

Characterization of livestock production systems and the potential of feed-based interventions to improve livestock productivity in Kodopa/Napeikar, Loima 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 goals 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 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, among others. This has brought about several challenges with regards to feed availability, quality and quantity (FAO, 2012). The challenge is more pronounced in the Arid and Semi-Arid Lands (ASALs) than other regions.

Turkana is one of the ASALs counties in Kenya located in the North-Western part of the country. The main livestock feed system is extensive pastoralist system with pockets of irrigated pasture and fodder along the riverine. These features create a diverse and complex system with wide arrays of feed sources and types that must be quantified using multiple data sources from household surveys, agricultural statistics, markets and land use studies. In addition, the extensive system involves livestock movements (mobility) over large areas of relatively low quantity and quality forage.

In order to identify feed intervention options for Turkana, Accelerated Value Chain Development program – Livestock Component (AVCD – LC) conducted an accurate assessment on existing livestock feed situations in Napeikar/Kodopa sub-location of Turkana using the Feed Assessment Tool (FEAST) (ILRI 2015), available at www.ilri.org/feast. The main aim was to assess the availability, accessibility and utilization of livestock feed resources in agro-pastoral production systems of Turkana where there is great potential for establishing sustainable pasture and fodder value chain. In addition, recommendations/interventions that will improve the current and future supplies for livestock feed for improved livestock productivity were identified based on the findings of the study.

Methodology

Study area

Napeikar/Kodopa is a sub-location in Turkwel ward of Turkana County. It is located about 25 kilometres South West of Lodwar town along river Turkwel. It lies at a latitude of 3.1071296 North and longitude 35.5967291 East. It has an estimated population of 7,000 with an approximate number of households of 1,200. It comprises of 11 villages; Napeikar, Kodopa, Loporukou, Kaapolikine, Nachomin, Kaakiring, Nabuin, Nawoyaawoi, Naitangoomo, Lokamarikori and Namarigat. The households in these villages are mainly agro-pastoralist with an exception of Namarigat village which consists of pure livestock keepers practising extensive pastoralism.

Data collection

The FEAST methodology comprised of a participatory rural appraisal (PRA) exercise using a semi-structured questionnaire that provided an overview of the farming system and livestock feed resource availability and utilization. Individual farmer interview questionnaires were administered to nine (9) farmers in order to generate quantitative and qualitative data on livestock feeds availability and utilization at the household level. Key informant interviews, scoping survey using transect walks, farm visits and data from secondary sources were used to triangulate the collected data.

Results and discussions

The results are categorized into farming system, livestock management, feed resources and household income sources. The farmers are agro-pastoralists practising mixed cropping in basin-irrigated schemes and extensive livestock production system. The major livestock feed resources are grazing, collected fodder, and crop residue.

Farming systems

The farmers in the areas are mainly agro-pastoralists practising mixed cropping using flood/basin – irrigation systems and extensive livestock production system. Rainfed crop farming is also practised in the area. The land is communally owned where extensive livestock production system is practised. However, households are allocated land from approximately 0.04 to 0.4 ha in the irrigation scheme where mixed cropping using flood irrigation is practised. Figure 1 shows the proportion of households with small, medium and large size landholdings in the irrigation schemes. About 60% of the households own medium size lands.

About 90% of the households have farms in the irrigation scheme. The main crops grown in the irrigation schemes are maize (*Zea mays*), cowpeas (*Green Leaf*), sorghum, green grams, kales and cassava. Crops are grown for subsistence with no surplus for sales.

