

Characterization of livestock production systems and the potential of feed-based interventions to improve livestock productivity in Lokapel-Katilu, Turkana South sub-county, Turkana, Kenya

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The Feed the Future Kenya Accelerated Value Chain Development (AVCD) program seeks to widely apply technologies and innovations for livestock, dairy and staple crop (root crops and drought-tolerant crops) value chains in order to competitively and sustainably increase productivity, contributing to inclusive agricultural growth, nutrition and food security in 23 counties in the country. Supported by the United States Agency for International Development as part of the US government's Feed the Future initiative, its main goal is to sustainably reduce poverty and hunger in the Feed the Future zones of influence in Kenya.

In partnership with the International Crops for Research Institute for Semi-Arid Arid Tropics (ICRISAT) and the International Potato Center (CIP), International Livestock Research Institute (ILRI) will lead the implementation of AVCD. The three CGIAR centres will work closely with partners—county governments, NGOs, CBOs, private sector actors and other USAID-funded projects/programs, as well as leverage knowledge and best practices from academic institutions and foundations.

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Introduction

Livestock feed availability is currently a major constraint to increasing livestock production and productivity in many developing countries. This can be attributed to a wide array of factors ranging from rising demand for livestock feed resources as a result of increasing livestock population, effects of climate change, changing livestock production systems amongst others. It has brought about several challenges with regards to feed availability, quality and quantity and more so in the Arid and Semi-Arid Lands (ASAL) (FAO, 2012).

Turkana is one of the ASALs: counties in Kenya which is located in the North Western part of the country. The main livestock production system is extensive pastoralist and agropastoral systems characterized by swards of rangeland pasture, small pockets of irrigated pasture and pastures along the riverine areas. Also, livestock movement (mobility) over large areas rangelands with variable and relatively low quantity and quality forage is another feature of ASAL. These factors converge into a diverse and complex system with a wide variety of animal feed resources and types that can be evaluated using diverse data from household surveys, agricultural statistics, markets and land use studies.

In order to develop appropriate livestock feed interventions for Turkana, the Accelerated Value Chain Development program – Livestock Component (AVCD – LC) conducted an accurate assessment of existing livestock feed system in Lokapel sub-location of the Katilu location in Turkana county. The Feed Assessment Tool (FEAST) available at www.ilri.org/feast was used in this assessment. The main aim was to assess the availability, accessibility and utilization of livestock feed resources in the pastoral and agropastoral production systems of Turkana where there is great potential for establishing sustainable pasture and fodder value chains. In addition, recommendations/interventions that will improve the current and future supplies of livestock feed for improved livestock productivity were identified based on the findings of the study.

Methodology

Description of the study area

Lokapel is a sub-location in Katilu Ward located about 127 kilometers South of Lodwar town along river Turkwel, Kenya. It lies at latitude 3.1071296 North and longitude 35.5967291 East. It has an estimated population of 15,000 with approximately 2,500 households. It comprises of 20 villages, namely; Akarakarait, Naperebei, Naturomwar, Napekwen, Kalokoda, Kimerik, Elemsekon, Nakwalele, Lokapel, Kaibachar, Kaimojo, Akou-Etom, Ekoropus, Ayanae-Elim and Soweto. The households in these villages are mainly agro-pastoralists practicing mixed crop farming and extensive pastoralism.

Data collection and analysis

The study was carried out in August of 2016. The quantitative data collected from participatory rural appraisal (PRA) surveys and individual interviews were entered into the FEAST excel template (www.ilri.org/feast) and analyzed. Results are presented in tables, graph pies and bar charts.

The FEAST methodology as described by Duncan et al., (2016) was used for this study. It is a Farmer-Centered Diagnosis approach which involves PRA tools. Firstly, focus group discussions with groups

of 16-25 farmers using structured questionnaires to provide an overview of the farming system and livestock feed resource availability and use, secondly, simplified individual farmer interviews with questionnaires administered to nine (9) farmers (representing the various wealth endowment categories) in order to generate quantitative and qualitative data on livestock feeds availability and utilization at household level. Furthermore, key informant interviews, scoping survey using transect walks, farm visits and data from secondary sources were used to triangulate the collected data.

