify constraints and opportunities for feed development (Lukuyu et al. 2019). Wakiso District is located in the central region of Uganda, about 47 Km from Kampala city (Uganda Bureau of Statistics 2017). Wakiso District is classified as an improved intensive dairy production zone. It is characterized by small farm sizes, improved dairy breeds, and good market access. The most common feeding system is the cut and carry system.

The G-FEAST exercise was conducted on 18 February 2020 in Namayumba subcounty. The tool combines 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, one with men only (16 men participated) and another with women only (12 women participated). Additionally, individual interviews were conducted with 18 respondents selected from the FGD participants. The participants were selected to represent different wealth groups in terms of landholding, considering 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

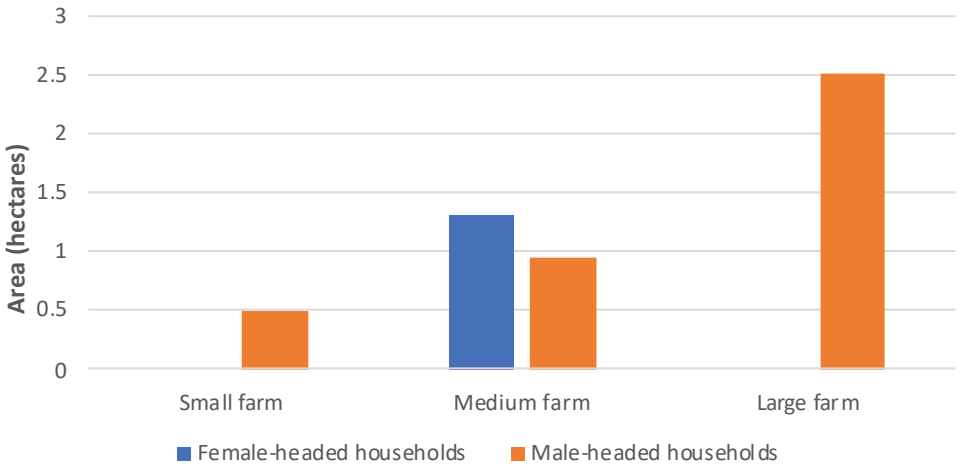
Wealth category	Male respondents	Female respondents
Small farm size (0–75 ha)	3	3
Medium farm size (0.75–2.5 ha)	3	3
Large farm size (2.5 ha and above)	3	3
Totals	9	9

3 Results

3.1 Farming systems

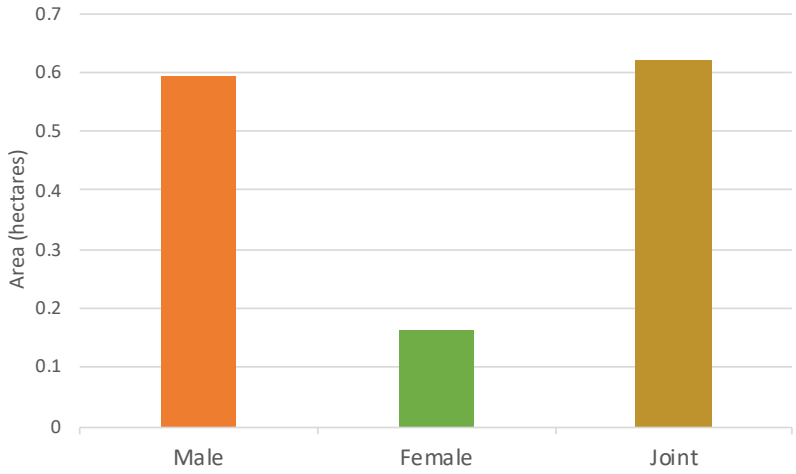
The farming system in Wakiso District is primarily an improved intensive mixed crop/livestock system. Average farm sizes in Wakiso District are about 0.81 ha (2 acres), with most of the land being used for crop production (both food and fodder crops). The average household size is six permanent residents per household. Figure 1 illustrates farm sizes by gender of the household head. We can observe that across the three landholding categories, the largest proportion of female-headed households falls in the medium-size farm category. In the small and large landholding categories, most households are headed by males.

