



Characterization of livestock production systems and the potential of feed-based interventions to improve livestock productivity in Eldas ward of Wajir county, Kenya

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Methodology

Description of the study area

Eldas is one of the four wards of Eldas sub-county in Wajir county. It consists of six locations: Eldas, Bulla Shair, Kilkiley, Masalale, Qarsa Jukala and Dadhantalahi. It is located about 110 km northwest of the county headquarters - Wajir town - at 2.4899° N and 39.5747° E.

The ward covers an area of 967 km², with a population of approximately 25,000 inhabitants, three quarters of whom are below eighteen years old. The average household size is ten. The majority of the household heads (85%) are male. On average, 20% of the household members migrate out of the ward for the following major reasons:

- Education
- Livestock grazing/herding
- Formal employment
- Conflicts/insecurity (inter-clan/resource-based)
- New settlements

Eldas location has three boreholes (one each for livestock, domestic use and irrigation). Some institutions and individuals also have private boreholes for both domestic and irrigation use. Masalale has one borehole for domestic and livestock use. There are four water pans/dams for rainwater harvesting located in Qarsa, Masalale, Dadhantalahi and Eldas. In addition, there are several shallow wells which complement the boreholes during the dry spell and reduce the pressure on the boreholes (which often break down due to overuse during dry spells).

Data collection and analysis

A farmer-centred diagnosis (FCD) was conducted on 26th of July 2016 to systematically and rapidly assess the farming system in relation to the animal feed situation in Eldas ward, Wajir county, Kenya. Sixteen farmers (10 male, 6 female) took part in the exercise with three local administrative officials. The FCD involved a focus group discussion (FGD) and nine farmers were selected for individual interviews.

Results and discussion

Major household income sources

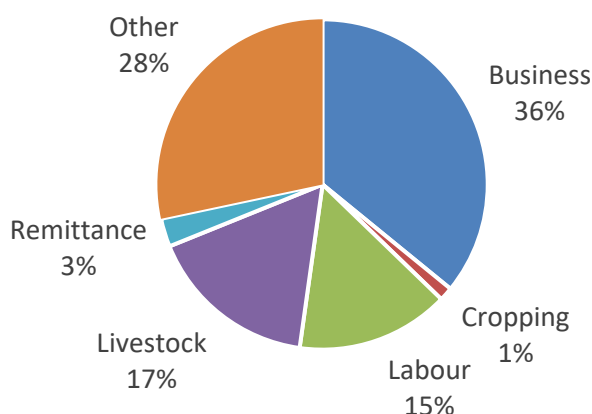


Figure 1: Contribution of livelihood activities to household income in Eldas ward

Farmers reported that sources of credit for livestock and cropping activities are from groups, wealthy individuals, business owners with shops, revolving funds from the county department of Wajir or from African Development Solutions (ADESO). The group can serve as collateral when an individual belongs to a group. For individuals who are not members of a group, the basis of lending relies on a personal guarantee that the loan can be repaid. In the unlikely event that a borrower cannot pay his or her credit, the area chief intervenes and ensures the debt is settled. Islamic sharia is strict about repayments of credits and it becomes a reinforcement mechanism that is adhered to and respected. Farmers reported that about 95% of them can access credit and 90% of them have had access to credit in the last two years.

Farming systems

The land is owned communally with farmers practising a predominantly mixed crop-livestock system. Extensive livestock production is, however, the most used system in the ward. Dryland farming is practised in patches of land by individual farmers or by farmer groups, mainly along the seasonal *laggas* (dry streams).

Land patches owned individually are primarily used for the development of residential houses and business premises. Pastoralists try and diversify their livelihoods to mitigate risks related to extreme climatic events such as droughts and floods, which were believed to have increased in the past few years. Therefore, the number of pastoralists engaged in economic activities, ranging from retail shops and wholesale businesses to transport and construction industries, has increased.

A majority of the households are smallholders and own less than one hectare of land, with very few farmers owning above two hectares. However, none of the households or groups holds a title for the land, which is a big challenge to livestock and fodder production. The reasons might be:

- a) Frequent natural resource conflicts between farming communities as pastoralists compete with crop farmers for the utilization, management and control of rangelands resources.
- b) The absence of a management framework of the rangeland resources leading to land degradation.
- c) Human-wildlife conflict over the resources that are shared between livestock and wildlife.
- d) The spread of diseases and pests to livestock from wildlife (due to the shared resources).
- e) Lack of motivation by the individual community members to develop/invest in the communal land.