Results

Major income sources

The main sources of income for households in the area are cropping (35%), livestock (33%), off-farm business enterprises (24%) and labour (8%) (Figure 1). However, casual labour is commonly hired during cropping or planting season. Informal sources of credit such as merry-go-round saving scheme and friends/relatives are the major sources of credit in the area. However, formal sources such as Kenya Women Finance Trust (KWFT), Uwezo fund and Equity bank are available in the area but not easily accessible due to stringent lending requirements.

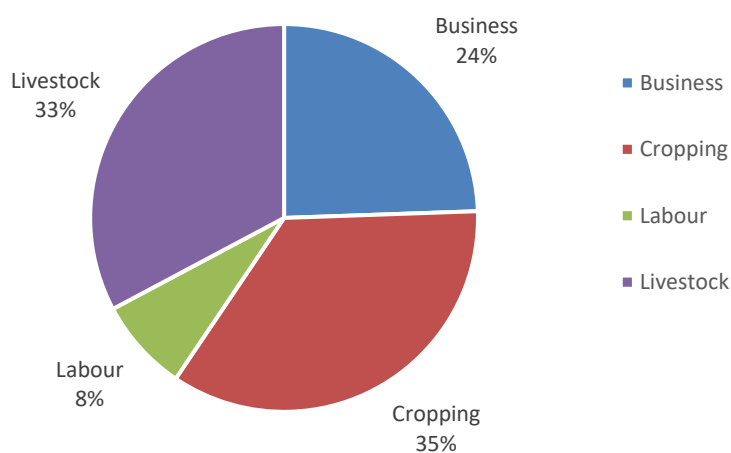


Figure 1: Major sources of income in Lokapel/Katilu villages

Farming Systems

Farmers in the area are mainly agro-pastoral practicing mixed cropping and extensive livestock production systems. The main cropping system is through flood irrigation, but rain fed crop production is also practiced. The land is communally owned where extensive livestock production system is practiced. However, households are allocated land in the irrigation scheme where mixed cropping using flood irrigation is practiced. Figure 2 shows the farmers perception about landholding in the irrigation schemes by households.