Figure 1: Farm size by household type



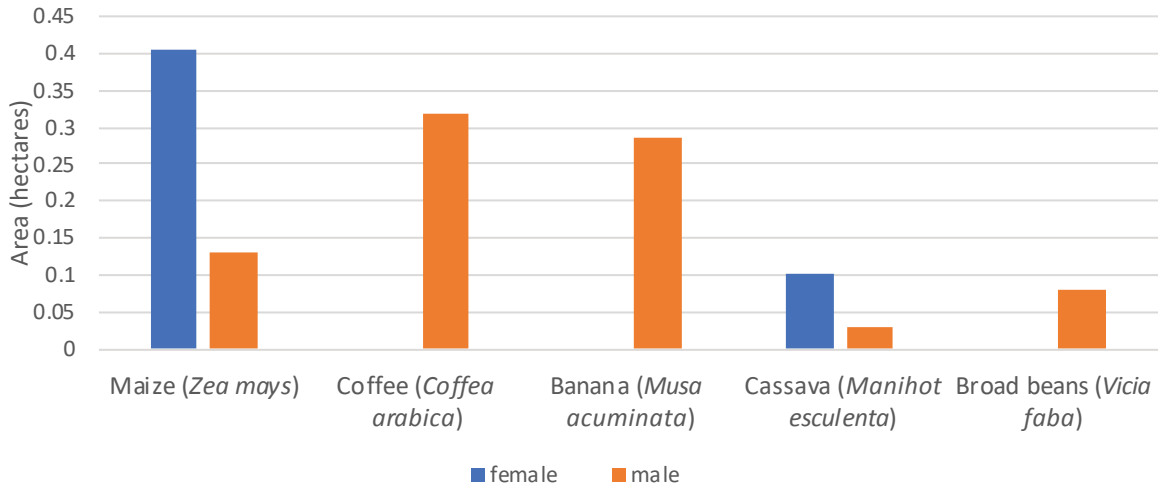
Common land tenure systems include leasehold and freehold systems whereby individuals have bought from the government (both local and national), communal land (Mailo land) where land is owned by the community, and the Bibanja system whereby land is owned by the Kabaka (King of Buganda). Figure 2 illustrates land ownership by gender within a household. The results indicate that the man owns most of the land. In some households, women individually own less than 0.2 ha. However, there are some households in which land is owned jointly by the man and his spouse. In both focus groups (men and women), there was consensus that women can own land equally, just as men do. However, in the men's FGD it was noted that in the Bibanja tenure system, the property owners (persons with land rights) do not permit the rearing of livestock and production of fodder. The other land tenure systems do not constrain livestock and fodder production.

Figure 2: Land ownership by gender



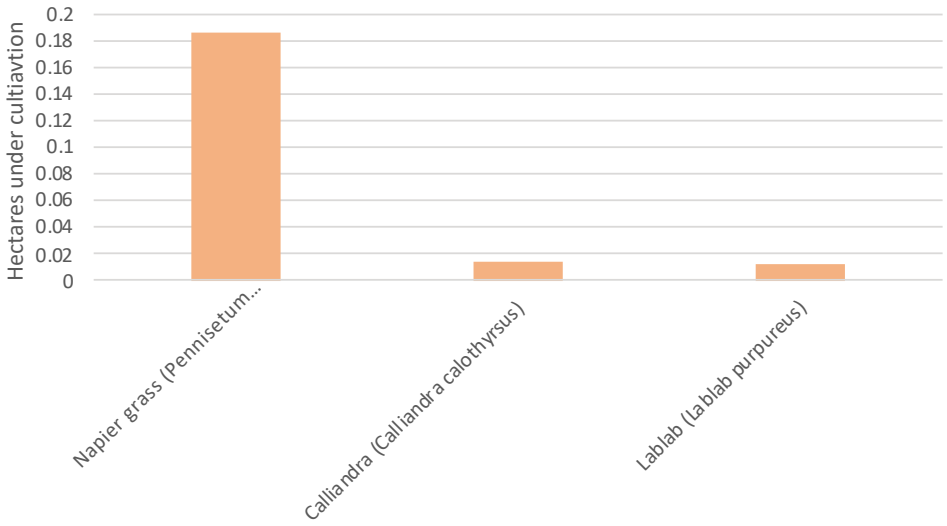
Households in the study area commonly grow a variety of food crops as shown in Figure 3. The most dominant food crops include bananas (*Musa acuminata*), maize (*Zea mays*), broad beans (*Vicia faba*), coffee (*Coffea arabica*) and cassava (*Manihot esculenta*). Other crops grown include green peppers (*Capsicum annuum*), assorted vegetables (mainly for household use), tomatoes (*Lycopersicon esculentum*) and sweet potatoes (*Ipomoea batatas*). Maize is the most dominant cultivated crop (on average, 0.4 ha under cultivation). Female-headed households are more likely to cultivate maize and cassava and less likely to grow coffee, bananas and broad beans.

Figure 3: Dominant crop types by acreage and by gender of the household head



Many farmers also grow forage crops, as depicted in Figure 4. Napier grass (*Pennisetum purpureum*) is the most commonly grown fodder, with an average of 0.18 ha planted to this crop for cut and carry. A few farmers grow fodder trees such as Calliandra (*Calliandra calothyrsus*) and fodder legumes such as Lablab (*Lablab purpureus*).

Figure 4: Dominant planted forage crops



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.

