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

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October 2015

Introduction

Lelchego Dairy Company Limited is located in Nandi County Kosirai Division located N 00'19.353, E 035'10.190 and elevation of 2143meters above sea level and was started in 2010. Currently Lelchego has over 4000 registered members. Membership is drawn from the following 10 locations in Kosirai Division; Lelmokwo, Itigo, Mutwot, Sigot,Jepkatet, Biribiriet, Kosirai, Kokwet, Ngechek, Tulon, Ngeris, Jepkanga and Lelchego. They have established 9 milk collection centers in, Mulango, Kapngetich, belekenya, Tulon, Airport, Marura, Karlel and Jepterit. During the wet rainy seasons, Lelchego Dairy collects about 13000 liters of milk per day however during the drier months they have recorded a minimum of 3000 liters per day.

The Feed Assessment Tool (FEAST) was used to characterize the feed-related aspects of the livestock production system in Lelchego Dairy Company's catchment area. This was done to help design feeding system interventions that are specific to Lelchego Dairy's catchment area. The exercise was carried out October 2014. Feedback of the preliminary results to the Producer Organization's management was done in February 2015. Both exercises were carried out by East Africa Dairy Development project (EADD-P) in collaboration with the Ministry of Agriculture, Livestock and Fisheries and Lelchego Dairy's extension staff. The assessment was

carried out through focused group discussions and questionnaire administered to nine key farmer representatives owning small, medium and large scale farms.

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 would enable the management develop an implementation plan that will address dry season feed gaps and improve livestock productivity in the catchment area.

Methodology

Sampling

Farmer representatives both male and female were selected from each of the ten locations to participate in the focused group discussion that was organized in two locations. The selection was done based on the size of land holding. The two focused group discussions were undertaken one in Ngecheck with 23 (13 male, 10female) farmers and another one in Sugut having 25 (16 male, 9 female) 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

From the results, all the ten locations in Lelchego Dairy do not have landless households. Majority of the households in the area fall under the medium category with land holding ranges from 5 to 10 hectares of land.
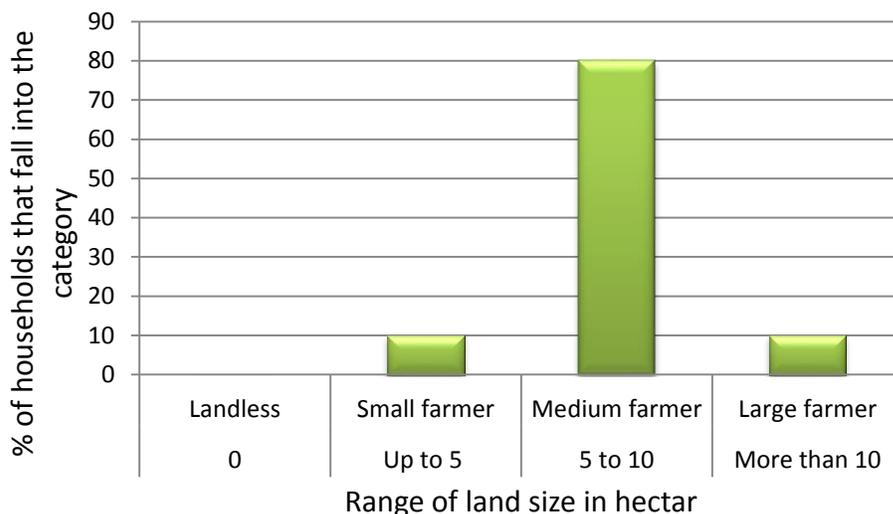

Figure 1: Average land sizes owned by farmers in various categories

The area receives long rains from March to June and short rains in August and September. This rainfall pattern influenced the occurrence of two season's dry and wet season, with two wet

seasons favorable for crop establishment. Major farming operations start from the month of March with crop establishment being done from April. Farmers reported that the second planting season for beans begins in August.