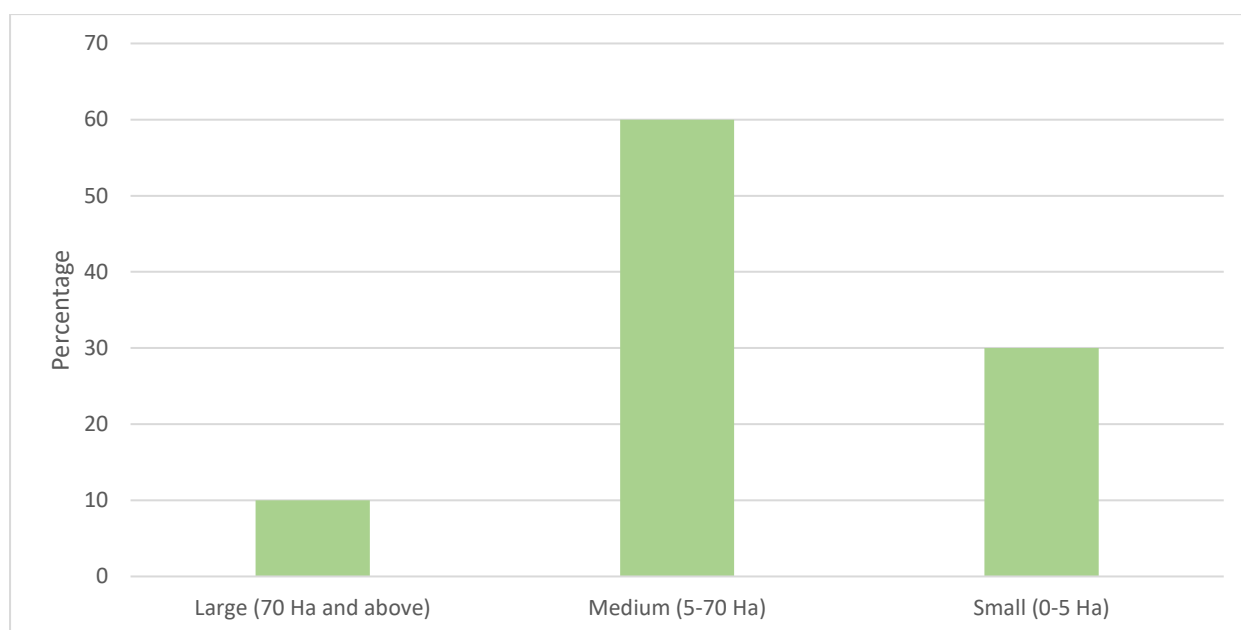


Figure 1: Landholding categories

Major income sources

The main sources of income to the household in the area are off-farm business enterprises (46%), cropping (23%), livestock sales (14%) and labour (7%). Other sources of income in the area are of basketry and sand selling contributing to about 4% of the household income (Figure 2).

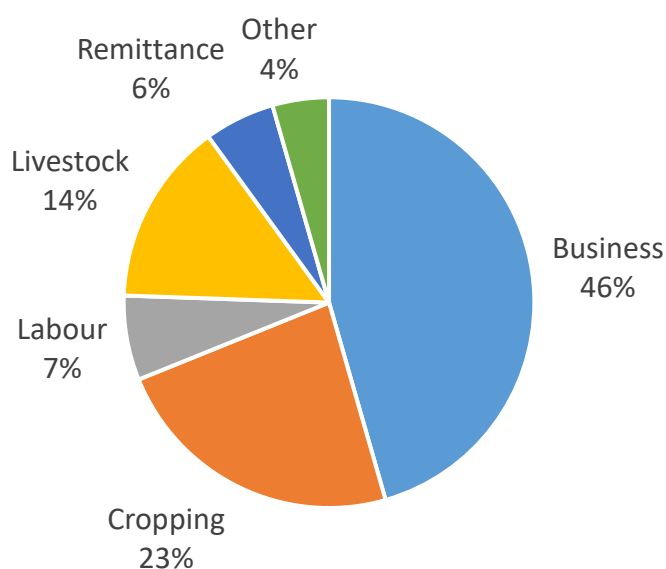


Figure 2: Major sources of income in Napeikar

Cropping seasons

Table 1 shows the two distinct rainy and dry seasons in Kodopa village. There are two wet seasons that correspond to the cropping activities. The first long rainy season (*Akiporo*) occurs from mid of March to early June. The second short rainy season is between October and early December. The cropping season is mainly during the wet season (*Akiporo* and *Ngirupei*). However, the short rains season is erratic and can be missed in a bad year. The two distinct dry seasons are from December to March and June to September.