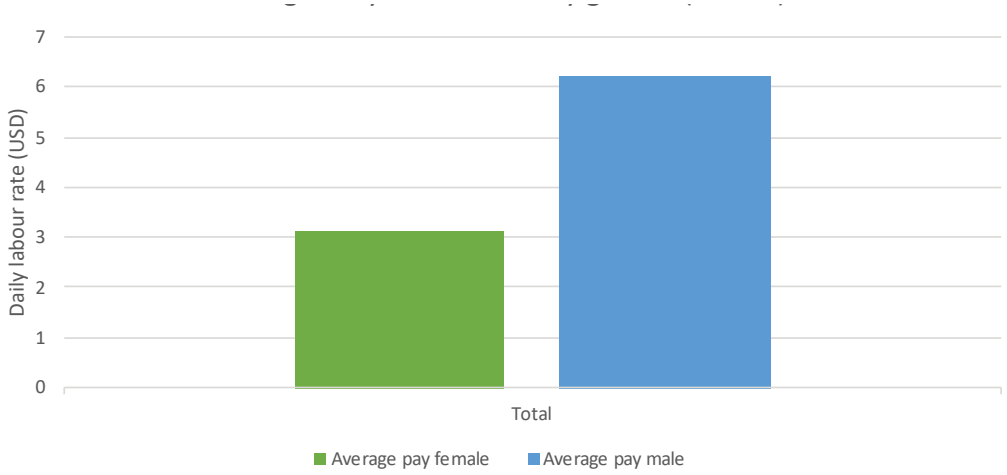
Table 2: Seasonal cropping patterns in Wakiso District

Name of season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry season (Kyeya/ Ekeya)												
Low rain season (Esoka)												
Heavy rain season (Eyokubili)												

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

Labour is generally available as and when required at an approximate minimum daily rate of UGX10,000 and a maximum of UGX35,000. The costs vary with activity and labour becomes more scarce during the planting season. Labour costs are much higher due to rural-urban migration, especially among the youth. The migration of the youth out of the village is estimated to be 70%, followed by men (20%) and women (10%). Female-headed households are more constrained in accessing labour than male-headed households are. Additionally, there is a difference in the wage rate paid to a man compared to a woman. Figure 5 shows that on average, a man in Wakiso would earn as high as USD6 compared to a woman (USD3). 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.

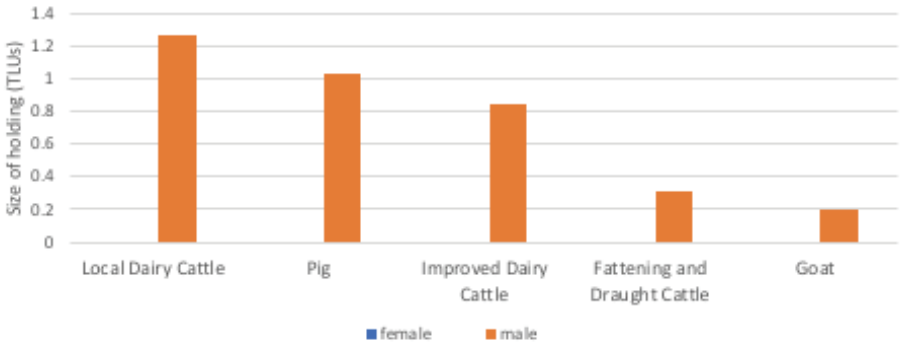
Figure 5: Average daily labour rates by gender (in USD)



3.2 Livestock production system

Households in Wakiso District raise a variety of livestock species including cattle, sheep and goats (shoats), pigs and poultry for different purposes. Cattle are kept mainly for milk, income from sale and manure. Local dairy cattle are the most dominant cattle type kept by farmers in Wakiso (Figure 6). The most dominant breed is Ankole/Nganda, while 70% of households keep local dairy (Nganda) cattle. Farmers also rear improved dairy cattle with the dominant breed being Friesian and its crosses. An estimated 10% of the households keep improved dairy cattle. The majority of the farmers fear the improved breeds because they require significantly more care and attention than the local breeds (FGD notes). On average, most households have two or three milking cows. Other livestock types kept include goats, fattening and draught cattle (Nganda) and pigs. Most are kept for sale as live animals (FGD data). From the FGDs, there was no difference in purposes for keeping livestock.

Figure 6: Dominant livestock categories by gender of the household head in Namayumba, Wakiso District



From the data in Wakiso, it is evident that male-headed households undertake most livestock production, which is focused on milk production. Milk produced in the area is sold in the local market at an average price of UGX500–800 (USD0.21–0.33) per litre.