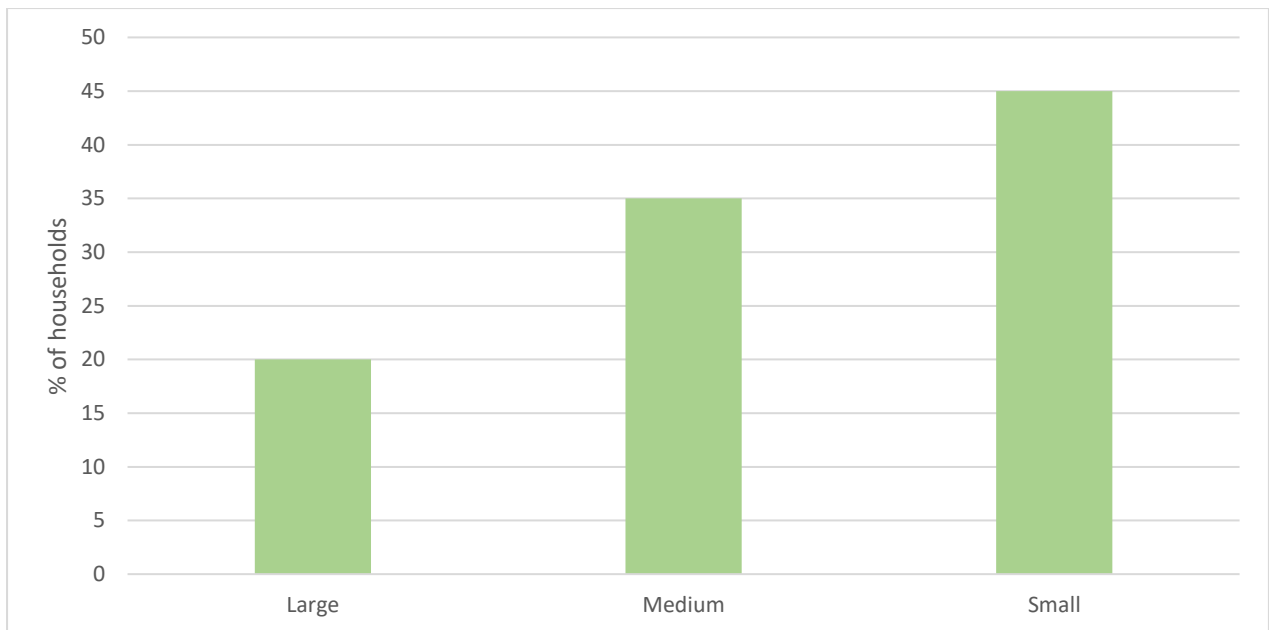


Figure 2: Farmer's perception of average land holding per household

About 80 % of the households have farms in the irrigation scheme and the main crops grown in the irrigation schemes are maize, cow peas, sorghum, green grams, kales and tomatoes (Figure 3). Crops are mainly grown for subsistence with no surplus for sales.

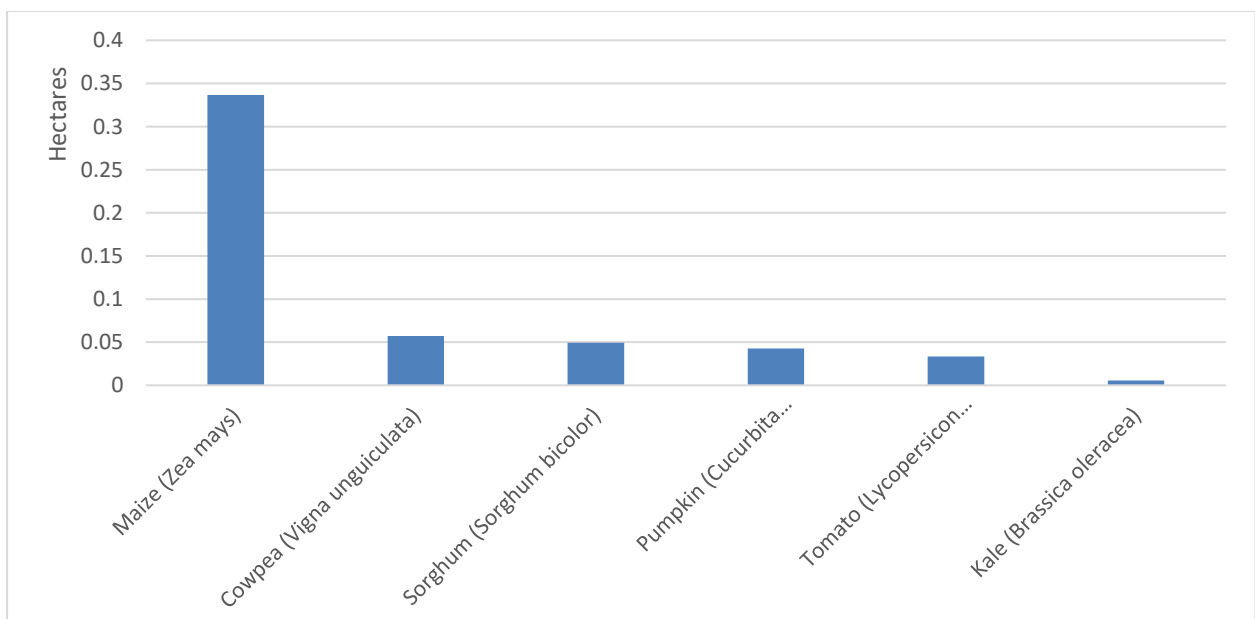


Figure 3: Dominant crop types by average hectares cultivated

Cropping seasons and crops grown

The cropping season is mainly during the wet season (Akiporo and Naiti) although rainfall pattern in the area is unpredictable and unreliable. It is nominally bimodal with long rains (Akiporo) occurring between March and June and short rains (Naiti) between October and November (Figure 4).

