

Characterization of the livestock feed resources and potential for enhancing dairy productivity in Batoka, Choma District, Zambia

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Introduction

The Gendered Feed Assessment Tool (G-FEAST) was implemented to characterize the livestock production systems in Choma District of Zambia, specifically in the Batoka Dairy Cooperative. The G-FEAST tool combines both qualitative and quantitative research approaches to identify if farmers/communities perceive feed as a problem and the potential solutions. The G-FEAST exercises elicited the viewpoints and perspectives of women farmers in the community regarding feeding practices and general crop and livestock production. It considers the pitfalls that households face, such as the labour burden on women and their limited access to and control over resources.

The Batoka Dairy Cooperative Society is located 28 km from Choma town. Batoka is part of the cattle corridor of Zambia's Southern Province. The agricultural production system in the area is classified as traditional extensive cattle production characterized by medium-sized to large farms, poorly developed grazing systems, unimproved grasses and large herds of cattle. Over time, cattle production has gradually changed from predominant beef production to dairy production. There are a number of dairy cooperatives developed through the Government of Zambia and development partners such as the GIZ and the International Livestock Research Institute (ILRI). The G-FEAST exercise was conducted on 4 March 2021 at Batoka Dairy Cooperative dip tank. This report presents the findings of the assessment and conclusions for further action

Process and sample description

A scoping exercise was conducted with the help of the local livestock officer to identify individual and groups livestock farmers in the project sites. One gendered focus group discussion (FGD) was carried out separately with 16 women participants. The G-FEAST exercise lasted for 5–6 hours and was held in community settings selected for the convenience of the respondents. Thereafter, nine respondents were selected for individual interviews from the group. The selection of the participants for individual interviews was based on different wealth categories using landholding as a proxy. This was considered for both male-headed and female-headed households. The composition of the sample is shown in Table 1. The group had a facilitator. A woman facilitator led the women G-FEAST session. Before each session an oral speech seeking permission for the interviews from farmers was given in the local language. Farmers agreed to the discussions and gave their consent before the sessions commenced. Each session had a note taker to keep record of the proceedings and a timekeeper to manage time as well as take photographs. Subsequently, the notes were transcribed into English in a hard copy notebook.

Table 1: Female respondents for individual interviews by farm size

| Individual interviews | Women respondents |
|----------------------------------|-------------------|
| Small farm size (0–3ha) | 3 |
| Medium farm size (3–5ha) | 3 |
| Large farm size (10ha and above) | 3 |
| Total | 9 |

Farming systems

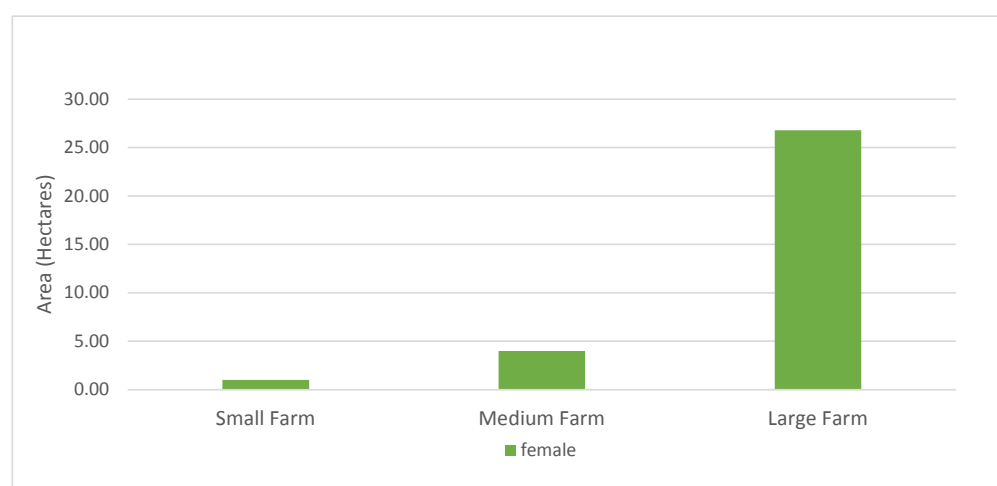
The farming system in the area is primarily traditional extensive mixed crop and livestock system. Average farm sizes in Choma District of Batoka are about 6 ha, with most of the land being used for grazing activities and smaller proportions dedicated to crop production (both food and fodder crops). The average household size is 10 people per household. Figure 1 presents farm sizes by gender of the household head. Across the three land holding categories, men and women own land. The largest proportion of female-headed households falls in the medium-scale farms category whereby female-headed households have on average 6 ha of land. This implies that women in Batoka can own land just as men do.

Table 2: Percentage of land ownership by household

| Category | Range of land size (ha) | % of households that fall in category | % of male-headed and female headed households that fall in category | |
|----------|-------------------------|---------------------------------------|---------------------------------------------------------------------|-----|
| | | | MHH | FHH |
| Landless | 0 | 20 | 70 | 30 |
| Small | <2 | 30 | 60 | 40 |
| Medium | <6 | 30 | 80 | 20 |
| Large | >8 | 20 | 80 | 20 |
| Total | | 100 | | |