Management of cattle varies by type of breed. Improved dairy cows are confined and fed in cattle sheds (zero grazing) whereas local dairy cows are tethered. Some farmers utilize the swampy areas for grazing. Farmers provide feeding

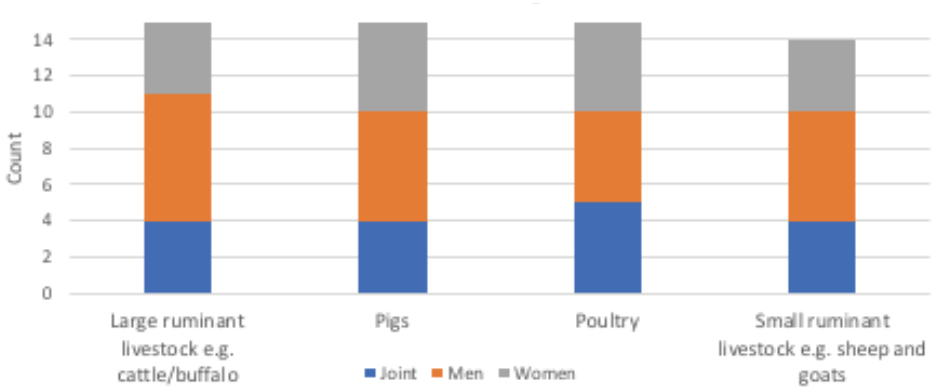
troughs to feed their animals with cut and carry fodder such as Napier grass. Other livestock species such as pigs and sheep are tethered within the compound. Chickens can be housed or left on free range.

Common livestock diseases include lumpy skin, foot and mouth disease (FMD) and laminitis. Farmers rely mainly on private veterinary officers in the area for animal treatment as public veterinary services are limited. Farmers complement veterinary services with traditional veterinary "doctors", which is more cost-effective than the high charges of modern veterinary services.

Artificial insemination (AI) services are not readily accessible to all farmers with an availability score of 1 reported in both male and female FGDs. Therefore, the majority of farmers (over 90%) often rely on bull services for reproduction. Farmers use their own bulls or those of their neighbours, especially the improved breeds such as Friesians and Jerseys. The average cost for a bull service is UGX40,000–50,000 (USD11–13). Some of the challenges associated with bull services is an increased incidence of reproductive diseases and poor breeds. Farmers reported that AI services are not affordable. For example, the average cost of semen/service ranges from UGX80,000–150,000 (USD22–41) (FGD data).

Through the FGDs, 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 can be reflected in the decision-making process in either household whereby men and women make most decisions jointly or individually (Figure 7). This implies that women may not own livestock but are actively involved in production decisions within Wakiso District.

Figure 7: Gendered decision-making on livestock

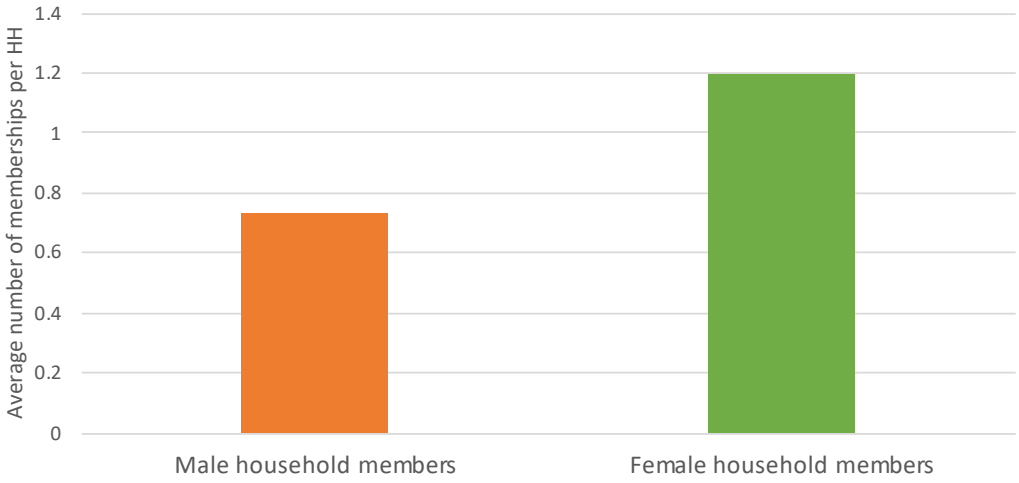


The main sources of financial service (credit) include VSLAs[1], Savings and Credit Cooperative Society (SACCO), banks, co-operatives, and individual farmers. In most cases, credit is obtained for the purchase of land, the purchase of livestock, farm inputs and other personal needs such as payment of school fees and medical costs. The conditions for accessing credit for livestock or crop production include membership (group/SACCO), possession of the land title, savings account in case of a bank and guarantors. About 60% 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 3 and by the women FGD at 4. In the men FGD, 90% of the participants aspired to access credit, which was similar to the participants of the women FGD (100%). Men have the most access to formal sources of credit whereas women in many cases have opportunities to access credit from informal sources. 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.

1 Village saving and loan associations

Figure 8 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 more than one female member will belong to a farmer organization compared to men (0.7).