Table 1: Seasonal calendar for Napeikar/Kodopa village

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

Labour demands and costs

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 one hectare of land is variable, depending on the density of trees. In the respondents' feedback, removal of one palm tree costs KSH 1,000 (USD \$ 10). The cost to lease land for cropping is about KES 5,000 (USD \$ 50) per cropping season.

Livestock management systems

Livestock production makes use of open grazing with predominant livestock species being goats, sheep, and local dairy cattle. Sheep and goats are the most important livestock species being kept by all households mainly for milk, blood, meat, hides and cash income. The average livestock holding is about 1.4 TLU/household for goats and 0.6 TLU for sheep. (Figure 2). Ownership of camels is not common in the area.

The livestock management practices in the area are similar across households. Large stock are not housed while small stock i.e. sheep and goat and local poultry are partially housed. The housing of small stock is mainly by using enclosures made from local materials. Feeding troughs and bedding are not provided in the enclosures. Young lambs and kids are separated from the main mature flock during grazing and when housed.

Livestock migrates to wet grazing areas (away from the homesteads) during the wet season since they can access water easily in the grazing field. Livestock are kept near the homestead during the dry period since they can access the riverine forage and water from river Turkwel. The average trekking distance for water during the dry period is approximately 32-36 km. Watering of animals during the dry period is difficult and is done once every two days. In extremely drought years livestock migrate beyond these traditional dry season grazing areas along the riverine.

There is no livestock feed processing in the area and neither do farmers use concentrates to feed their livestock. However, weak and sick animals are fed on 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 2). Livestock keepers can access livestock inputs and veterinary drugs from two input suppliers available in the main market. The most common types of animal health problems are diseases such as Pest 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 types of bulls used are local and are easily available for free. The providers are owners, relatives, neighbours and friends. Selective mating is practised but nonetheless, inbreeding is common in the area due to common grazing.

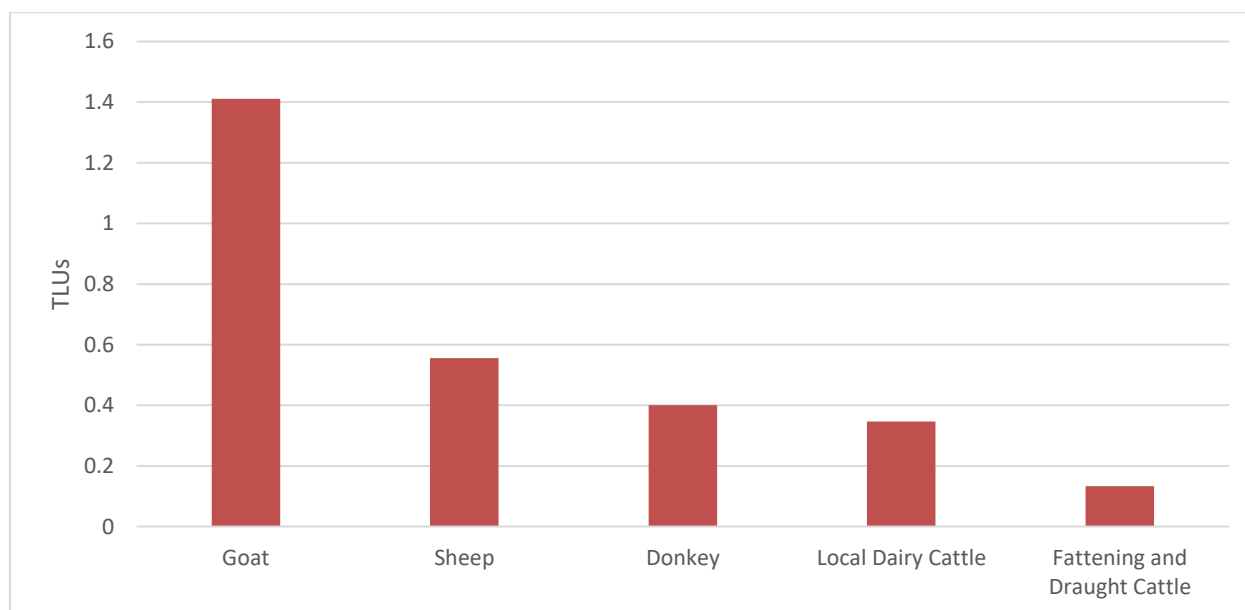


Figure 2: Average household livestock holding by c in Tropical Livestock Units (TLUs)

