



Characterization of the Livestock Production Systems and the Potential of Feed-based Interventions for Improving Livestock Productivity in Ol'lessos Division of Nandi County (Kenya)

By Sylvia Wafula (ICRAF), Josephine Kirui (ICRAF), and Ben Lukuyu (ILRI)

October 2015

Introduction

Lessos Farmers' cooperative Society is one of the dairy producer organization (PO) situated in Nandi County, Nandi hills Constituency; Ol'lessos Division Koilot Location located N 00°10.713, E 035°18.544 and Elevation of 2171meters above sea level. It was started in the year 1962, flourished in the 1980s and declined in the 1990s when liberalization was introduced and Cooperatives no longer had monopoly over farmers' produce during this period, the government also reduced support its' to cooperatives. In 2008, Lessoss dairy Farmers cooperative (LDFC) started registering farmers afresh and currently has 2,750 members spread across the following locations; Koilot, Lessos, Sochoi, Chuyiat, Tulwet, Oll'ainguse and Terige. Currently, the cooperative has three collection centers; Lessos, Oll'ainguse and Tulwet. The cooperative collects about 8,000lt of milk per day. Apart from challenges of stiff competition from hawkers and other milk marketers, LDFC, also experience a decline in milk volumes during the dry season and an increase during the rainy season.

The Feed Assessment Tool (FEAST) was used to characterize the feed-related aspects of the livestock production system in Lessos Dairy Farmers' Cooperative catchment area. This was done to help design feeding system interventions that are specific to Lessos Dairy Farmers' Cooperative catchment area. The exercise was done in November 2014 by East Africa Dairy Development project (EADD-P) in collaboration with the Ministry of Agriculture, Livestock and Fisheries and the Lessos Dairies Extension Department.

The main objectives of this study were to get;

- (i) an overview of the farming systems
- (ii) Identify major feeds and feeding related production problems, existing opportunities and potential interventions that would inform estimation of the feed gaps in the area.

This will enable the management develop an implementation plan that will address dry season feed gaps and improve livestock production and productivity of Lesoss Farmers Cooperative's members.

Methodology

Sampling

Farmer representatives both male and female were randomly selected from each of the seven locations to participate in the participatory rural appraisal (PRA) focused group discussions. The selection was done based on the size of land holding. Two FGDs were undertaken; one in Koilot with 22(Female 9: Male 13) farmers and another one in Sochoi having 20 (Female 8: Male 12) farmers. From each category of land holding size in the discussion groups, key informant farmers were purposively selected and individually interviewed in the seven Locations. These were 6 farmers, 2 from each category of land holding small scale, medium scale and large scale.

Data collection

The assessment was carried out using qualitative and quantitative methods of data collection. Focused group discussions (FGDs) were used to gather qualitative information on farmers perceptions about; farm sizes, household sizes, farm labour availability, annual rainfall pattern, irrigation availability, types of animals raised, general animal husbandry, access to credit, access to farm inputs, problems issues and opportunities within the livestock system. An interview using a structured questionnaire was used to collect quantitative information. The structured questionnaire was administered to nine key farmer representatives owning small, medium and large scale farms. The issues covered in the questionnaire were; dominant breeds, types of food and cash crops grown, how the crop residues are utilized, types of fodder crops grown and how much each feed resource contributes to the diet.

Data Analysis

The qualitative information gathered during the (FGDs) was analyzed and reported. The quantitative data collected from individual key informant farmers were entered into the FEAST excel template (www.ilri.org/feast) and analyzed.

Key Findings

The following are the findings of the assessment, and existing opportunities in the area.

Farming systems

The farming system is mixed crop- livestock with maize dominating in both areas; Koilot and Chemngetuny. Land holding varies across households with the majority falling under medium land holding with acreage ranging from 5 to 10 acres of land (2 to 4 hectares). None of the members is landless (Figure 1). The average family size is 6 per house hold.