Jan Lodunge	Feb Lomaruk	Mar Lochoto	April Titima	May Elel	June Losuban	July Lotiak	August Lolongu	Sept Lopo	Oct Lorara	Nov Lomuk	Dec Lokwang
		AKIPORO (Long Rains)							NAITI (Short Rains)		
AKAMU (Dry Season)						AKAMU (Dry Season)					AKAMU

Figure 4: Seasonal rainfall pattern in the Lokapel/Katilu Village

Workloads are at their greatest during planting season and food shortages are also high during this season since the harvests have not come in. However, this is complemented by better milk production as the rainy season progresses. For livestock keepers, labour is required throughout the year with heavy workloads being experienced during the dry season when herds migrate for pasture and water. Labour cost varies depending on the type and intensity of work with the cost of herding ranging from KES 3,000 (USD \$ 30) to KES 5,000 (USD \$ 50) per month in addition to the provision of food. Manual labour to open 0.4 hectares of land is variable based on the thicket. In the respondents' context removal of one palm tree costs KES 1,000 (US \$ 10) per person.

Livestock management systems

The main livestock production system in the area is open grazing and the predominant livestock species are; local dairy cows, goats, sheep, camel, fattening and draught cattle and donkey. Sheep and goats are the most important livestock species being kept by almost 100 % of the households mainly for milk, blood, meat, hides and cash income. Figures 5 shows the dominant livestock categories by TLUs and average livestock holding by category in TLUs for goats, sheep, donkeys, local dairy cows (lactating), local bulls', local dairy cow (dry) and local dairy heifers in the area.

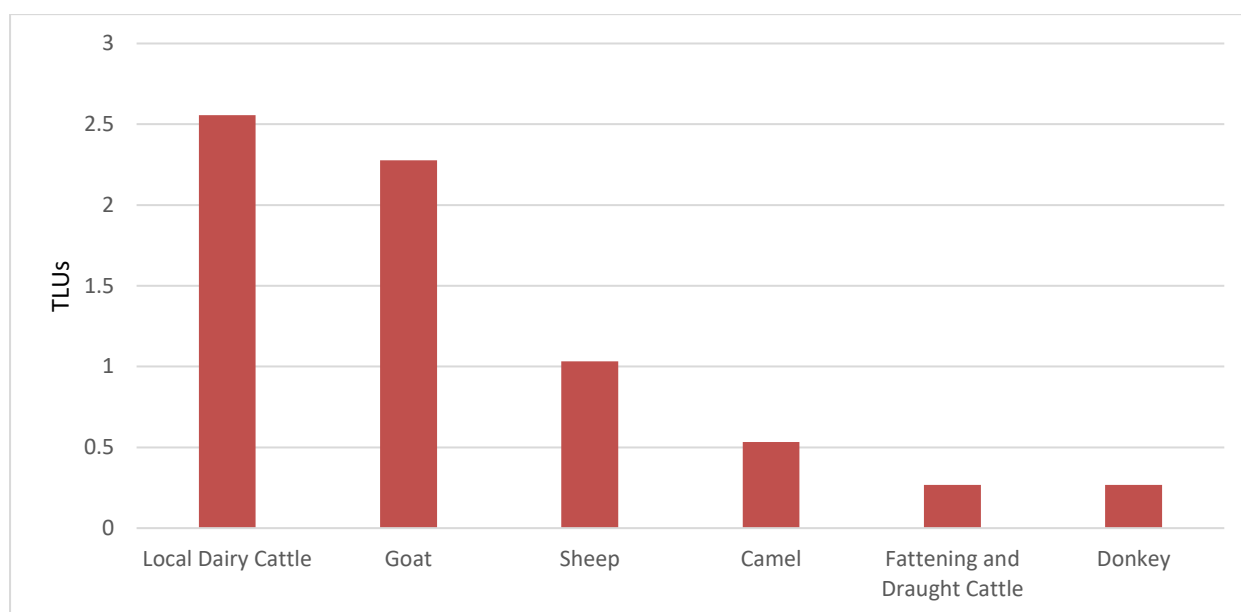


Figure 5: Dominant livestock categories by TLUs

The livestock management practices in the area are similar across households. Large stock i.e. cattle, camel, and donkey are not housed while small stock i.e. sheep and goat and local poultry are partially housed. The housing of small stock is mainly through enclosures made using locally available materials (local shrubs and bushes). Feeding troughs and bedding are not provided in the enclosures. Young lambs and kids are separated from the main herd during grazing and when housed.