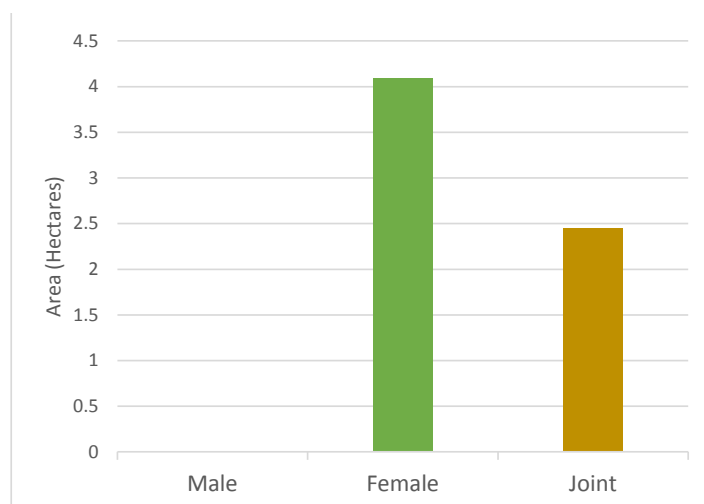
Table 2 indicates the percentage in terms of ownership of land. It shows that the majority of farmers that have land fall on the medium category represented by a higher percentage (30%), those with large farms have (20%) and those with small farms have (30%). According to the FGD, most of the people owning large plots of land are males and females, with females having a small percentage of ownership. The women are mostly found on the medium and large farm size categories. The results indicate that women own most of the land. However, in other households, land is jointly owned by the men and their spouses.

Figure 1: Farm size by household type.



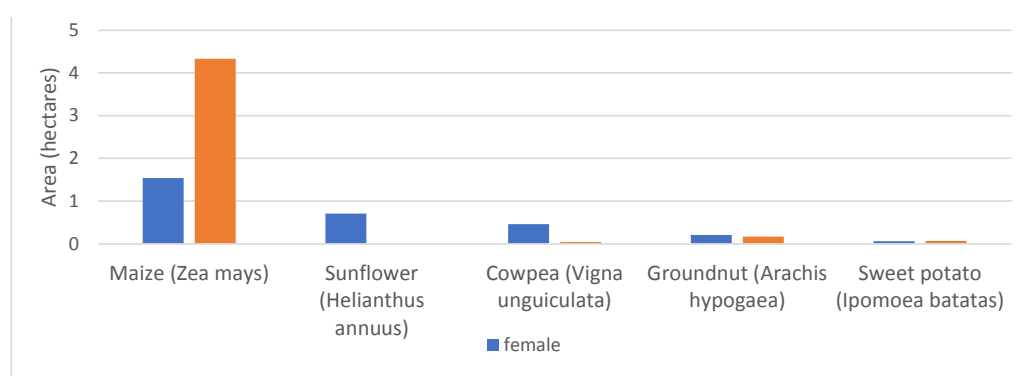
The common land tenure systems the study sites include traditional and communal land where land is owned by the community. Figure 2 shows land ownership by gender within a household. The results indicate that the higher percentage of land is owned jointly by men and women and jointly owned land is usually under large hectares of land. Men own big pieces of land, and they are usually the medium land size owners followed by women owning land of 2.0 hectares and below.

Figure 2. Land ownership by gender.



Households in the area commonly grow a variety of food crops as shown in Figure 3. The most dominant food crops include maize (*Zea mays*), sunflower (*Helianthus annuus*), cowpea, sweetpotato and groundnut. Maize is the most dominant cultivated food crop with an average of 1.5 ha committed to its cultivation. Female-headed households are more likely to cultivate maize, sunflower and cowpea and less likely to grow potatoes and groundnuts.

Figure 3: Dominant crop types cultivated (ha) by gender of household head



The most dominant fodder crops cultivated by livestock producers in Batoka. Rhodes grass is the only cultivated fodder type in the community produced over an average area of 0.014ha.

Rainfall levels are generally adequate to support agricultural activities during the three major cropping seasons in a year. However, farmers reported that over the years, unpredictable weather patterns have threatened reliance on rain-fed agriculture. It has also threatened the livestock production, which relies heavily on grazing of natural grasses and bushes. Table 3 shows the rainfall pattern by season.

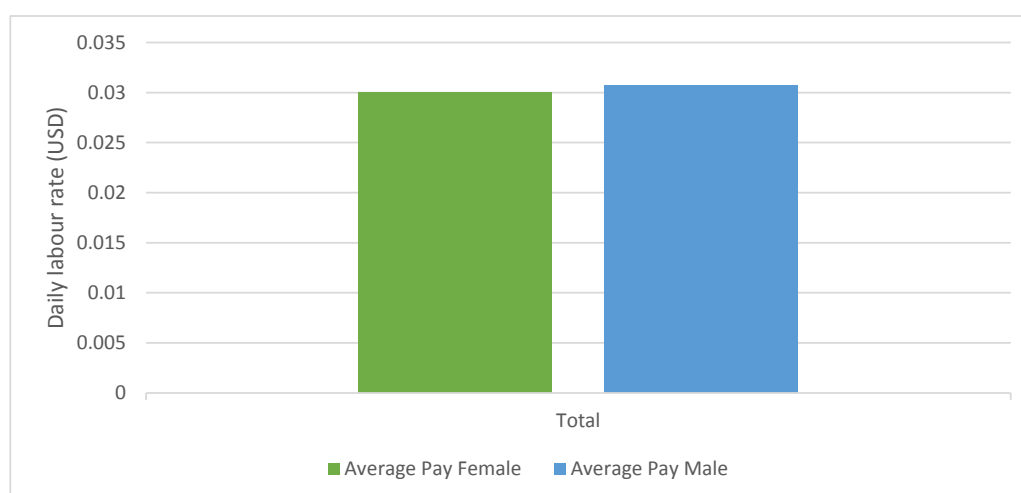
Table 3: Seasonal cropping patterns in Batoka, Choma District

| Name of cropping season | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Rain season (Mainza) | | | | | | | | | | | | |
| Cool/dry season (Kutontola) | | | | | | | | | | | | |
| Hot/dry season (Ciindi Cakupya) | | | | | | | | | | | | |

The first cropping season of the year for farmers is called 'Mainza,' which is characterized by heavy and moderate rain. It starts in November through to May. The most common farming activities during this time include seeding, ploughing, harvesting and weeding. The second cropping season is the cold season and is characterized with coldness with no rainfall. The cool season starts in late April to end March. Major crop farming activities during this time include harvesting, gardening, shelling and storage. The dry season is referred to as 'Cilimo'. During the dry season, farmers are preparing their land for cultivation, gardening and others marketing of their products.