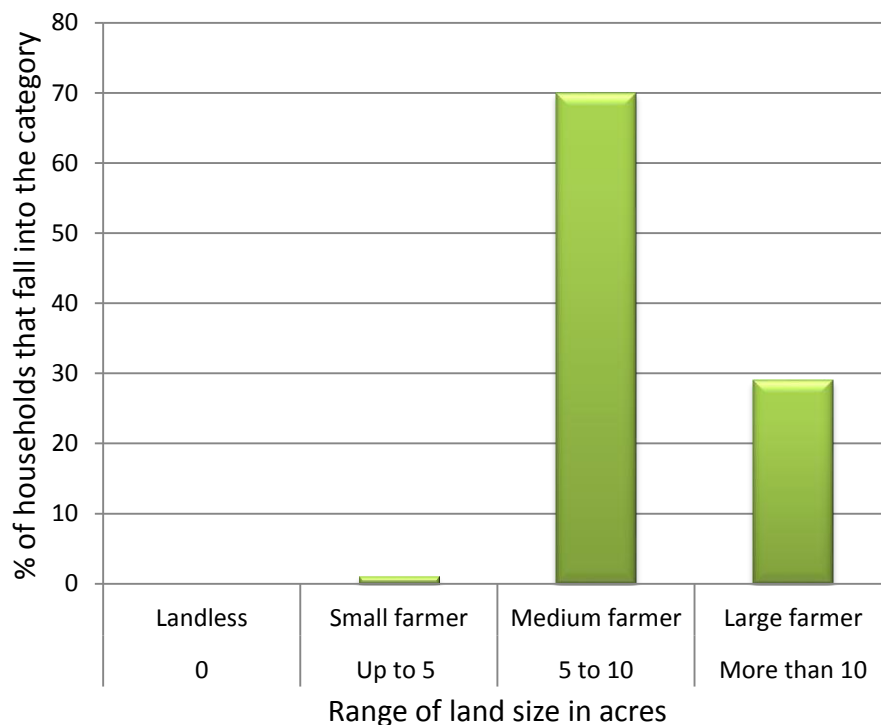


Figure 1: Average land sizes owned by farmers in various categories

The area experiences two rainy seasons favorable for crop production (Table 2). The long rains season occur from March to June while the short rains begin from August to October. Maize, beans and tea are planted during the onset of the long rains with beans being planted again in the short rains.

Table 2: Cropping Seasons in the Area

[illegible]

As shown in figure 2, maize is the dominant crop with majority of the farmers intercropping it with beans. The maize is grown both for income and as a food crop with crop residues from both maize and beans being used as livestock feed. However, some of the famers leave the crop residues in the field as mulch whereas a few burn the residues.

Irrigation is not practiced and on the rains. Labor availability is diminishing with majority of the casual workers opting for the neighboring tea growing areas. This has led to use of herbicides for weeding by some farmers. Land preparation is mechanized and labor is mostly required during the planting season, weeding and harvesting of maize in the months of March to May, August and October respectively. The cost of labor is Ksh1200 (13 USD) per acre for weeding maize, Ksh 1000 (11 USD) per acre for staking maize and Ksh50 (0.55 USD) for harvesting one 90kg gunny bag of maize on cobs.