From the conducted FGD, only 20% of the land is estimated to be under cultivation. There is a trend to put more land under cultivation as more pastoralists diversify their sources of livelihood through rainfed crop farming. Frequent droughts have been experienced in past years due to the El Nino phenomenon in 1993, 1994, 1997, 2004, 2006, 2009 and 2011. Most of the farms are owned by small groups and about 80% of the farmlands are left to fallow, so the group can look for extra capital to buy farm inputs. Farming is mainly for subsistence use with only a few groups doing it for commercial purposes. The vast fallow lands outside the farmlands are used for extensive livestock grazing.

Cropping seasons and crops grown

There are four seasons in Eldas, two rainy seasons and two dry seasons (Table 1). Breeding occurs during the longer rainy season (Guuh) when there is abundant green vegetation and calving usually takes place during the shorter rainy season (Deyr). This is the traditional breeding calendar of the pastoralists.

According to the pastoralists who were interviewed, there is an increasing variation in the weather pattern over the past two decades, in which the short rains are becoming heavier, resulting in flooding (due to El Nino in 1997 and 2006).

Table 1. The main seasons of the year

Name of season	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Orehet (dry season)												
Guuh (long rains)												
Hagaa' (dry season)												
Deyr (short rains)												

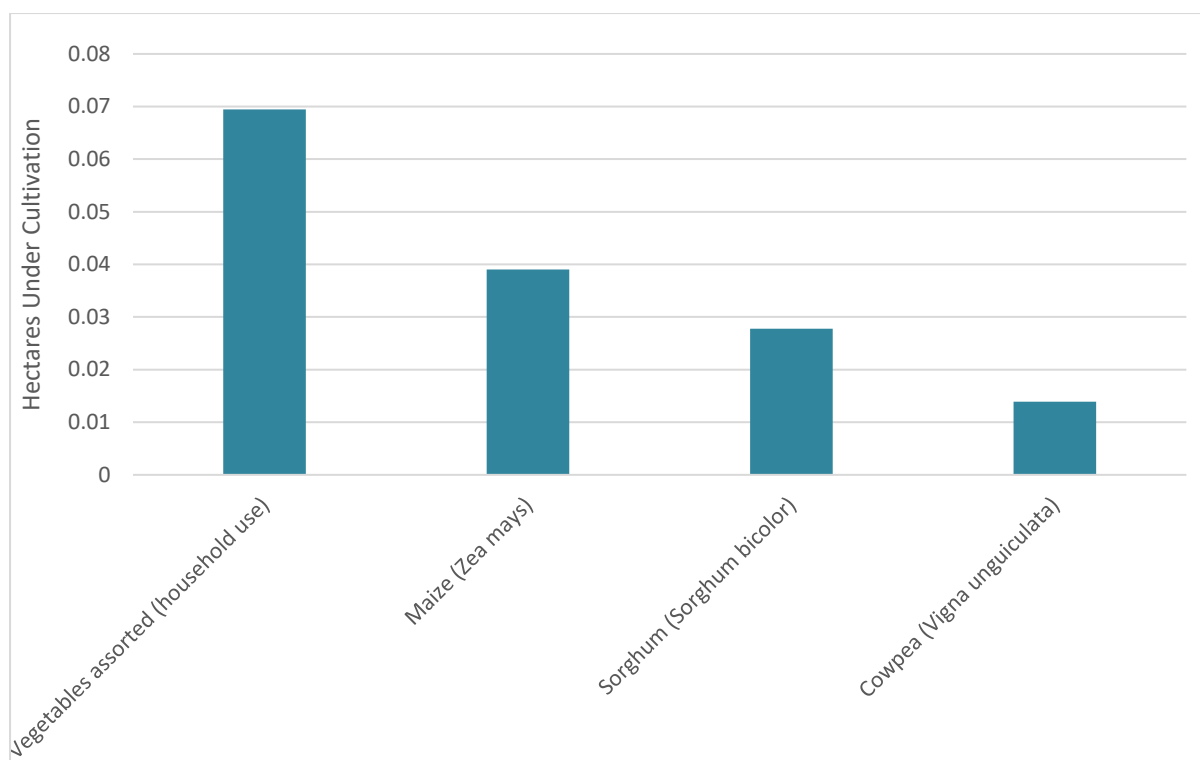


Figure 2: Dominant crop types by average hectares cultivated

Livestock management

The farmers keep different livestock: camels, cattle, sheep, goats, donkeys and poultry. This is in line with the livelihood classification of Wajir county as an area suitable for all species. The keeping of many species is a way of using the pastures more effectively. As an example, pastoralists understand camels and goats are more robust than cattle and sheep when faced with water and forage shortage, and that certain diseases may affect one species and not the other. The communities of Eldas are nomadic pastoralist and rear the livestock for meat, milk and trade in live animals and livestock products such as milk, meat, hides/skin and eggs. Other uses for livestock are paying for dowry, performing religious functions and as a status symbol.