Figure 8: Average number of household members of cooperatives and farmer organizations by gender in Wakiso



3.3 Major income sources

Figure 9 presents major sources of household income in Wakiso District. Livestock-related activities (predominantly dairying) contribute 40% to household income. Income received from the regular sale of livestock is uncommon in the area as indicated by the proportional off-take rate of 1% and 6% for cattle and sheep/goats respectively. Cropping of food crops contributes 38%, followed by off-farm business (19%) and formal employment (3%).

Figure 9: Primary sources of household income in Wakiso

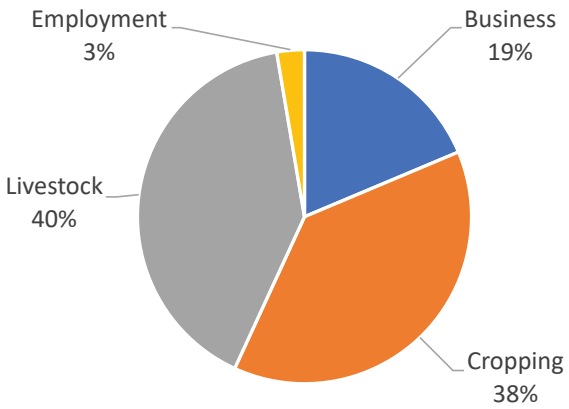


Figure 10 shows the relative contribution of major sources of income to household and women's income respectively. Cash crops, food crops, off-farm business, piggery, poultry and remittances are the main contributors to women's income. As observed in Figures 9 and 10, dairying, cash crops, food crops, piggery and off-farm business are the main contributors to household income. Other income sources include poultry meat, fattening of cattle and shoats, and employment.

Figure 10: Relative contribution of income sources to household and women's income in Wakiso

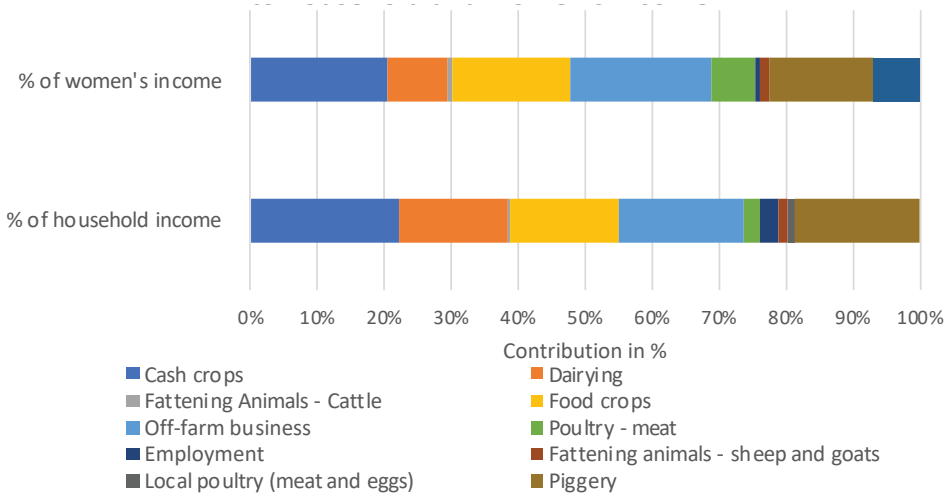
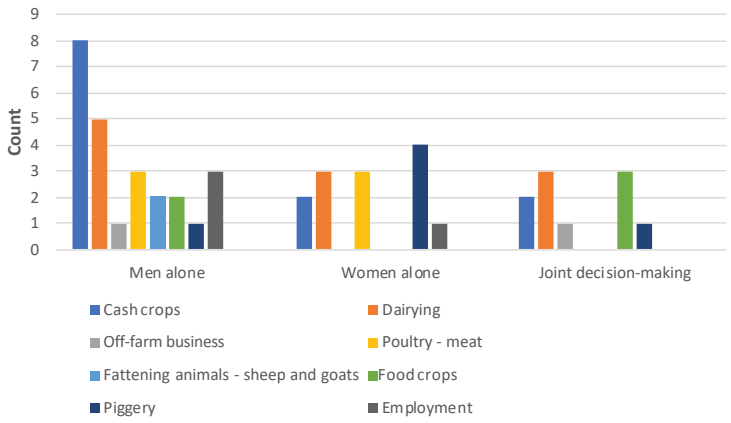