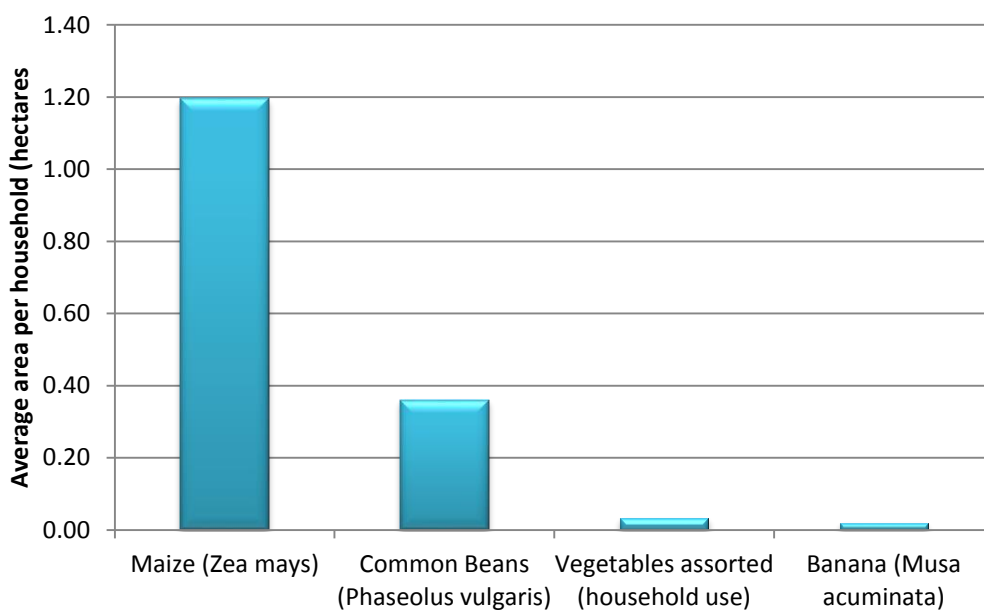


Figure 2: Average area per major crops grown by farmers

Income sources

Dairy production is the main source of income contributing 52% of the household income followed by crop (maize and tea) production at 25% (Figure 3). Horticultural crops; passion fruits, vegetables and tomatoes are also a contributing source to house hold income at 15%. Off farm business like shops and trading contributes 8% to the household income.

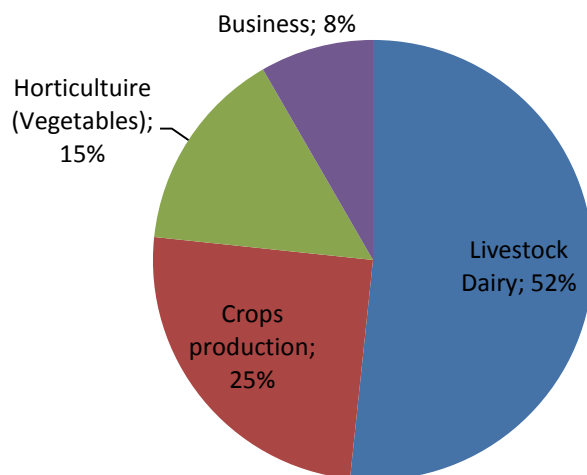


Figure 3: Contribution (%) of livelihood activities to household income

Livestock Production system

Livestock production system is semi intensive with improved dairy cattle being the most important livestock (Figure 4). Farmers reported an approximate of 90% household having improved dairy cattle with an average milk yield of 4.5 (EADD2 baseline report 2014). Cattle are mainly kept for milk, income from sale of culls and heifers, manure and dowry. Draught cattle are kept for plowing as well as income and dowry while donkeys are kept for transportation. Small ruminants (Sheep) are kept for meat, income, manure and also dowry. Farmers reported that 0.1% of the households have zero grazing units and majority do not house their livestock. Farmers reported that 75% practiced mainly grazing on natural pastures with a little supplementation. The supplementary feeds offered include; dry maize Stover, Napier grass, bean haulms, Rhodes grass, and green maize Stover. About 10% practice roadside grazing. Similarly, farmers reported 50% of household practiced feed processing by chopping and mixing at least two types of forages: Napier mixed with Rhodes grass hay. The common processing equipment includes pangas (machetes), chuff cutters and pulverizer.

Veterinary and Artificial insemination (AI) services are available to households who are registered members of Lessos Dairy Farmers' Cooperative who access the services either by paying cash or through a check off system. The prices of A.I range from Ksh1000 (11USD) to Ksh 6000 (65.9USD) depending on the breed, company that is distributing the semen and whether it is sexed or not. A few farmers use their own improved bulls while those who do not have bulls access bull services from their neighbors. The cost of veterinary services varies depending on the diagnosis.

