Characterisation of the livestock production system and potential for enhancing productivity through improved feeding in Amoni Division, Mweiga District, Central Kenya, May 2010.

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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 to 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 livestock production system and in particular feed-related aspects of the Mweiga district in Kenya. The assessment was carried out through structured group discussions and completion of short questionnaires by three key farmers/stakeholders on the 21st of May 2010. The following are the findings of the assessment and conclusions for further action.

Overview of the production system

The area is a mixed crop/livestock production system with a focus of milk production. Farmers utilise an average land area of approximately 2.6 hectares per household. The size of land holdings varies greatly ranging from 0.1 to 12.14 hectares. A wide variety of food crops are grown by most households as shown in Figure 1. Crops grown include; potatoes (*Solanum tuberosum*), maize (*Zea mays*), peas (*Pisum sativa*) carrots (*Daucus carota sativus*), and kales (*Brassica oleracea*). Other food crops such as; spinach (*Spinacea oleracea*), turnips (*Brassica rapa var. rapa*) and radish (*Raphanus sativus*) are also grown, but are of lesser importance and are grown on a small scale. Fodder crops such as; Napier grass (*Pennisetum purpureum*), sorghum (*Sorghum bicolour*), Oats (*Avena sativa*), beetroot (*Beta vulgaris subsp. vulgaris.*), and lucerne (*Medicago sativa*) are also grown by most farmers. A wide variety of livestock species are kept by farmers. Holstein Friesians and Ayrshires dominate livestock holdings for milk production. Sheep used for wool and meat production, donkeys for transportation and chickens to fulfil household meat and egg requirements are also kept. Rabbits are also kept by children in many households. Goats and horses are very uncommon in the area and are kept by very few households. Rainfall is generally considered adequate to carry out the necessary cropping operations. However, water availability can become a problem during the dry season as bores and wells are the only sources of water. Labour can also be a problem at peak times of requirement such as harvesting and planting, especially for those households with larger land holdings.

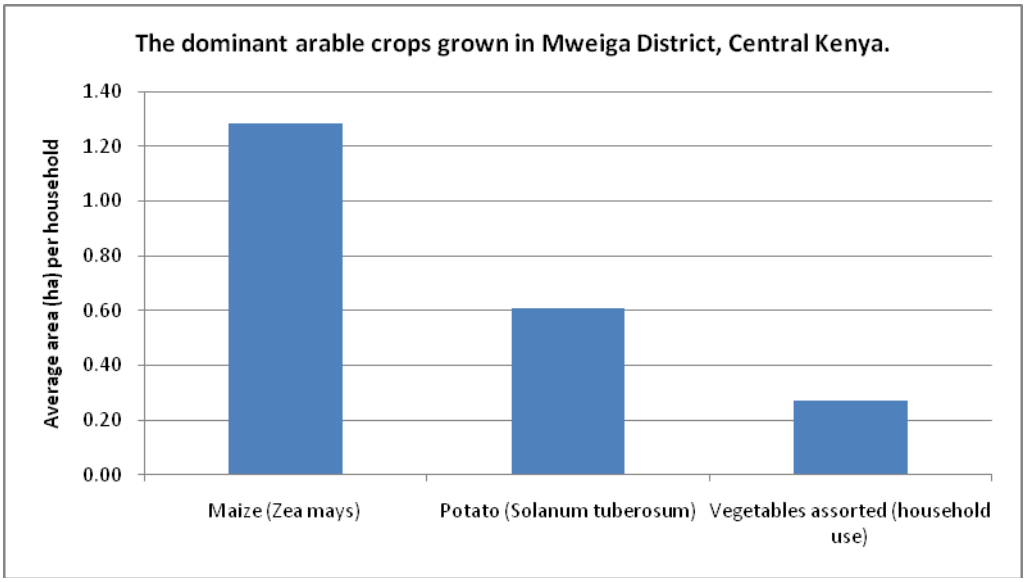

Figure 1: The average area of land utilised per household for arable crops in the Mweiga district, Kenya

Livestock contribute approximately 60% of all household income in this area as shown in Figure 2. Milk sales are the primary contributor. Other livestock products such as the irregular sale of cull cows and bull calves, sale of manure, sale of poultry products, sale of rabbits and the sale of shoats make insignificant contributions to income. Potatoes are the second most important contributor to income, contributing approximately 40%. Many of the other crops grown by the household, particularly maize, generally do not generate any income as they are either consumed within the household or fed to livestock as fodder.