Labour is not always available as and when required by farmers. The minimum annual labour costs is ZK4,800 and the maximum rate is ZK14,400. The labour cost varies with type of farming activity and becomes scarcer during the planting season. The scarcity of labour is because of rural urban migration by the youth looking for paid jobs. The percentage of youths migrating from Batoka is over 20% with women being the majority. Additionally, there is a difference in the wage rate for a man compared to a woman. Figure 4 shows that on average, a man earns about (USD0.044) compared to a woman who earns (USD0.022). This could imply that men are paid more because they are perceived to work either longer hours (deliver more work) compared to women, or they do a better job in some activities compared to women.

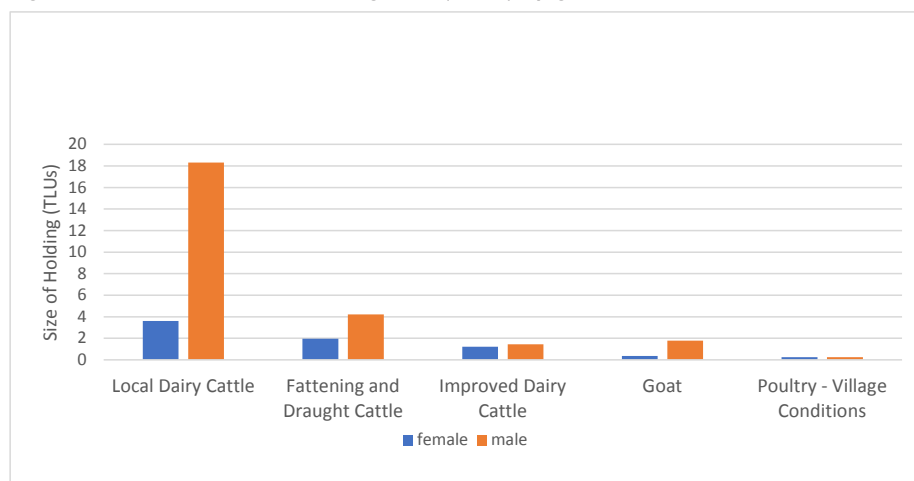
Figure 4: Average daily labour rates by gender



Livestock production system

Local dairy cattle are the dominant type of livestock kept by livestock farmers in the Batoka area of Choma. The dominant breed is local and crosses for milk production. Other livestock types kept include goats, fattening and draught cattle, improved dairy cattle, goats and pigs. Most cattle are kept for milk production and sale as fattened cattle for beef. Goats are mainly kept as a source of income through sale of live animals for goat meat. Figure 5 indicates that local dairy cattle have a high frequency rate in that most of the farmers (both men and female) have equal access to this type. Fattening is dominated by male farmers, but women farmers also fatten and keep draught animals. Women are more likely to keep goats and pigs.

Figure 5: Dominant livestock categories (TLUs) by gender of the household head.

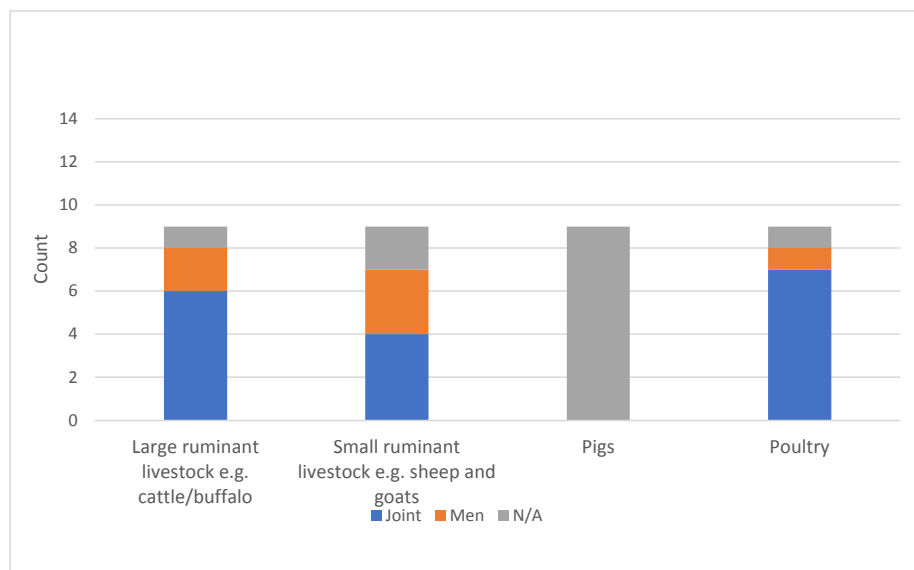


In Batoka, male-headed households dominate in large ruminant cattle production and mainly for beef production compared to female-headed households that mainly keep improved dairy cattle for milk production. Poultry and small ruminant are mainly kept by women. Livestock, especially cattle, are mainly grazed in open pasture fields most of the day. However, farmers confine and feed their animals with supplements and with cut-and-carry fodder such as Napier grass on feed troughs from late afternoons.