Table 2: Animal Health services and providers

Service	Provider	Average distance (km)	Remark
Vaccinations	County government	25	Free
Treatment	County Government, private AHAs, Agro vet	25	Vary depending on the treatment
Endo and Ectoparasite	Owners, Private AHAs, County Government	25	Vary depending on the treatment

Major feed resources

The major livestock feed resources are collected fodder, crop residues and grazing. Grazing remains a major source of feeds throughout the year (Figure 3). Green collected fodder and crop residues are the second most important feed resources used by the majority of the households in the village. Collected fodder and crop residues supplement grazing during the harvesting period i.e. months of

July and August. There is limited or no value addition to the crop residue during feeding. Crop residue conservation using traditional means such as raised beds/surfaces is a common practice in the area (Error! Reference source not found.).

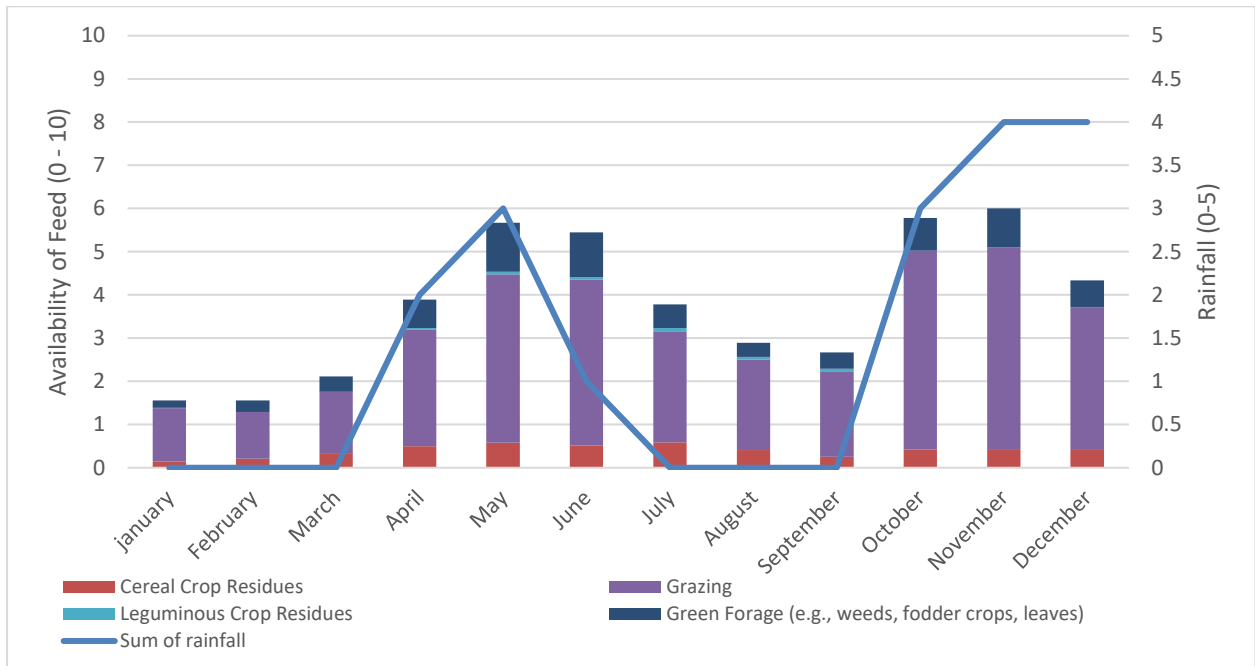


Figure 3: Rainfall and feed availability at Napeikar



Figure 5: Local dairy cow (lactating) feeding on crop residues (left) and conserved crop residues on a raised table (right)

Grazing remains the single most important feed resources supplying livestock diet with the largest proportion of dry matter (DM), metabolizable energy (ME) and crude protein (CP). About 76% of the diet's dry matter is contributed by grazing (Figure 6).