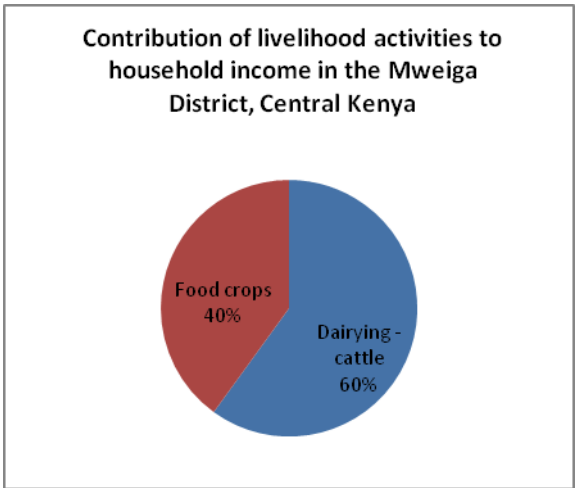

Figure 2: The average contribution of livelihood activities to household income (as a percentage) in Mweiga district Kenya.

The livestock production system

Cattle dominate livestock holdings as shown in Figure 3. The main focus of the livestock system is the production of milk with each household having on average 6 milking cows. However, this number varies greatly in the area and can range from 1- 21 cows. Cows are primarily maintained in small fenced areas in close proximity to the household and supplementary fed. Grazing is only available to

households with large land holdings as there are no communal lands in the area. Cattle are allowed to graze during daylight hours and return to the enclosed area at night for supplementary feeding. Supplement feeds vary between farmers, however, it is primarily based on a “cut and carry” system, in which, forage material from cropping areas, or weeds and grass from roadside and forest areas are cut and carried back to the animal. Many farmers also purchase additional feeds, especially during the dry season, to mix with fodder material. The primary components include a mixture of one or more of the following feeds; Dairy meal, Maize germ, wheat pollard, cotton seed cake, and mineral lick. Others include oat straw, maize stover, and sweet/Irish potato residues. Some farmers have also commenced silage production and include silage in the feed mix. Veterinary treatments are readily accessible with six service providers in close proximity to the area. The price for veterinary treatments depends on the type of treatment being applied. Prices generally range from 400-1000 Kenyan shillings (USD$ 4.44 – USD$ 11.10) per treatment. Treatment for East Coast Fever (ECF) tends to be more expensive at 3500-4000 Kenyan shillings (USD$38.85 – USD$ 44.40) per treatment. Artificial Insemination (AI) is also readily accessible and is the preferred method of reproduction. Local bull services are only used in very exceptional circumstances when a cow doesn’t conceive after a number of attempts with AI. The price of semen is highly variable depending on the quality and availability of the bull desired. Local semen ranges in price from 800-2000 Kenyan shillings (USD$8.88 – USD$22.20) per straw. Imported semen can cost anything in excess of 2000 Kenyan shillings (USD$22.20). Due to the expense of imported semen, farmers can take out a loan from the milk cooperative against milk sales to purchase the semen.

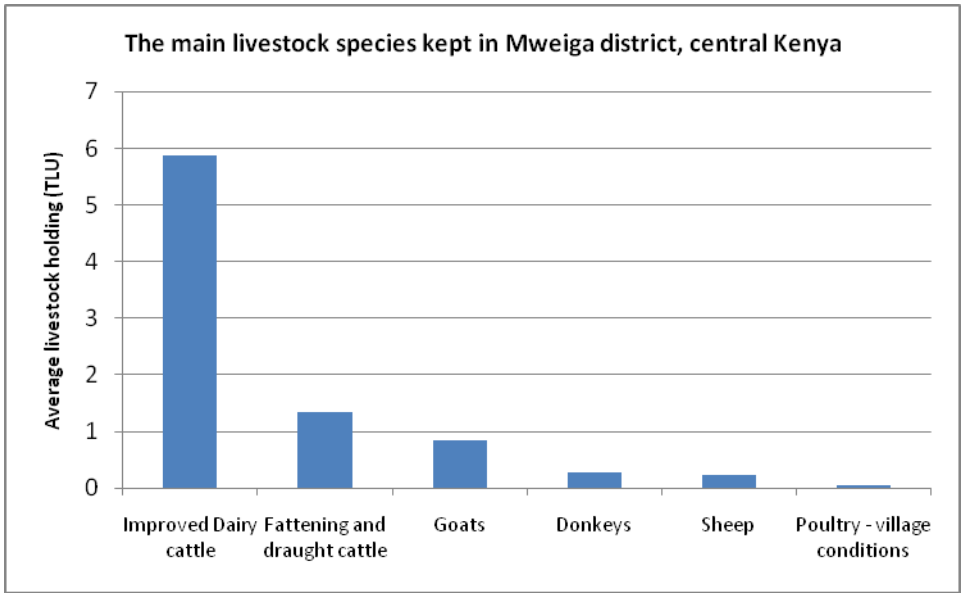

Figure 3: The average livestock holdings per household in Mweiga district, central Kenya in Tropical Livestock Units (TLUs)