The most common livestock diseases include foot-and-mouth disease (FMD), East Coast fever (ECF), lumpy skin and anaplasmosis. Farmers rely mainly on public and private veterinary officers in the area to treat their animals. Public veterinary officers are much cheaper than private veterinarians, but they are not readily available. Figure 6 shows that farmers sometimes supplement veterinary services with traditional veterinary 'doctors' services. These are commonly used in treating abortion and mastitis. Both men and women reported that artificial insemination (AI) services are not available with a score of 0/5. However, majority of farmers (100%) often rely on bull services. Farmers mainly use improved breeds of bulls such as Friesians and Jersey crosses. One of the challenges with bull services is inbreeding. Farmers reported that vaccines are very expensive to acquire, and they have what to use for AI but there are no straws and semen.

Other animal health services include vaccinations. Women did not manage to list similar input suppliers compared to men implying that women are less knowledgeable about the animal health needs in livestock production. The trend can be reflected in the decision-making process.

Figure 6: Gendered decision making on livestock.



The main sources of financial service (credit) include banks, village saving and loan, dairy cooperatives, and local moneylenders ('kaloba'). In most cases, credit is obtained for purchase of land, medicines, farm inputs and other household needs. Informal credit sources dominate in the credit share compared to formal credits sources. There are no groups that give loans in the area, the farmers said they had heard of the existence of some groups that offer loans and shared some names of groups but have never had contact with them. They said the groups gave stringent requirements for accessing credit.

Major income sources

Figure 7 presents major sources of household income within Batoka. Results indicate that livestock-related activities, predominantly dairying, contribute the highest share to household income. Dairying contributes the highest share within the livestock category at 49% out of 50%. Cropping (food crops) contributes about 34% of 50% to household income. This mainly includes sale of maize, cowpeas, sunflower, sweetpotatoes and groundnuts.

Figure 7: Primary sources of household income by category.

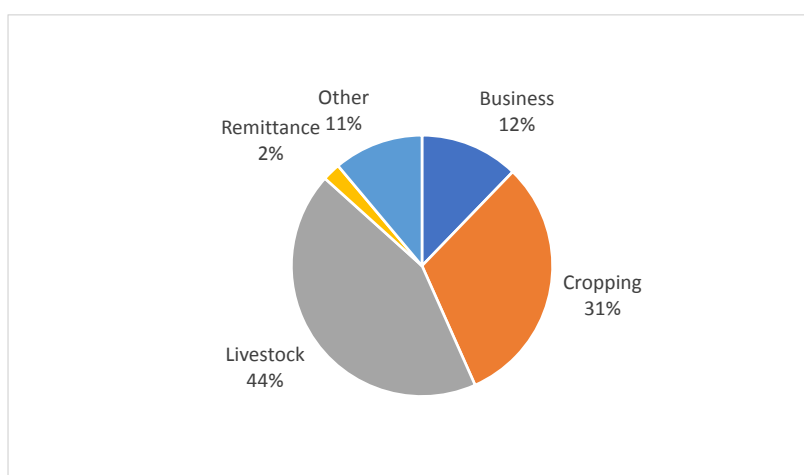


Figure 8 shows the relative contribution of major sources of income to household and women's income. Dairying (31%), fattening animals, food crops (15.2%) and cash crops (24.44%) contribute the highest share of household income. Food crops and dairying contribute the highest share to the women's income. Women also derive income from poultry (7.8%) and fattening of sheep and goats. Dairying and food crops provide the most income for women.

Figure 8: Relative contribution of income sources to household and women's income.

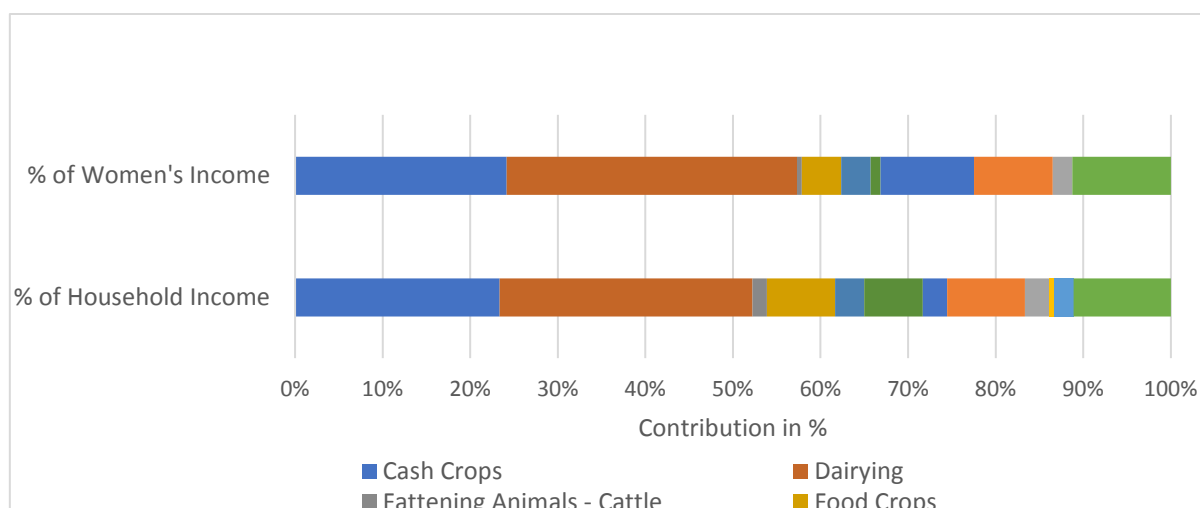


Figure 9 indicates that men and women make decisions on income from dairying, fattening animals, cash crops and food crops. The figure indicates that the decisions on food crops are made jointly, cash crops by a woman and dairying a man. This shows that women have a say when it comes to making of decisions on income use. In some households, the decision on the enterprises is joint between the man and spouse. In other households, women make most decisions on cash crops, food crops, and in a few households, on dairying.