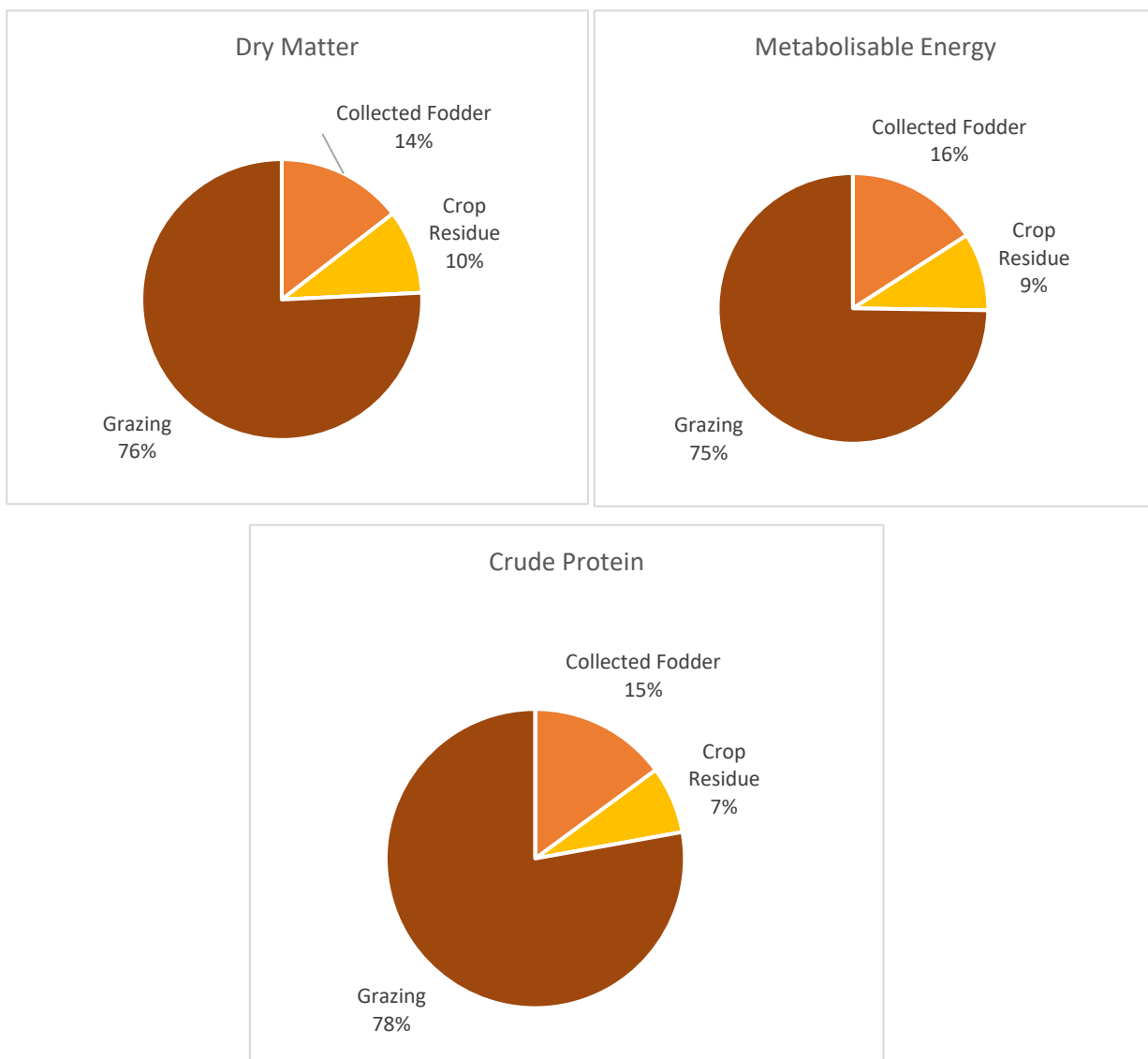


Figure 6: Contribution of different feeds to dietary requirements of livestock in Napeikar Village; Dry Matter (DM); Metabolisable Energy (ME); Crude Protein (CP)