Feed availability throughout the year

The main feed sources relied on throughout the year are green forages and grazing as shown in Figure 4. Green Maize, Napier grass, and weeds (predominantly wild growing ryegrass) are the main contributors of green forage, particularly during the wet season. Maize forage is considered to be the most important feed source grown by farmers. Farmers generally expect 0.1 hectares of green maize to yield approximately 2 tonnes of fodder material. The fodder material is generally fed after

the green maize is removed for roasting. Some households also sell it as fodder to other households that may be experiencing shortages. Oats are also grown by many households to meet fodder requirements. Oat seed generally costs 50 Kenya shillings/kg (USD$0.55/kg). Many farmers also sell seed commercially for 43 Kenyan shillings/kg (USD$ 0.48). Other feed sources such as crop residues, and purchased concentrates are also fed. The proportion of these feedstuffs in the diet is minimal as shown in Figure 5. Crop residue material contributes approximately 4% of the total dietary Dry Matter (DM), 5% of the total Metabolizable Energy (ME) and 4% of the total Crude Protein (CP). Farmers in this area show a clear preference for the type of feeds they purchase as shown in Figure 6. The commercially mixed ration forms 71% of the all the feeds purchased by farmers in this area.

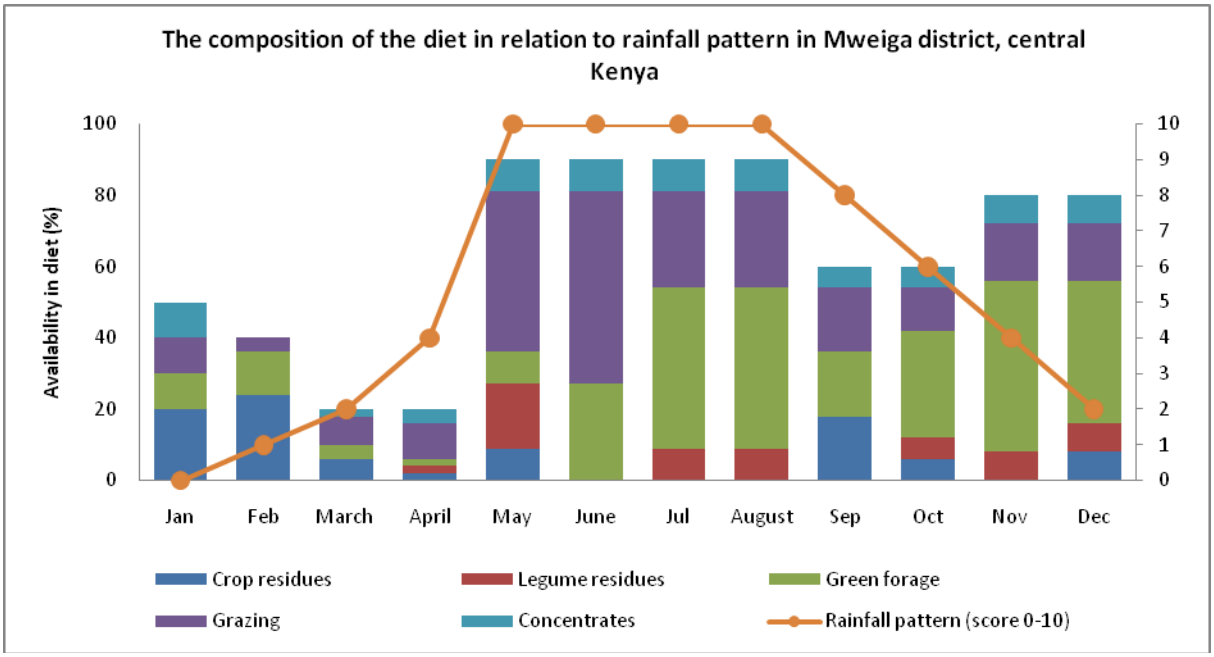

Figure 4: The composition of the diet in the Mweiga district, central Kenya throughout the year in relation to rainfall pattern.