The pastoralists of Eldas keep goats, sheep, cattle, camels, donkeys and local chicken but none of the individuals who participated in the FGD and individual farmer interviews kept cattle for one reason or another.

Table 2. Livestock population by species

Livestock species	Approx. population
Camels	4,255
Cattle	5,060
Sheep	16,854
Goats	18,436
Donkeys	1,739
Local chicken	2,760

(Wajir County Livestock Production Annual Report, 2015)

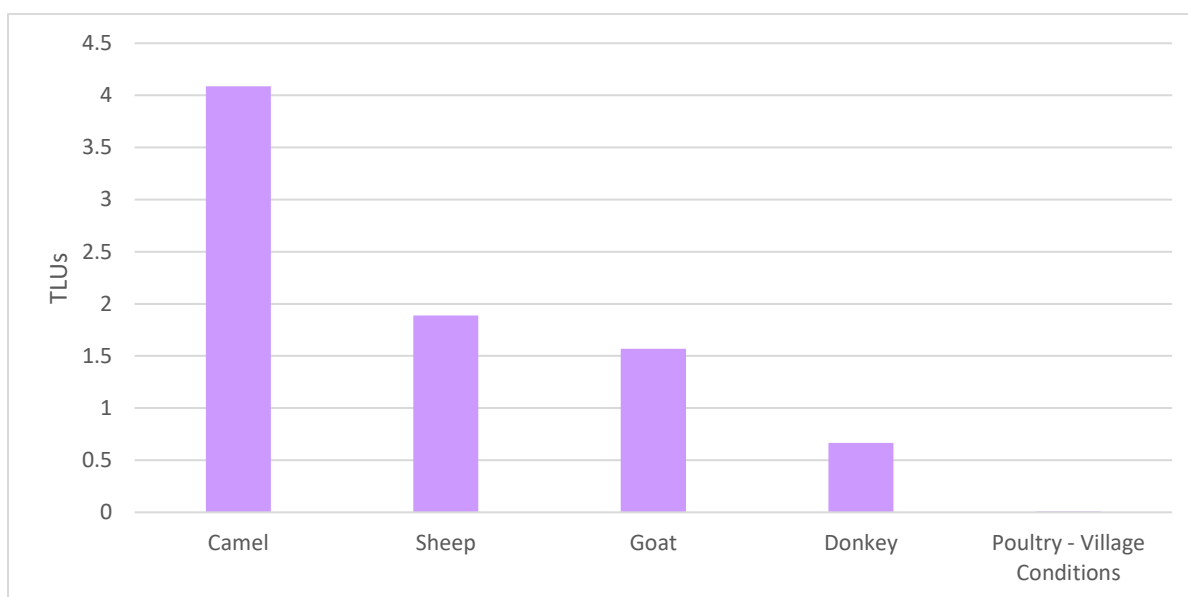


Figure 3: Average livestock holdings per family in Wajir county

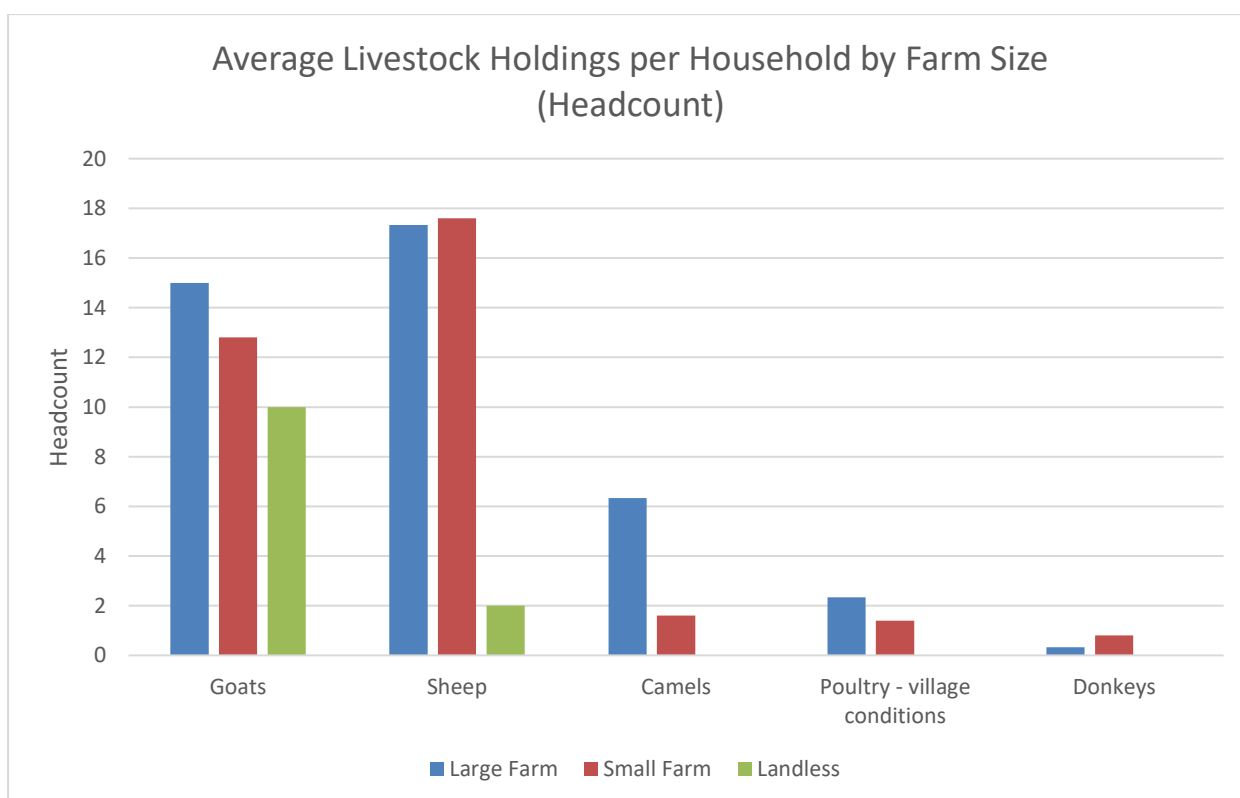


Figure 4: Average livestock holdings per household in Wajir County

Livestock are kept under an extensive system and the main supply of feed comes from naturally growing pasture. The livestock are kept in *bomas* and around the homesteads during the night to protect them from wild animals. During droughts, which are frequently experienced in the area, the livestock keepers separate their herds into dry and lactating herds and according to species. The dry herds and the camels are usually moved far from the traditional grazing areas where better pastures

and water resources are available. The lactating herds and the small ruminants are left with the families around the water sources and given supplementary feed at home such as purchased feeds, collected fodder and crop residues.

Small livestock are grazed separately from camels and cattle until the beginning of the rainy season when all the herds are kept close to the *manyatas*. There is no feed processing in Eldas county.

Animal health services

The main animal health service provider is the County Department of Veterinary Services which oversees disease control and offers vaccination and other animal health care services. Other service providers are the community disease reporters that report disease outbreaks and organize vaccinations through community mobilization. They also assist in spraying livestock and provide basic extension services on husbandry practices such as castration and hoof trimming.

Eldas pastoralists use 100% bull service and bulls are free of charge in the open grazing fields. No health-related problems have been associated with the bull service.