There are seasonal differences in grazing areas where during the wet season, livestock is grazed away from the reserved areas while during the dry season the animals are brought back to utilize the reserved forage and crop residues at Lokapel hills. The average trekking distance for water during the dry period is approximately 8-10 kilometers. Watering of animals during the dry period is difficult and can be done once after 2 days. In extremely bad years the livestock migrates beyond these traditional dry grazing areas along the riverine and Lokapel hills.

There are no livestock feed processors in the area and neither do farmers use concentrates to feed their livestock. However, weak and sick animals are fed using collected fodder such as acacia pods, kitchen leftovers and maize near homesteads.

Animal health services in the area are mainly provided by the county government and other non-state actors (Table 1). However, livestock keepers can access livestock inputs and veterinary drugs from input suppliers available in the main market. The most common types of animal health problems are animal diseases such as Peste des Petits Ruminants (PPR), Sheep and Goat Pox (S & GP), Contagious Caprine Pleuropneumonia (CCPP), Contagious Bovine Pleuropneumonia (CBPP) and malnutrition.

The main livestock breeding method in the area is natural mating with no Artificial Insemination (AI) services in the area. The type of bulls/bucks used are local and are easily available at no cost. The providers are owners, relatives, neighbors and friends. Selective mating is practiced but, inbreeding is common in the area due to common grazing.

Table 1: Animal health services and providers

Service	Provider	Average distance	Average price
Vaccinations	County government	13 km	Free
Treatment	County government, private animal health attendants, Agro-vets	13 km	Varies depending on the treatment
Endo and Ectoparasite	Owners, private animal health attendants, County Government	13 km	Varies depending on the treatment

Feed availability

Feed availability across months

The major livestock feed resources in the area are collected fodder, crop residues and green forage resources with farmers reporting that the later provides the major source of feed in all seasons (Figure 6) and accounts for the bulk of dry matter intake, metabolizable energy and crude protein requirements of livestock. Collected fodder and cereal crop residues are abundant during the harvesting period when pasture for grazing gets scarce. Leguminous crop residues and concentrate are not part of the feed resource base for livestock in the area.

Feed storage reserves/confinement is a common phenomenon in the area as collected fodder is fed to livestock in these confinements.