Table 1: Cropping Seasons in the Area

Name of season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Long rains			■	■	■	■						
Short rains								■	■			
Dry season	■	■					■			■	■	■

In all the 10 locations, maize emerged as the dominant arable crop (Table 1). Land is utilized for more than one crop per year as farmers reported that they do intercrop maize with beans and under sow the beans in the maize field in August. A proportion of the crop residues from both maize and beans are collected used as livestock feed while the rest is left as mulch on the farm, it was reported that close to 40% burn the crop residues. Results indicated that irrigation is not practiced in all the ten locations. Both family and hired labor are readily available in the area. Labor is mostly required during land preparation in March, planting in April, weeding from mid-May and harvesting of beans and maize in August and October respectively. The cost of labor for one acre (0.4hectares) in all the ten locations is an average of 2000Ksh (22 USD) for weeding, 1500Ksh (16USD) planting, 1000Ksh (11USD) staking maize and harvesting 70 Ksh/90kg (0.78USD) bag on cob maize.
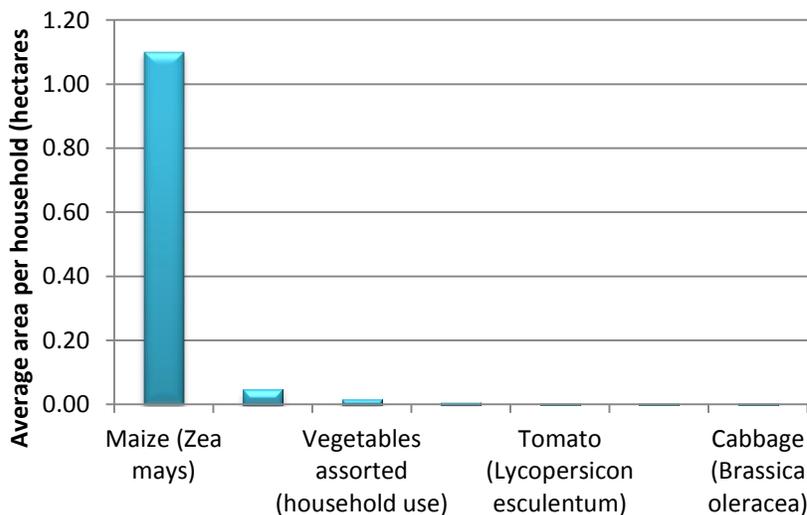
Figure 2: Average area per major crops grown by farmers

Income Sources

The PRA results indicated that Livestock is the number one contributor to household income contributing 59% followed by crop production at 22%
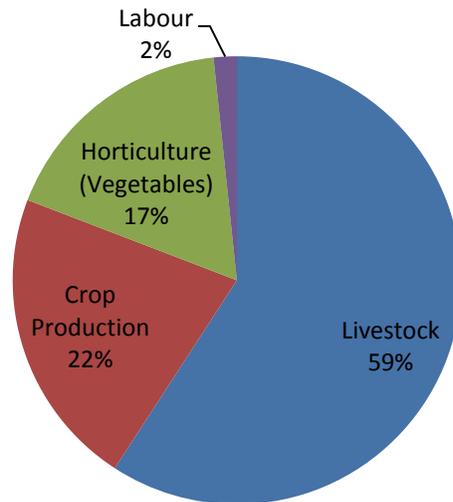

Figure 3: Contribution (%) of livelihood activities to household income

Livestock Production system

Improved dairy cattle sheep, local poultry, fattening and drought cattle are the livestock species kept in the area across all the ten locations. (Figure 4). They are used as a source of food, and other uses include dowry and manure and milk From the EADD 2 baseline survey the daily average milk production per cow is 4.5 liters (EADD2 Baseline report 2014). 20% of the households house their livestock while 80% confine them in paddocks at night. Majority of the households practice open grazing in paddocks. The most common feed processing methods practiced in the area are; chopping(using machetes, chuff cutters and pulverizers), mixing of maize Stover with Napier grass and molasses and also sprinkling with mineral salts.