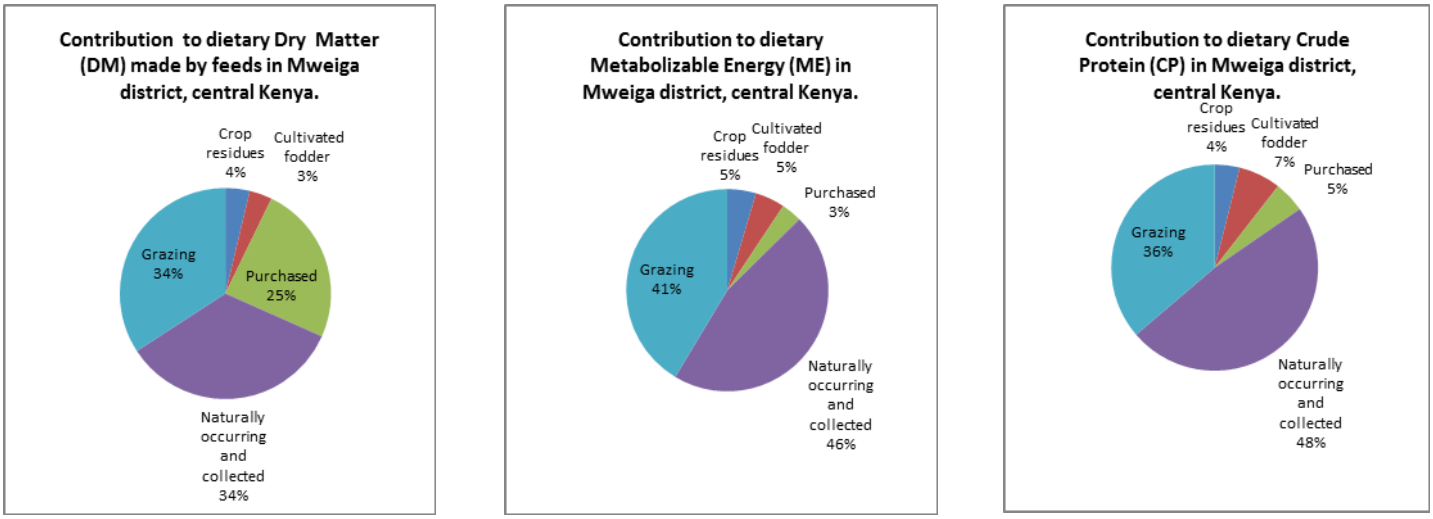

Figure 5: The contribution made by the various feedstuffs to the Dry Matter (DM), Metabolizable Energy (ME) and Crude Protein (CP) content of the diet of animals in the Mweiga district, central Kenya.

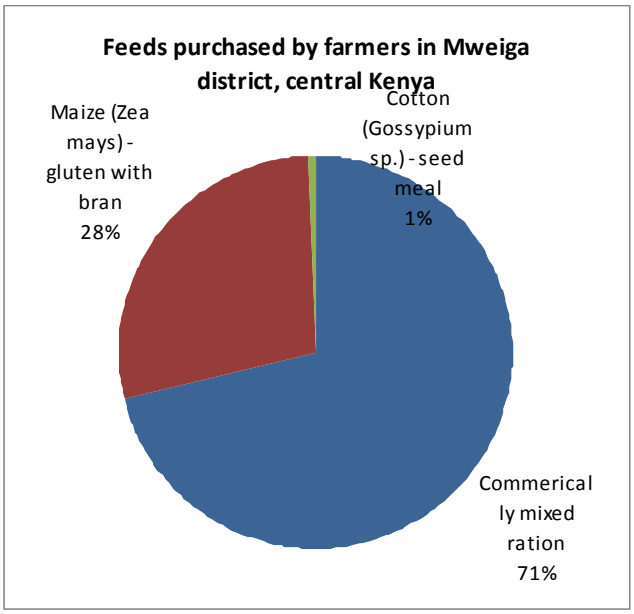

Figure 6: The feeds purchased by farmers in Mweiga district, central Kenya.