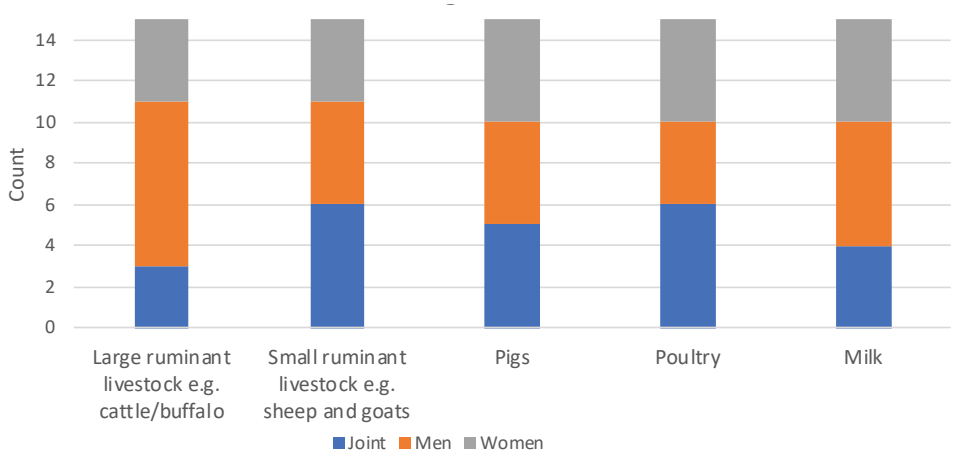
Figure 11 illustrates household gendered decision-making on the major sources of income. Men make most decisions alone on income from employment. In other income sources, such as income from livestock, cropping and off-farm business, men and women equally make decisions alone and in other cases.

Figure 11: Gendered decision-making on major sources of household income



Focusing on income from the sale of milk and/or livestock, Figure 12 shows that men make most decisions on the sale of cattle and milk, whereas women in most cases decide on the sale of shoats, pigs and poultry. However, as can be observed in Figure 12, joint decision-making applies to most livestock and milk. This implies there is a lot of inclusivity between men and women on livestock-related income.

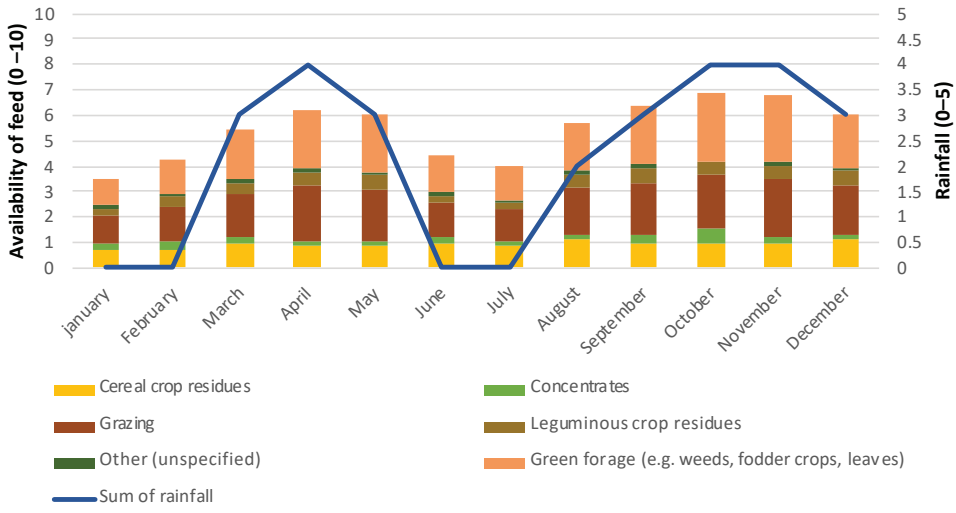
Figure 12: Gendered decision-making on the sale of livestock and milk in Wakiso



3.4 Major feed sources

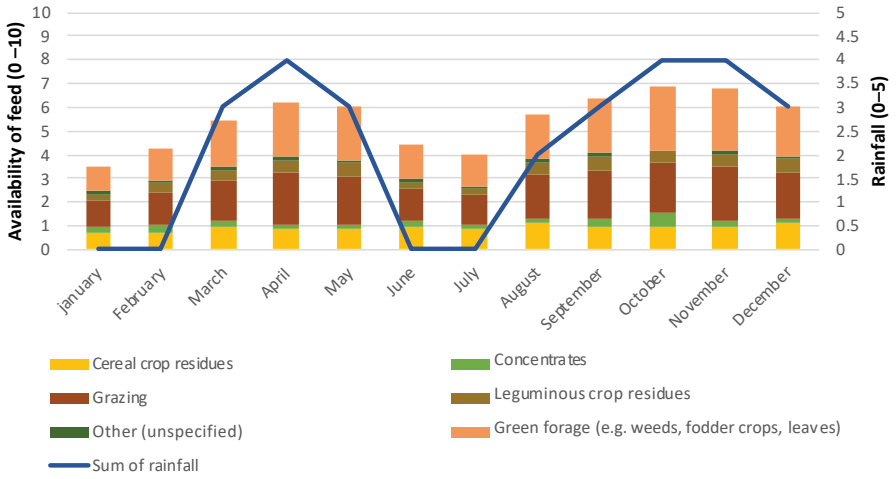
The diet is composed primarily of green forages, grazing, cereal crop residue, leguminous crop residues, and concentrates, as shown in Figure 13. The contribution made by these feed sources to the diet varies throughout the year. Green forages contribute the most significant share to animal diets. Green forages include fodder crops and collected feed. Farmers also graze their animals on naturally occurring grass mostly in swampy areas. Grazing and green forage intensities increase during the wet season (March–June) and (September–December) and reduce in the dry season. Farmers also incorporate leguminous crop residues in higher quantities during the wet season compared to the drier season. During the dry season, cereal crop residues 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 13: Dietary composition of cattle in Wakiso throughout the year in relation to rainfall pattern