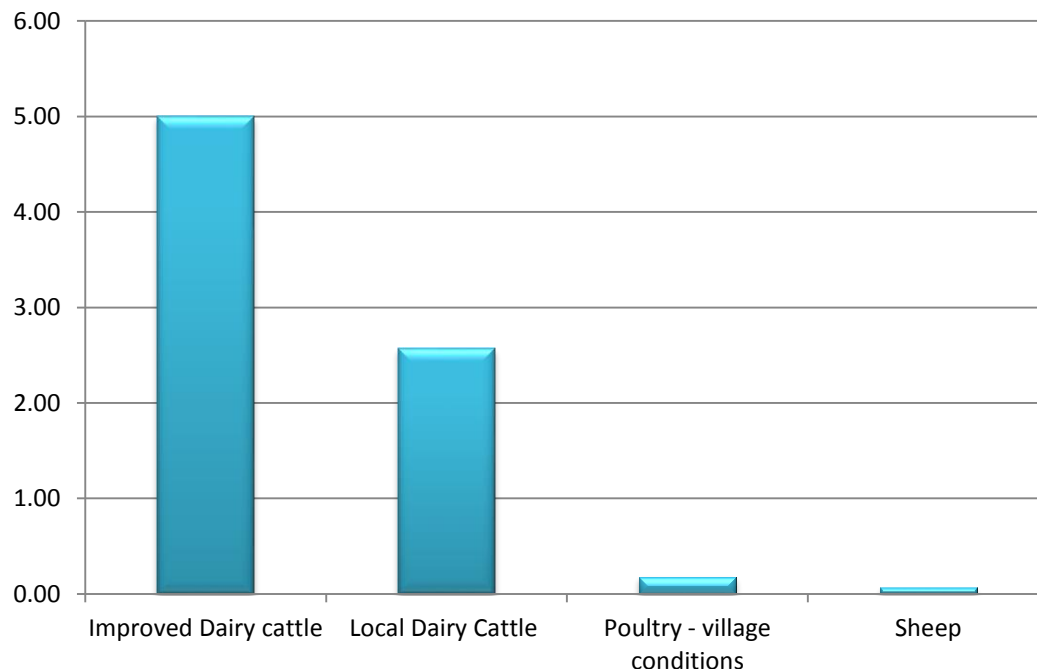


Figure 4: Average livestock species holdings per household in Tropical Livestock Units

Feed Resources and Availability

Farmers highly depend on grazing, collection of naturally occurring fodders (weed) and a small percentage of cultivated fodder (figure 7). Crop residues become accessible once the farmers start harvesting beans in August Dry maize Stover is available during the maize harvesting season in October .This is an indication that feed availability in the study site is a function of land use and rainfall pattern. Major feed resources include, natural pasture, crop residue from maize and beans, naturally occurring collected grass and cultivated fodder crops are a main source of livestock feed. Majority of cultivated land is utilized for crop production, hence grazing on naturally occurring pasture contributes a highest percentage of 49% dry Matter (DM) of the total diet. Naturally occurring and collected fodder also contributes 27% DM to the total diet, metabolizable energy of 29% and crude protein of 28%. This is mainly weeds collected along soil and water conservation terraces, in maize farm lands during the rainy season