Problems, issues and opportunities

Farmers in this area face a number of constraints to the further development of their dairying operations. At present, the price received for milk sales is highly variable. Prices can range from 13.5-22.8 Kenyan shillings (USD$0.15 - USD$0.25). This is particularly pronounced during the wet season when milk can be rejected altogether. This is a serious concern for farmers as it prevents them from undertaking strategic developments of their production system as they can never be assured of the amount of income that will be generated from milk sales. This problem is further compounded by the expense of AI services. Farmers believe semen is simply too expensive especially when they have to pay the same price for repeat services should the cow fail to conceive and there is a limited selection of bulls available. Many of the farmers are also critical of the AI service providers as they have a history of being unreliable. Often when farmers make an appointment for their cow to be inseminated, the technician never arrives and the farmer is forced to wait another month for the cow to cycle again. A general lack of information available to farmers in regard to feeding, feed processing and fodder conservation technologies is also viewed as a constraint as many farmers believe such information will allow them to improve their production capabilities.

Potential interventions

The highly variable price received for milk indicates that there is a general oversupply in the marketplace, particularly during the wet season. Altering of the feeding system to improve feed efficiency will not overcome the low price received for milk but it will improve the income earning potential of milk sales as larger volumes will be available for sale. Improved feed utilisation and efficiency can achieved through the introduction of simple feed processing technologies such as chopping and chaffing. These processes increase the surface area to volume ratio of the feedstuff making it more available to microbial decomposition in the rumen. As a result, the animal is able to more fully utilise the feedstuff and produce more milk per kilogram of feed consumed. Mixing of

various feedsources may also be advantageous. At present, it is highly likely that one or more important nutrients required for high levels of milk production are lacking in the diet. Attempts should be made to rectify this situation through mixing a number of feed sources available locally to form a more diet capable of providing nutrients in the quantities required for production. Other methods could also be considered to overcome poor milk prices such as commencing the production of value-added products such as cheese and yoghurt. Diversifying production away from milk production and into other livestock species such as sheep or goats which receive consistent prices throughout the year should also be considered.

It is unlikely the farmers themselves will be able to change the pricing structure applied to AI services by service providers. However, farmers can take steps to ensure their cows have the best chance of conceiving during the first service to prevent the need and additional expense associated with repeat services. Improved farmer training in a number of key areas including; heat detection, improved hygiene practices during birthing to prevent uterine infections, flush feeding, and appropriate bull selection to prevent disadvantageous reproductive traits possessed by modern Holstein Friesian genotypes being introduced into their herds.

To improve the availability of information to farmers in regard to feeding, feed processing, and feed conservation methodologies. It will be necessary to improve linkages of the area with extension services. Extension services are responsible for the dissemination of such information to farmers. Furthermore, for the introduction of any potential intervention to occur in a sustainable way, it will depend largely on the ability of extension services to provide farmers will the correct information in a timely manner.

Conclusion

Milk production is the main focus of this mixed crop/livestock system. The area is characterised by small land holdings of approximately 2.6 hectares. Dairy cattle, particularly Holstein Friesians and Ayrshires, dominate livestock holdings with each household milking on average 6 cows. Milk sales supply over 60% of household income. Potatoes contribute the remaining 40% of all household income. The main constraints experienced by farmers are poor milk prices, expensive and unrealiable AI services, and a general lack of information pertaining to feeding, feed processing and feed conservation methodology. To mitigate the effects of poor milk prices, it will be necessary to improve feed efficiency and utilisation through the use of feed processing technologies. On-farm value-adding of milk products and the potential diversification of the system away from milk production should also be considered. Improving farmer understanding and knowledge of key areas required for successful AI treatments such as; heat detection, improved hygiene during birthing, flush feeding, and bull selection will mitigate the need and expense associated with repeat services. To ensure that farmers have improved access to the feeding, feed processing and feed conservation information they require, it will be necessary to strengthen linkages with local extension services (government and private). This will ensure farmers can gain access to the information they desire and ensure the effective introduction of potential interventions to alleviate production constraints in a sustainable way.

Summary

Key issues

- Milk prices are considered low and are highly variable throughout the year.
- AI services are too expensive and unreliable.
- A general lack of information is currently available to farmers in key areas of; feeding, feed processing and feed conservation methodologies.

Key metrics

- Milk yield: 10436.67 Litres per household per year
- Meat offtake: 30.38% per household per year

Ways forward

- Improve feed efficiency to ensure more milk can be produced per kilogram of feed.
- Consider value-adding milk products on farm and potential diversification away from milk production into more stable livestock commodities such as sheep and goats.
- Improve farmer training in the areas of importance for successful AI procedures. Areas should include; heat detection, improve hygiene practices during birthing, flush feeding, and bull selection.
- Improve linkages with extension services in the area.