Figure 9: Gendered decision-making on major sources of household income.

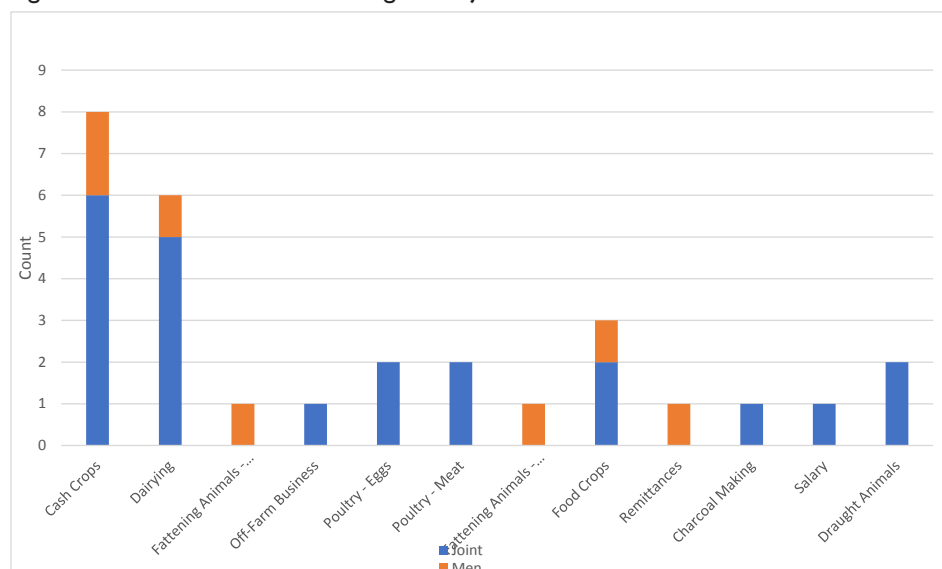
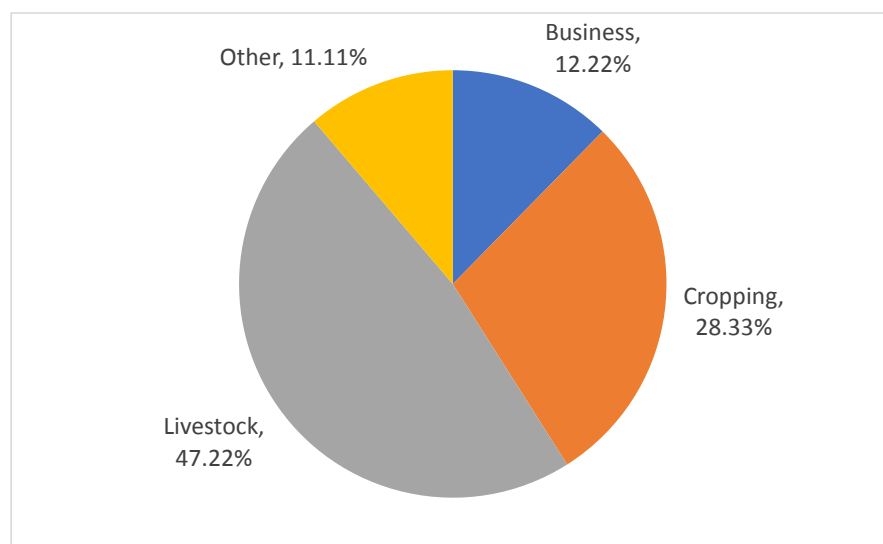


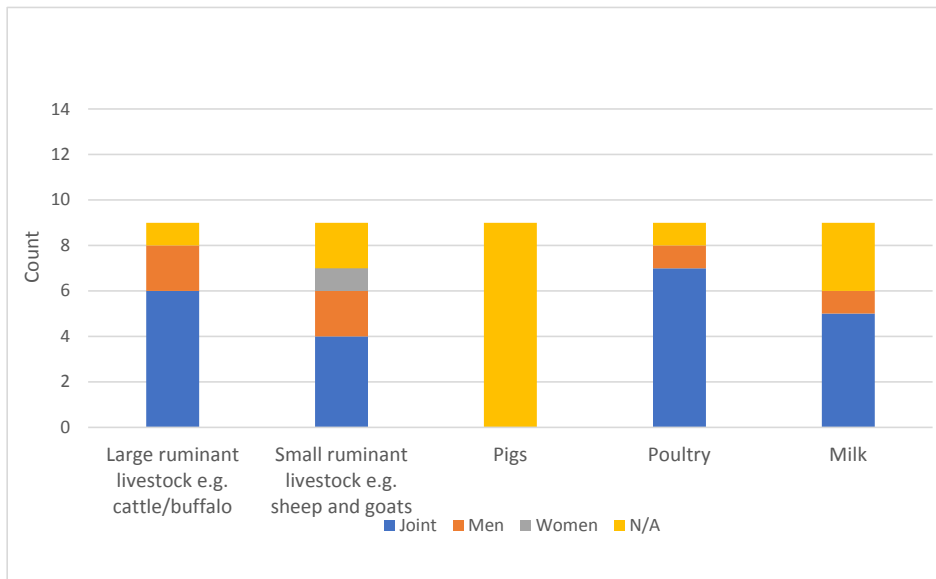
Figure 10 indicates that the major contributor of income for women comes from the livestock activities at 44% followed by cropping activities at 38.8%. This means that women contribute a significant share of the total income in a household.