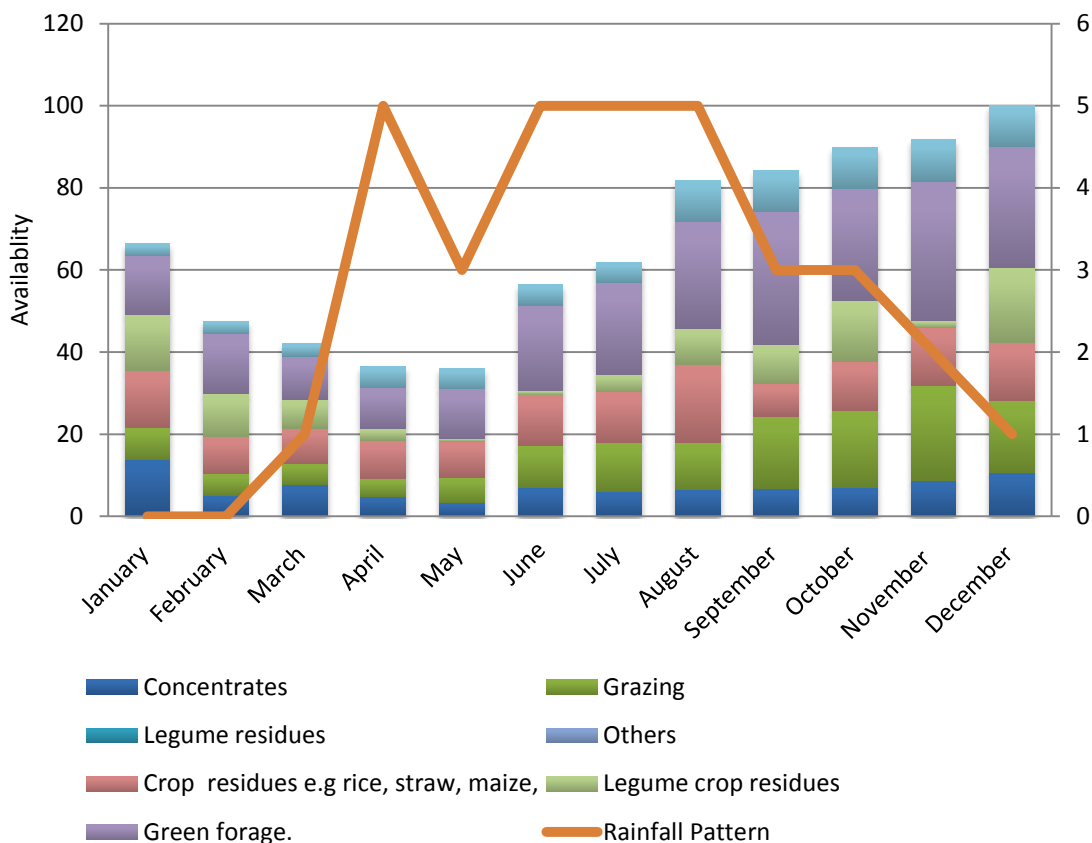


Figure 5: The composition of the livestock diet throughout the year in relation to the rainfall pattern

Purchased concentrates contribute less (4%) to the total diet as a feed resource. Farmers feed concentrates mainly from October to March. From figure 5 above, farmers specified that feed shortage is critical from the months of January to July where they mainly rely on crop residues, which have low nutritive value. Crop residue from maize (Dry maize Stover) and bean haulms (from common beans) is collected from the crop land and piled in stacks near the homestead where by it is chopped or pulverized and given to animals in small quantities. From figure 7 below it only contributes 3% of the total dietary DM. This implies that a lot of crop residue is wasted by not being collected from the crop land since it is either burned or left in the farm.

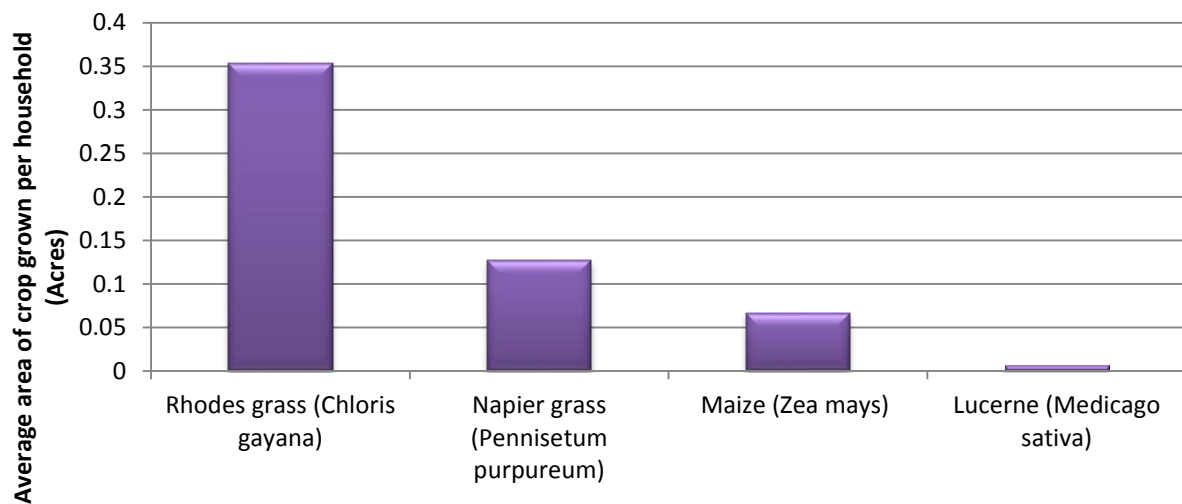


Figure 6: Dominant Fodder crops grown in the area

Cultivated fodder contributes 17% dry matter content to the total diet (figure 7). Rhodes grass (*Chloris gayana*) is the leading cultivated fodder with an average 0.035 acres, followed by Napier grass (*Pennisetum purpureum*), maize (*Zea mays*) and Lucerne (*Medicago sativa*) in a descending order.