Both veterinary and A.I services are readily available to the members of Lelchego dairy. This is because Lelchego dairy has employed Animal Health Assistant (AHAs) practitioners and linked private AHAs to their members. These services are accessed either through on cash or check off

depending on the financial capability of the member. The cost of A.I ranges from 1000 Ksh (11USD) to 6000 Ksh (65USD) depending on the type of breed, company and whether the straw is sexed or not. However farmers reported that close to 80% of the households use bull services since they can access bull services free from their neighbors.
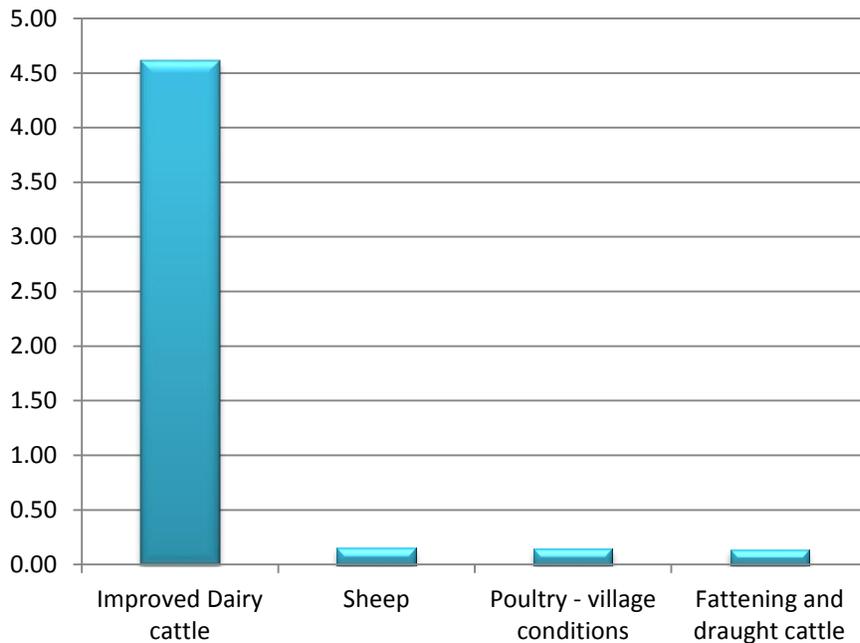

Figure 4: Average livestock species holdings per household in Tropical Livestock Units

Feed Resource Availability and Feeding

Naturally occurring pasture and cultivated fodder are the main feed resources in all the ten locations. Natural pastures contribute the largest proportion of the feed on dry matter (DM) and metabolizable energy (ME) figure 7 and 8. Other feed resources include, crop residues, green forage and naturally occurring weeds collected on farmlands during the wet season (Figure 5). Farmers reported that they collect chop and store crop residues that are fed from October all through to August.
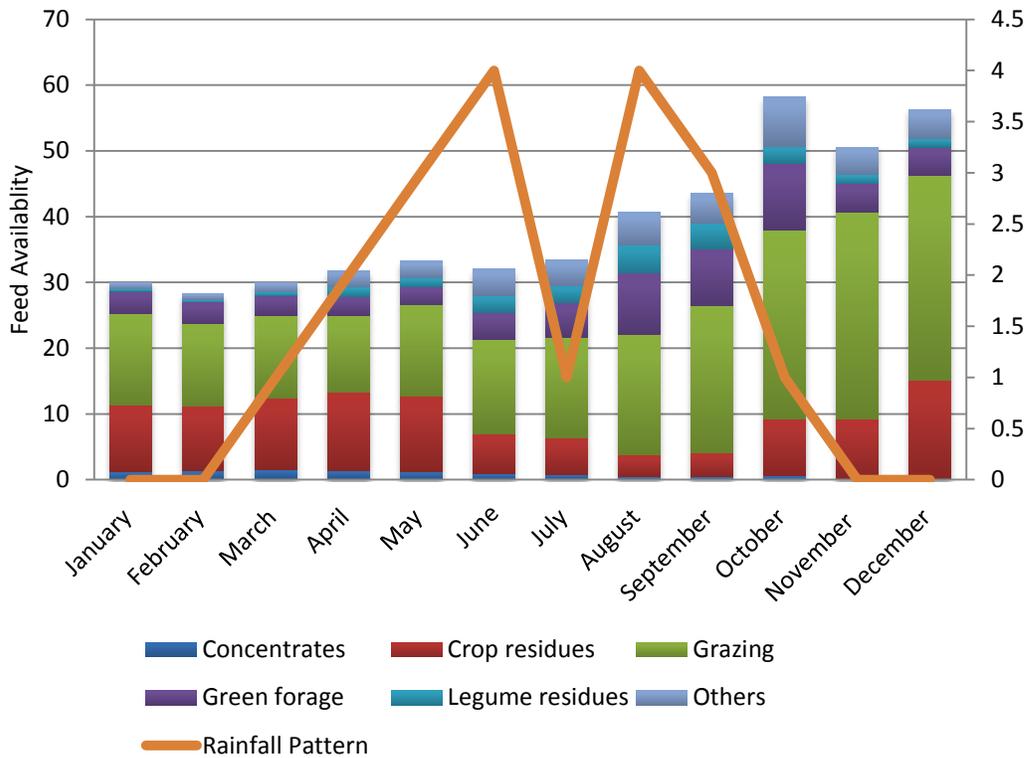
Figure 5: The composition of the livestock diet throughout the year in relation to the rainfall pattern