Grazing contributes 66% to the total dry matter intake on farms followed by collected feeds (25%). Cultivated fodder, comprising mainly green forages, contributes 8% to animal diet (Figure 14). Purchased feed contributes 1% to the total dry matter intake. Purchased feed includes crop residues, green fodder and supplements such as maize bran and dairy meal.

Figure 14: Contribution of dietary dry matter (DM) to the total diet by feed source



The contributions of total ME (MJ/Kg) and crude protein (cp %) are shown in Figures 15 and 16 respectively. As observed, grazing contributes the highest share in terms of ME(MJ/Kg) at 63% and crude protein at 62%. Collected fodder contributes 27% to the total ME (MJ/Kg) and crude protein at 23%.

Figure 15: Contribution of dietary metabolizable energy (ME, MJ/Kg) to total diet on-farm in Wakiso

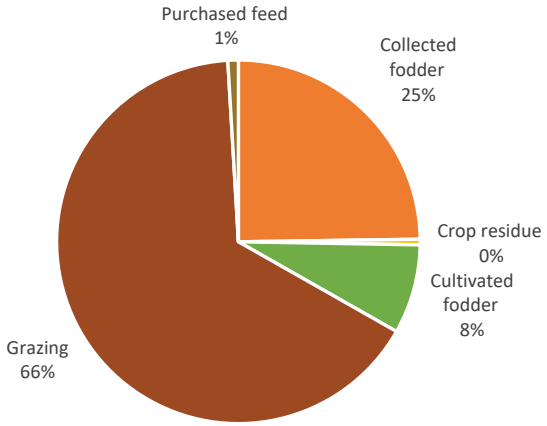
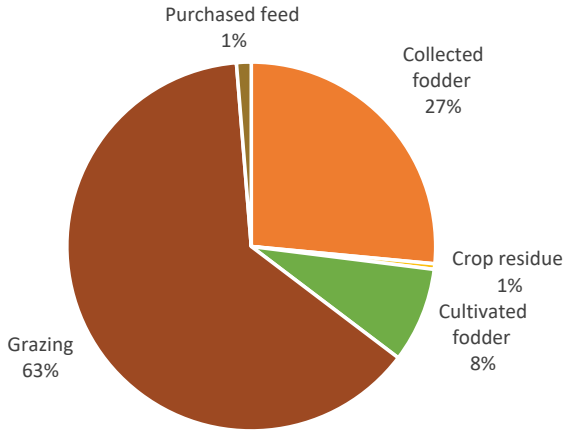


Figure 16: Contribution of crude protein (CP %) to the total diet on-farm in Wakiso



Cultivated fodder contributes 8% to the total ME (MJ/Kg) and 11% to crude protein. Purchased feed contributes 1% and 3% to the metabolizable energy and crude protein respectively. Crop residue contributes 1% to ME (MJ/Kg) and crude protein (Figures 15 and 16).

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

Figure 17 shows different activities in forage production and the different roles and responsibilities of household members. Women, men, children/youth have distinct roles in production, harvesting of feed and in feeding livestock. Men's primary work is in land preparation and planting forage crops as well as harvesting, transportation, purchase of feed, processing and mixing of feed ingredients. Women do most work on weeding, collection of feed, storage, feeding and watering. They are also involved in the transportation of feed and mixing of feed ingredients although men more generally do this work. Children and the youth play key roles in the collection and processing of off-farm forages, feeding and watering animals and general cleaning of feed and watering facilities. However, their contribution is limited to less burdening roles and a lot of their time is dedicated to education.