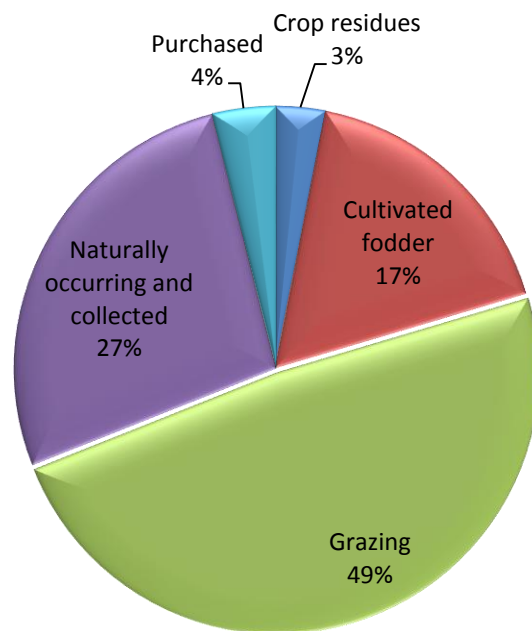


Figure 7: Dry Matter Content of total diet

Figure 8: ME content of total diet

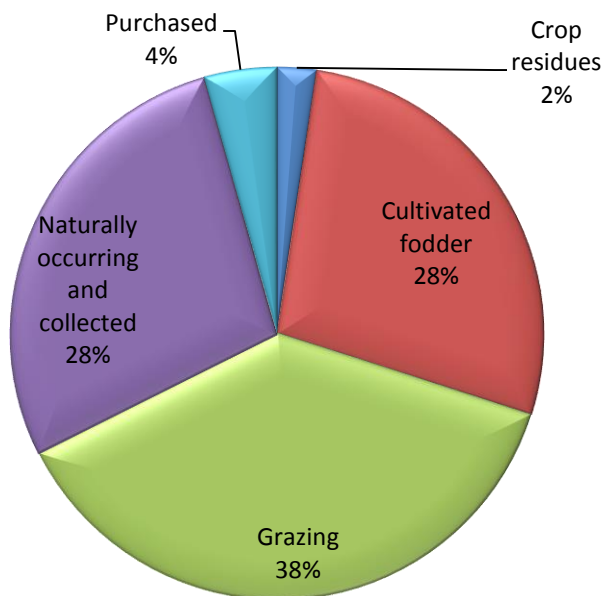
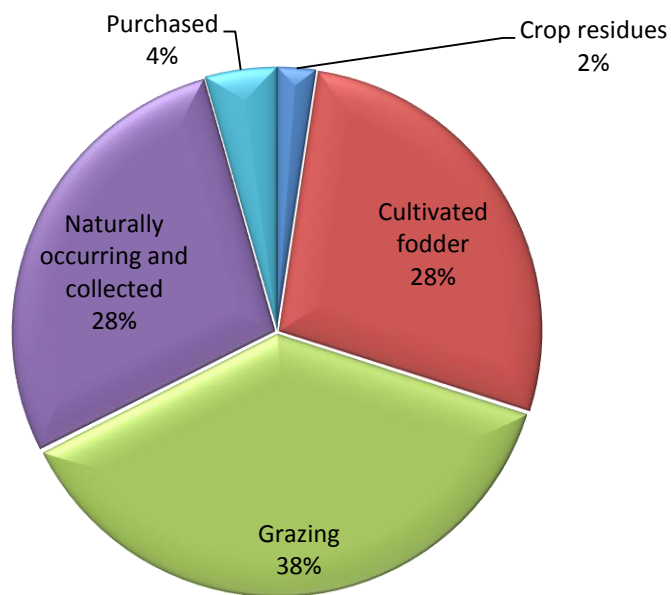


Figure 9: CP content of total die

Problems Issues and opportunities

Table 2: Problems, issues, proposed solutions by farmers and key areas of intervention from the feedback session