Figure 10. Major income sources for women.



According to Figure 6, if we focus on income from sale of livestock, it is observable that women make most decisions alone on sale of large and small ruminants except poultry sales. Men make most decisions on large ruminants, milk sales, small ruminants and pigs. However, in this study it is the other way round. There is, however, joint decision-making in the sale of livestock and milk (Figure 11). This implies there is a lot of gender inclusivity on income from livestock.

Figure 11: Joint decision-making in the sale of livestock.



Major feed sources

The livestock diets are primarily grazing, crop residues, green forages, legumes and concentrates as shown Figure 12. The contribution made by these feed sources to the diet varies throughout the year. Grazing contributes the most significant share in animal diets in Batoka. Farmers utilize their expansive land to graze their animals on naturally occurring grasses. Grazing intensity increases during the wet season (December to March). During the dry season, cereal crop residues and legumes are found in the diet in larger quantities. Green forages and collected feeds are incorporated more during the wet season. Concentrates are used in very little quantities and appear higher in December compared to the rest of the year. The figure also shows that there is a poor rainfall curve, the rains start around October and improve in November at 2/5. The rains in January usually peak in February at 5/5, after February the rains decrease and the rest of the months from May to September, at 0/5, have no rain leading to likelihood of drought which reduces water and feed access for animals and causing a reduction in milk production.

Figure 12: Seasonal availability of feeds in relation to rainfall patterns in Batoka throughout the year.

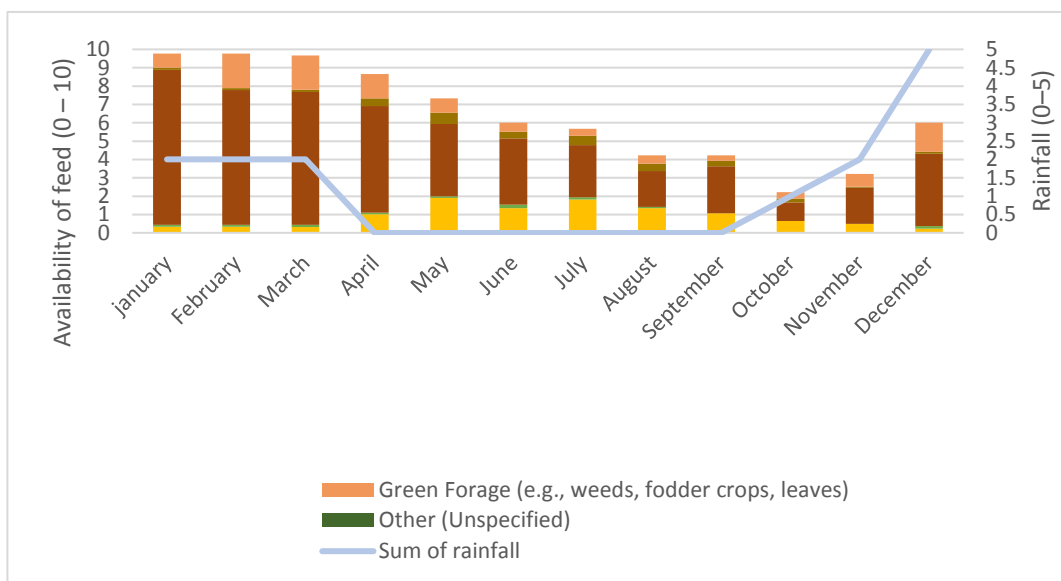
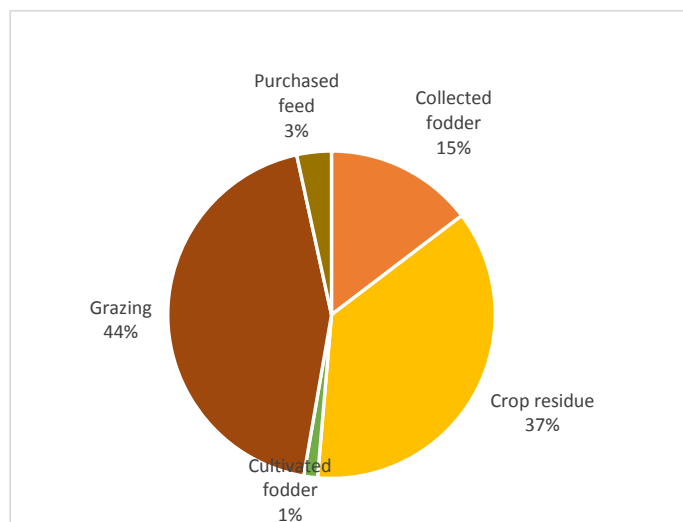


Figure 13 shows that grazing contributes 44% to the total dry matter intake on farms followed by crop residue (37%) comprising of maize. Collected feeds contributes 15% of the dietary dry matter. Cultivated folder contributes about 1% and consists of residues from cereal crops. Purchased feeds contributes 3% and includes maize bran.