Figure 17: Gender division of labour in feed production, harvesting and feeding

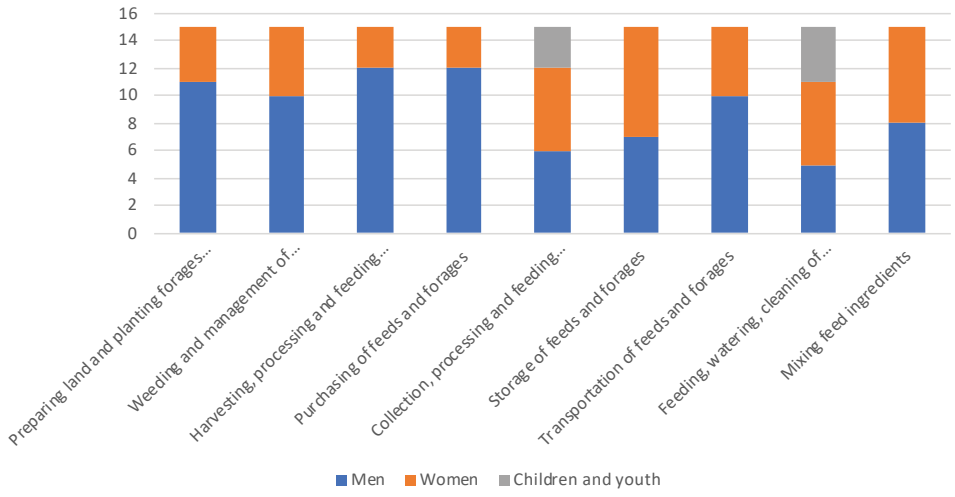
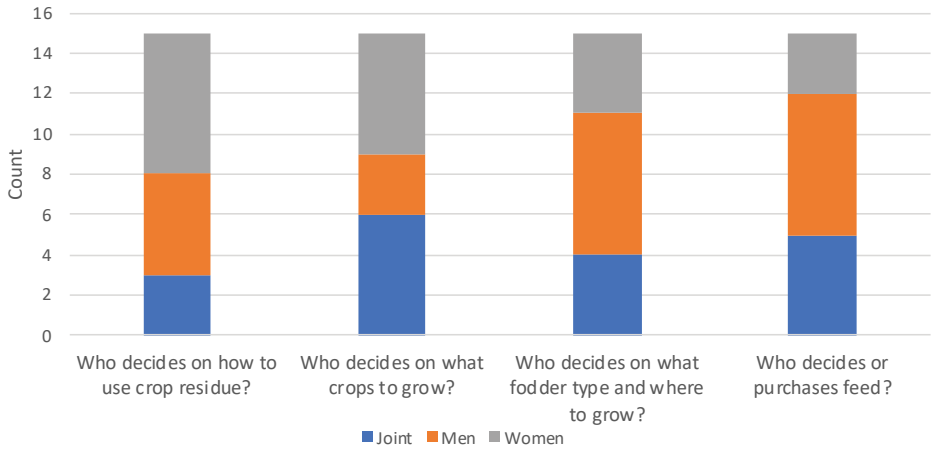


Figure 18 shows the decision-making roles between men and women regarding what crops and feeds to grow. With respect to decisions relating to feeds, (type of fodder, where to grow as well as purchase of feed) men make most decisions. However, women also decide alone or jointly with men. Women make decisions on the types of crops to be planted and how the crop residues will be used. In other households, these decisions are undertaken jointly, as observed in Figure 18. 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 18: Gendered decision-making on crops and feeds



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, low quality feeds, limited access to veterinary services, scarcity of water and theft of animals.
- The main problems identified by women in the community are limited forage varieties, diseases, poor breeds, limited access to extension services and inadequate knowledge of livestock management.

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

Main problem	Who is affected most? (Small/medium/large farms; men/women; MHH/FHH; etc.)	Proposed farmer solutions	Ranking in Men FGD	Ranking in Women FGD
Diseases	All but mostly medium farms	Vaccination	2	3
		Proper housing and separation of animals		
		Regular spraying of animals		
Low quality feeds	Small farms	Adoption of improved high-quality forages	5	4
		Increased awareness through training		
		Irrigation in production fields		
Limited access to vet/extension services/limited knowledge of livestock management	Small and medium farms	Increasing number of extension/vet personnel	1	1
		Use of private service providers		
		Increased training by government and development partners		
Poor quality breeds	Youth and landless	Improving AI services	n/a	2
		Subsidy on AI services		
Theft of animals	All	Improving security through community policing	4	n/a

4 Potential interventions

The proposed interventions include:

- Introduce new fodder varieties with higher nutritive quality adaptive to the livestock production system.
- Training farmers on proper feed management practices such as feed conservation and processing, e.g. haymaking and silage.
- Training on proper fodder husbandry/production techniques on-farm using demo plots.
- Introduce alternative pest and disease management mechanisms to reduce disease prevalence as well as supply of quality medicine through enhancing regulation of the sector.
- Train farmers on animal nutrition for increased production of high-quality milk (emphasis on concentrates and other minerals).
- Build capacity of extension service providers to increase quality service provision.
- Introduction of mobile-based (SMS) extension model such as the MWANGA platform to increase access to extension services.
- Introduce and promote synchronized AI services and use of sexed semen to improve the animal breed.

5 Conclusion

Farmers in Wakiso District are inclined towards dairy production in intensive systems; the introduction of improved planted forages 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 emphasize the incorporation of women and youth to participate in different levels of the livestock feed value chain.

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