Problem Rank	Identified constraint	Proposed solution by farmers	Proposed Key interventions from the feedback session
1	Inadequate water	The producer organization to establish linkages with input suppliers like water tanks and other stakeholders involved with water supply	Facilitate linkages between the producer organizations and stakeholders providing water tanks and financial institutions for farmers to access through check off
2	Unavailability of pasture seeds and vegetative planting material	The Producer Organization to stock seed in their agro vet	Facilitate linkages with pasture and fodder seed manufacturers and distributors Initiate farmer groups seed multiplication and bulking of vegetative materials
3	High cost of commercial concentrates	The Producer organization to have a variety of commercial concentrates stocked in the agro-vet Capacity building on, on-farm feed formulations concentrate (dairy meal) formulations	Facilitated the Producer organization to establish linkages with reputable commercial concentrate manufacturers to enable bulk sourcing to benefit from economies of scale and ensure farmers access good quality concentrates Include fodder legumes as a feed resource
4	Unavailability of pasture harvesting equipment's (balers, brush cutters)	The producer organization to facilitated farmers access the equipment's through check off Trainings on how to use box balers and storage as pulverized hay	Facilitate linkages with equipment suppliers Facilitate linkages with service provider who will provide baling services
5	Inadequate extension service providers to guide farmers on the best practices	The Producer Organization to increase the number of extension service providers	Explore farmer to farmer extension by facilitating recruitment and capacity building of Volunteer farmer trainers who will complement the extension service providers.

Summary and Existing Opportunities

From the results, there exists a potential for farmers to establish pasture as majority of the farm land ranges from 5 to 10 acres with a few farmers having more than 10 acres. Utilizing the area under grazing and converting a proportion of it to cultivated fodders as natural pastures are low in nutritive value as feed resource farmers will increase dry matter yield per unit area of land. Cultivation of improved forages would also reduce time wasted in collecting naturally occurring weed. This time could be used for other income generating activities. The natural pastures could also be improved by paddocking manure application.

Similarly, results indicated only four feed resources under cultivated fodder (Rhodes grass, Napier grass maize and Lucerne). There is need to increase the feed resource base to include a variety of basal forages and legumes and also farmers need to increase acreage under cultivated fodder as the dominant (Rhodes grass) was averaging 0.035 acres. Having maize and beans as dominant crops presents an opportunity for farmers to utilize crop residues as a feed resource, however, crop residue contribution to total diet is 3%. Though the crop residue is processed by drying and chopping farmers do not include additives like industrial by products (Molasses) and urea to improve its digestibility. Green forages are available from the month of July all through to December, this presents an opportunity to harvest the excess forages and conserve for dry season feeding.

Way Forward and Key areas of Intervention

From the feedback discussion, an implementation plan has been developed (annex 2) to address the following key issues.

Technological interventions

1. Increase the acreage under cultivated fodder by training on forage establishment
2. Introduction of other alternative feed resources like forage sorghum, and fodder trees
3. Training feed ration formulation, crop residue handling, processing and utilization
4. Improve the existing grazing lands through natural pasture management, harvesting it during the rainy season and conserving as hay

5. Identification of Volunteer farmer trainers who will host demonstrations of the introduced feed resource practices and seed multiplication

Institutional Interventions

1. Creating linkages with input suppliers to enable stocking of the agro-vet with improved pasture and fodder seeds, good quality commercial concentrates, simple feed processing equipment (pulverizers and brush cutters) and stakeholders to address water shortage.
2. Identify input suppliers to stock the agro vet with silage making inputs (silage bags, molasses and silage sheets)
3. Identify Volunteer farmer trainers who will complement the existing extension structure.

Annex 1: Dry season Feed gap Estimation Results

Current situation; average milk production= 4.5liters/cow/day (EADD baseline report 2014)

Target production = 11.4 liters/cow/day

Total Dry matter deficit from the feed gap estimation = 131613 kg DM

Assumptions:

1. Assumed 6kg DM/ bale of hay,
2. Total yield of 200 bales/ acre /year
3. For Grazing, a cow is able to pick only 5kg DM/day

Feed Resource	Dry Season Gap (DM kg)	Rhodes DM (Rhodes+Naturally occurring)	Estimate bales	Estimate Acres under Rhodes	Estimate acres under other forages (takes a percentage of the area under grazing
Rhodes	21314	63941	10656	53.28	
Naturally occurring collected	42628				
Grazing	61277				
Purchased	6394				
Estimated area under grazing to meet the above (61277) DM requirement	12255 acres				5 % of 12255 acres

List of References.

Duncan, A., York, L., Lukuyu, B., Samaddar, A. and Stür, W. (2012). Feed Assessment Tool (FEAST) Questionnaire for Facilitators (Version 5.3); A systematic method for assessing local feed resource availability and use with a view to designing intervention strategies aimed at optimizing feed utilization.

EADD2 Baseline Report 2014