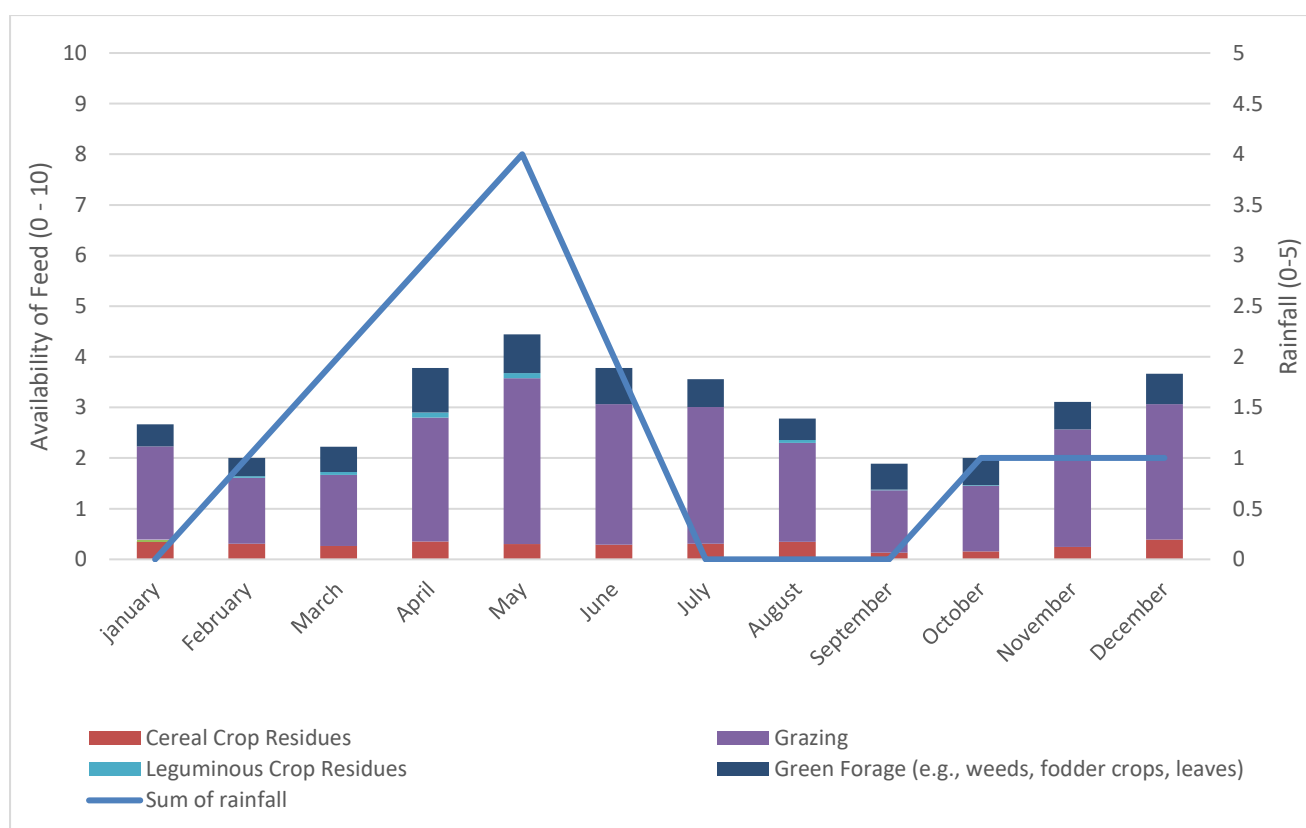


Figure 6: Rainfall and feed availability in Lokapel/Kaitlu

Livestock dietary composition

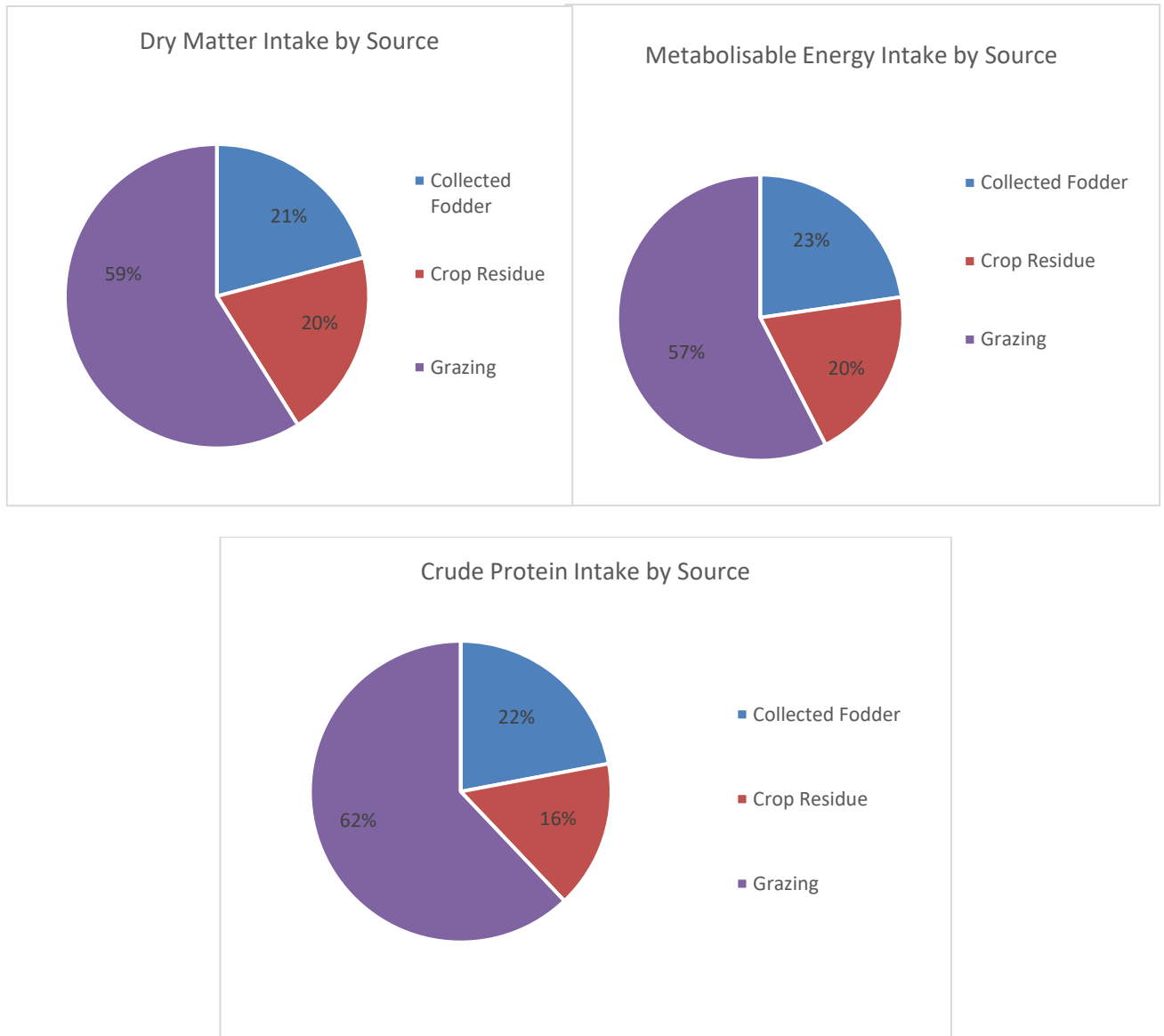


Figure 7a, 7b and 7c: Contribution to dietary requirements in Napeikar Village; Dry Matter (DM); Metabolizable Energy (ME); Crude Protein (CP)

Key challenges and suggested interventions

Table 2 shows the major challenges/problems experienced in relation to livestock production in the area and proposed solutions.

Table2: Challenges affecting livestock production in the area and proposed interventions

Rank	Challenges	Proposed interventions by the farmers
1	Water scarcity	Increase number of boreholes and water pans De-silt irrigation canals Improve water catchment i.e. sand dams, water pans and roof catchment
2	Livestock feed scarcity	Provision of seeds for reseeding pastureland, conservation, irrigated fodder Improvement of the storage facility Processing of crop residue i.e. maize stoves
3	Livestock diseases	Vaccination Treatments High level of hygiene Reporting in good time Observe regulations e.g. quarantine
4	Livestock markets	Improve livestock marketing information by timely training on livestock off-take, agribusiness and linkages to market Value addition to livestock and livestock products
5	Livestock extension	Livestock breed information Exchange programme Establishment of a pastoral training centre Employment of extension staff