Figure 13: Contribution of dietary dry matter (DM) to the total livestock diets by feed source on farms in Batoka.



The contributions of total metabolizable energy (ME) (MJ/kg) and crude protein (CP %) are shown in Figures 14 and 15, respectively. Grazing contributes the highest share in terms of ME (MJ/Kg) at 43 %, and crude protein at 20%. Cultivated fodder contributes 5% to the total ME (MJ/Kg) and a high crude protein at 20%.

Figure 14: Contribution of metabolizable energy (MJ/kg) to the total livestock diet by source in Batoka.

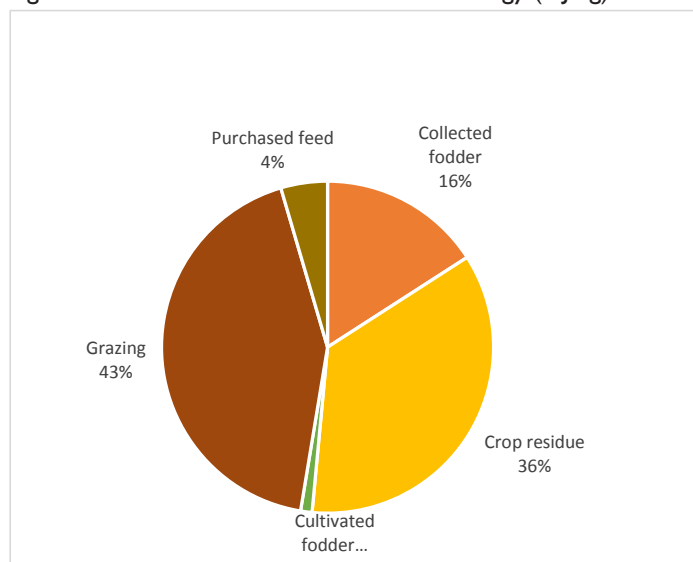
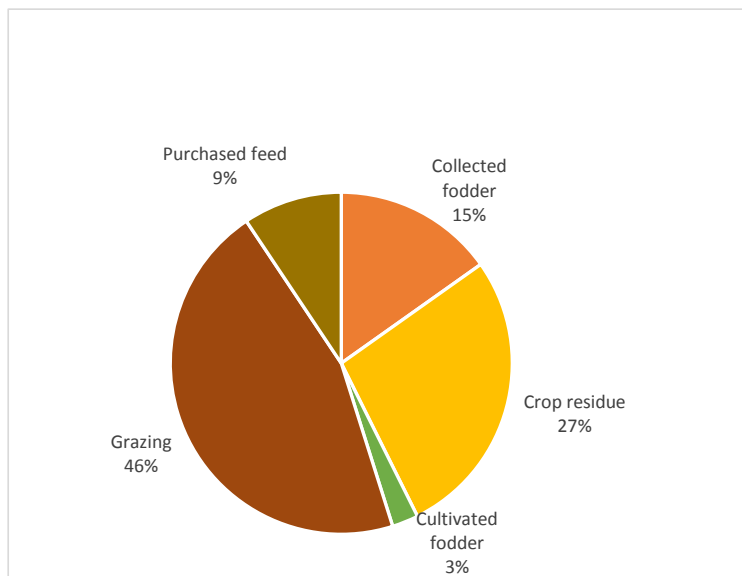


Figure 15: Contribution of crude protein (CP%) to the total livestock diet by source on farms in Batoka.



Gender division of labour and gendered decision-making on livestock, feeding and sales

Figure 16 shows different roles of children and youth, and women and men in forage production activities. Men dominate land preparation, planting, processing of feed, purchasing of feed and mixing feed ingredients. Women are mostly involved in weeding forage crops and storage of feeds and harvesting. They are also involved in collection of off-farm forages, and feed harvesting and mixing feed ingredients. Children and the youth are mainly involved in cleaning livestock feeding and watering facilities, collecting off-farm forages and watering. In general, all household members provide considerable labour in the production and management of forages and livestock and women in Batoka showed that they do more especially when the men are away.

Figure 16: Gender division of labour in feed production, harvesting and feeding practices on farms in Batoka.