Key challenges and suggested interventions

Community members who participated in the focus group discussion identified a number of challenges facing agro-pastoralists in Napeikar village. The first most challenge limiting agricultural and livestock productivity are water shortages. The second most important limiting constraint is feed for livestock, as most depend on grazing of natural pasture. Feed problem is also aggravated by lack of proper conservation practices among agro-pastoralists. The third important constraint identified by the FGD members is the prevalence of economically important livestock diseases. Absence of productive breeds and market stood 4th and 5th in the ranking analysis. Table 12 shows the major challenges/problems experienced in relation to livestock production in the area and proposed solutions.

Table 1: Problems affecting livestock production in the area and suggested interventions

Rank	Problem	Suggested interventions
1.	Lack of water	Increase number of boreholes and water pans De-silt irrigation canals Improve water catchment i.e. sand dams, water pans and roof catchment
2.	Inadequate livestock feed	Provision of seeds for reseeding pastureland Pasture production, and conservation Irrigated fodder production Improvement of storage facilities Processing of crop residue i.e. maize stovers
3.	High prevalence of livestock diseases such as PPR, CCPP	Routine vaccination Treatments High level of hygiene Disease surveillance and reporting Good animal husbandry practices
4	Inadequate/ lack of livestock breeding knowledge and genetic materials	Supply of improved bucks i.e. galla goat Improve breed selection and mating Promote livestock performance recording Capacity building on animal breeding
5	Lack of market for livestock and livestock products	Improve livestock marketing information Strengthen market linkages Promoting value addition to livestock and livestock products

From the analysis of the problems faced by this community, availability of adequate livestock feed in terms of quality and quantity remains a major challenge across all seasons. This can be attributed to limited cultivation of pastures and fodder, inadequate rainfall and rangeland degradation. This is even though land for the forage production is adequate and the community's interest in fodder production is high¹. There is also a great potential to produce pasture and fodder including other feed resources considering the following options:

¹ "Livestock feed is a major problem in Napeikar and we have struggled to feed our animals for long. However, land for pasture and fodder production is available and we are ready to provide the land where reseeding and pasture production can be done" Peter Ejore, Village Elder

- Cultivated fodder production using irrigation.
- Capacity building farmers on storage, conservation and utilization of crop residues.
- Promote traditional/community feed conservation and utilization strategies to help farmers access and utilize feed resources during dry periods.
- Improve water access and availability for fodder production by establishing water harvesting structures such as water pans, trapezoidal buds etc.
- Introducing rangeland improvement technologies in the grazing fields.
- Encouraging sustainable land management practices.

In addition to addressing the inadequate livestock feed resources constraints, it is imperative to enhance the provision of private animal health services. Other interventions that are required to improve animal productivity in the area is to enhance livestock breeding practices by the community, improving market linkages, and capacity building of the livestock keepers on good animal husbandry practices.

Conclusions

The area practices both crop production and pastoral livestock production system. At present, cropping and livestock, mainly sheep and goats, sales are the primary agricultural contributors to household income. However, the productivity of the two sectors is low resulting in high poverty levels. Water and feed are the two most limiting factors in the area and farmers have not adopted the practice of cultivating fodder. In order to address these problems, different stakeholders need to consolidate their efforts in supporting and building the capacity of farmers/livestock keepers with feed production and conservation technologies that are easily adaptable and achievable to improve the livestock productivity. In addition, improved sustainable rangeland management practices need to be developed in the area to increase feed biomass production in the area.

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.
- ILRI. 2015. Feed Assessment Tool (FEAST) data application user manual. Nairobi: ILRI.

Annexes

1. Feed/Context Issue grading

S/No.	Context Attribute	Score (0-4)
1	Availability of cash	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 growing season	1