From the analysis, livestock feed is the major constraint to increase livestock production and productivity but there is a great potential to produce livestock feed in Lokapel. The lands in Lokapel can support the increased production, water resources are available, and the community has got the interest to produce feed for their livestock. Expansion of land to increase crop production, land for grazing and for fodder production is essential. Bush clearing along the riverbed is needed to avail land for production of quality feed in adequate quantities.

Training of farmers on feed production, storage, preservation and utilization of crop residues through intensive extension services is also needed. Other necessary intervention strategies include improvement and promotion of the traditional feed conservation strategies to help increase the availability of feed resources during dry periods. Water access and availability can be improved by the utilization of the local water resources such as the rivers and water pans. Livestock and livestock products marketing should be encouraged by creating marketing linkages and attractive prices to farmers to sell their milk, hides/skin and live animals.

References

FAO. 2012. Conducting national feed assessments, by Michael B. Coughenour & Harinder P.S. Makkar. FAO Animal Production and Health Manual No. 15. Rome, Italy

Annexe

1. Feed/Context Issue grading

S/No	Context attribute	Score (0-4)
1	Availability of cash/credit	2
2	Availability of input delivery	2
3	Availability of knowledge	2
4	Availability of labour	4
5	Availability of land for fodder cultivation	3
6	Availability of water in the growing season	4