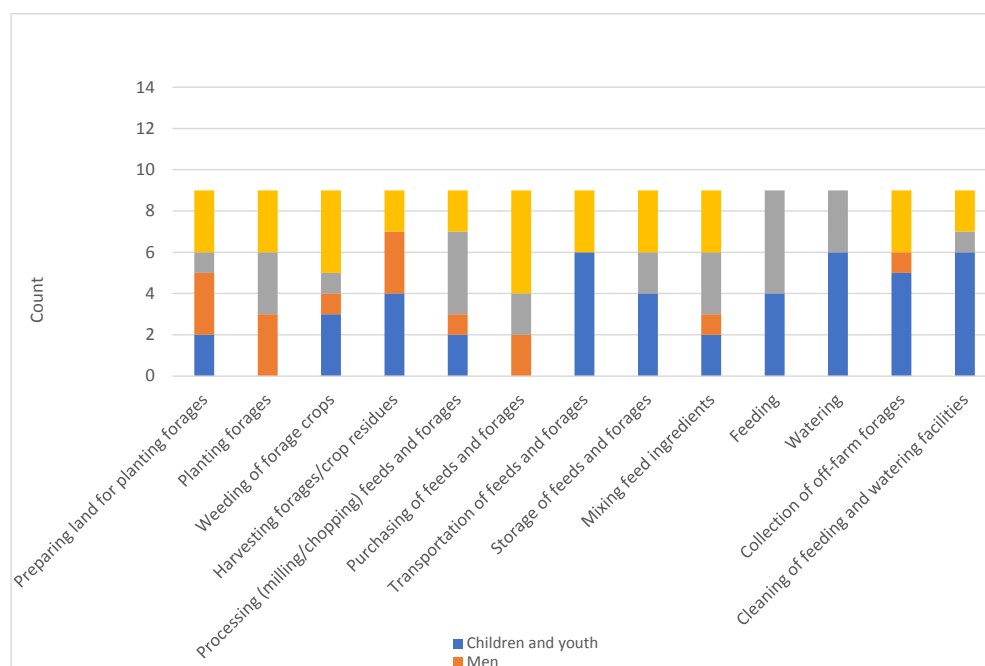
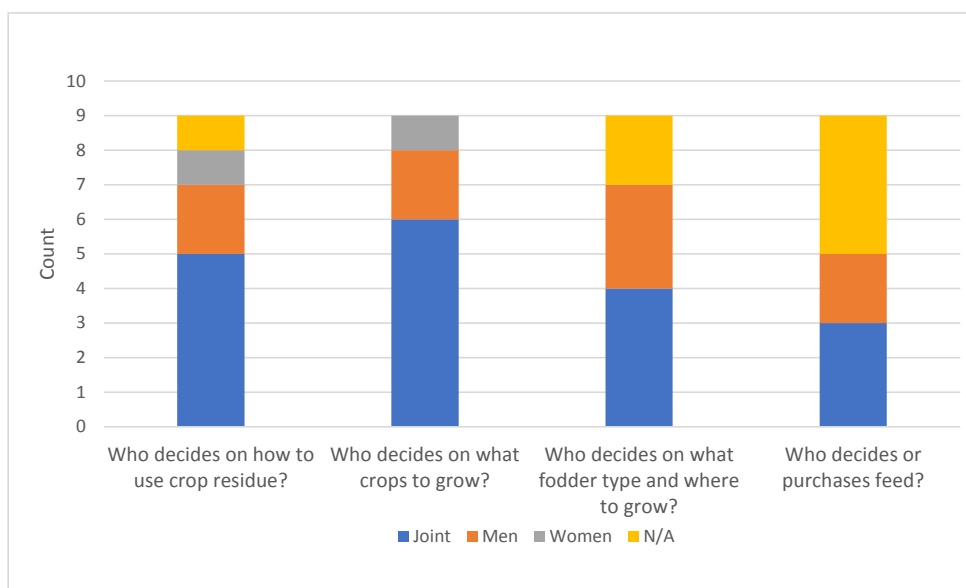


Figure 17 shows the decision-making roles between men and women regarding crops and feeding. It is evident that in a household, both men and women make joint decisions about what to grow, where, and how. With respect to decisions relating to feeds, (type of fodder, where to grow, what to purchase) women are sole decision makers. However, women are involved either as sole decision makers or in joint decision-making.

Figure 17: Gendered decision-making on cropping and livestock feeding.



Potential interventions

Table 4 gives a summary of problems and challenges farmers face and possible solutions, as suggested by farmers. The main challenges identified by women in the community are lack of water, diseases outbreaks, lack of improved breeds, lack of extension services and lack of knowledge on livestock management practices.

Table 4: Problems, issues and proposed farmer solutions within production systems in Batoka area

| Main problem | Who is affected most? (small/medium/large farms; men/women; MHH/FHH etc.) | Proposed farmer solutions | Ranking by women |
|---------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------|
| Lack of water | All | Construct of dams in the area | 1 |
| Lack of improved breeds | All | Drill boreholes AI should start being used Provide community bulls | 2 |
| Disease outbreaks | All | Training farmers on diseases | 2 |
| Lack of knowledge on animal husbandry | All | More vets to do follow ups Add value to the milk by making sour milk or butter so that the price of milk increases | 4 |
| Lack of extension services | All | The milk price should increase then the drugs could be affordable Need trainings Need more extension officers | 4 |

Proposed interventions

The proposed interventions include:

- Training farmers on proper feed management practices such as feed conservation and processing (e.g. haymaking and silage making).
- Selecting knowledgeable farmers who could act as lead farmers to train other farmers during field days, based on their experience because the theory says that a farmer learns 10% from the extension officers and 70 % from other farmers, 20% from research or new technologies
- Training farmers on how they can utilize the crop residues from the maize fields by adding molasses, salt and urea treatments.
- Coming up with focus farms, which are well equipped so that farmers can use them to hold training sessions through field days to share their experiences.

- Training through the fact sheets which are simple and well interpreted with topics like managing mastitis and how to reduce cost of production etc.
- Introducing new fodder varieties with higher nutritive quality adapted to the agro-ecological production system.
- Training farmers on proper fodder husbandry/production techniques on-farm through demonstration plots.
- Training farmers on animal nutrition for increased production of high-quality milk (emphasis on concentrates and other minerals).
- Building capacity of farmers through the local dairy cooperatives on value addition of milk to improve on market access and increase price stability.
- Training farmers on importance of water harvesting and proper storage and use.

Conclusion

Farmers in Batoka are inclined to milk production and fattening cattle, most of them, however, lack knowledge in dairy farming, and most do not keep records in order to know whether their enterprises are profit- or loss-making and for reference purposes. AI services are needed in order to improve the types of breeds these farmers have and more training with practical demonstrations is required to show them how to increase milk production, use good disease management practices to reduce outbreaks, feed animals strategically to meet milk production needs, and utilize the available feed resources. For example, farmers can make homemade concentrate using local resources to reduce the cost of production.