Cultivated fodder contributes 29% dry matter (DM), 27% metabolizable energy (ME) and 57% crude protein (CP) to the total diet Results indicated that Rhodes grass is the dominant fodder species planted across the ten locations with each house hold having established and average of about 0.35 hectares. Other cultivated fodder include, Napier, Desmoduim and fodder trees.
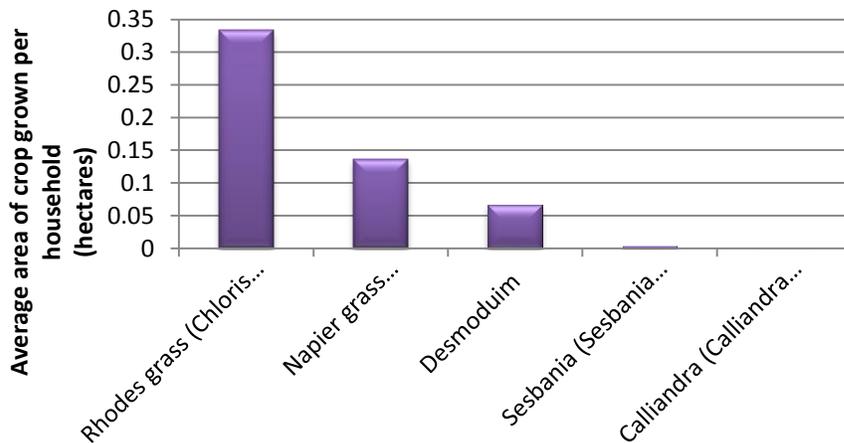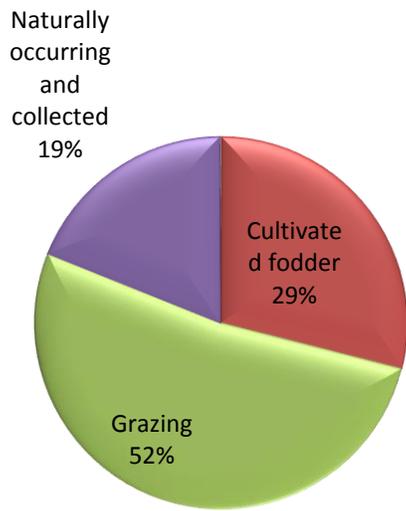
Figure 6: Dominant Fodder crops grown in the area

Naturally
occurring
and
collected
19%

Cultivate
d fodder
29%

Grazing
52%

Figure 7: Dry Matter Content of total diet
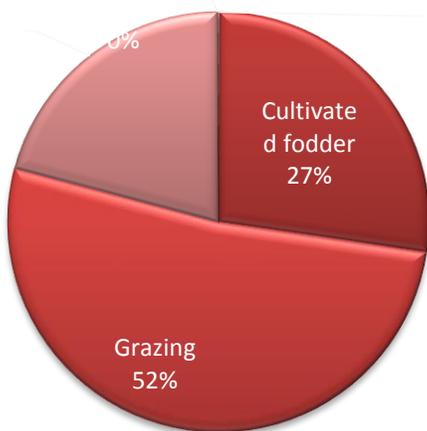
Cultivate
d fodder
27%

Grazing
52%

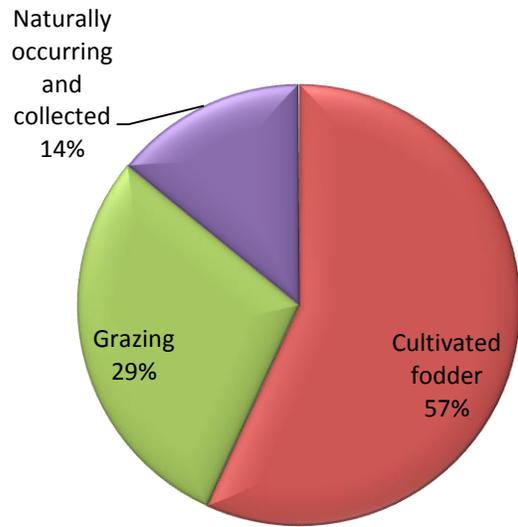Figure 8: ME content of total diet

Figure 9: CP content of total diet

Problems Issues and opportunities

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

Rank	Problem identified by Farmers	Proposed solution by farmers	Proposed Key interventions from the feedback session
1	Poor quality dairy meal and high cost of mineral salt licks	Lelchego Dairy to source from reliable manufacturers to ensure quality and gain from economies of scale	• Lelchego Dairy to start making dairy meals • Increase acreage under forage legumes that are high in crude protein
2	Inadequate pasture seeds	Lelchego Dairy to stock the seeds in their agro vet	• Establish linkages with seed manufacturers to acquire seed at stockiest price • Use volunteer farmer trainers to multiply and bulk seeds
3	Prolonged dry spell that led to poor pasture germination	Timely planting to make use of the available rains	• Training on seed pre-treatment and establishment techniques • Introduction of drought resistant feed resource bas varieties
4	Inadequate knowledge on feed ration formulation	Trainings on feed ration formulation	• Practical demonstrations on feed ration formulation
5	Poor feed storage leading to spoilage		• Trainings on importance of feed storage and effects of aflatoxin
6	High cost of feed processing equipment, like Pulverizers, chuff cutters and brush cutters	Lelchego dairies to facilitate access	• Establish a working relationship with suppliers and financial institutions for farmer to access through check off

Summary and Existing Opportunities

There is availability of land for pasture establishment as results indicated that majority of the households own land between 5 to 10 hectares. With the occurrence of two cropping seasons in a year, farmers can be able to establish both during the long and short rains. In all the ten locations, natural pastures emerged as the major feed resource base contributing 52% DM. Converting a proportion of this grazing land into established forages would in turn yield more dry matter per unit acre of land. Increasing the feed resource base by introducing drought tolerant varieties that include forage legumes, sorghums, and fodder trees will also ensure feed availability all year round.

It also emerged that farmers utilized only a proportion of the crop residues from maize and beans as a feed resource base that is pulverized and mixed with molasses. There is need therefore to train on crop residue treatment with urea so as to increase its palatability and nutritive value.

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

- Introduction of other feed resource base to include forage legumes, sorghums, fodder trees and maize for silage
- Use of Volunteer farmer trainers to multiply and bulk seeds.
- Training on simple feed stores and conservation.
- Training on crop residue handling, treatment and utilization.
- Contract farmers to plant and conserve hay to be stocked in the agro vet shops

Institutional interventions

- Establishing sustainable working relationships with input suppliers to ensure inputs are stocked in the agro vet shops. These inputs include Pulverizers, pasture seeds and salt licks.
- Establish working relationships with service providers for hay baling
- Establish linkages with financial institutions for farmers to access credit
- Identify Volunteer farmer trainers to complement the existing extension structures.

Annex 1: Feed gap Estimation Results

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

Target production = 11.4 liters/cow/day

Estimated number of cows in the area = 22000

Total Dry matter deficit from the feed gap estimation = 120750 kg DM

Assumptions:

1. Assumed 6kg DM/ bale of hay,

2. Total yield of 200 bales/ care /year

3. For Grazing, a cow is able to picks 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	32608	57960	9660	48.3	
Naturally occurring collected	25358				
Grazing	62790				
Purchased					
Estimated area under grazing to meet the above (61277) DM requirement	12558 acres				5 % of 12558 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.

EADD 2 Baseline report 2014