The livestock owners can purchase livestock drugs to treat their animals, but the drugs are not easily available. They can only be bought in agro-vet shops located in Wajir or Habaswein, which are located far away from Eldas. This can become very critical during emergency conditions.

The major challenges in the delivery of animal health care services are:

1. The presence of low-quality counterfeit animal drugs coming through Somalia where the regulations are less strict. Consequently, pastoralists fall prey to these counterfeit drugs as they are cheaper.
2. A low number of veterinary frontline extension staff. The entire Eldas population of 15243¹ people are served by one veterinarian doctor and three animal health assistants (AHA), which is far below the recommended staff to farmer ratio by the OIE which is 1 VO, 1 LO, 3 AHAs at each ward level.
3. There is no vaccination calendar by the county government, which makes disease outbreaks a major setback to the control efforts.
4. Very low county government investments in the livestock sub-sector. According to the county government of Wajir, the livestock subsector was allocated a paltry 5% out of the total county budget ² for the fiscal year of 2015/2016.

The main livestock diseases in Eldas are:

- Sheep and goat pox (Furuk)
- Contagious caprine pleuropneumonia affecting goats (Gesdor)
- Peste des petits ruminants affecting sheep and goats (Difdeer)
- Lumpy skin disease of cattle (Kuskus)
- Foot and mouth disease (A'beb)

¹ Kenya population census 2009

²Abdisemet Osman, Wajir road map report, July 2015

- Trypanosomiasis in camels (Dukan)
- Haemorrhagic septicaemia (Kharir)
- Mange and mites infestation (Ambar) and infectious wounds in camels (Ma'ah)
- Worms (Goriyan)

Feed availability and water sources

Figure 5 shows the composition of feeds available throughout the year in relation to the rainfall pattern in Eldas. Livestock rely mostly on grazing year round with cereal crop residues making a small contribution in the month of July. Green forages (weeds, fodder crops and leaves) make some contribution especially during the rains. Concentrate, leguminous crop residues and ground litter make very little or no contribution to the feed resource base of livestock in Eldas. The end of the dry season months are seen to coincide with periods of relative feed scarcity.

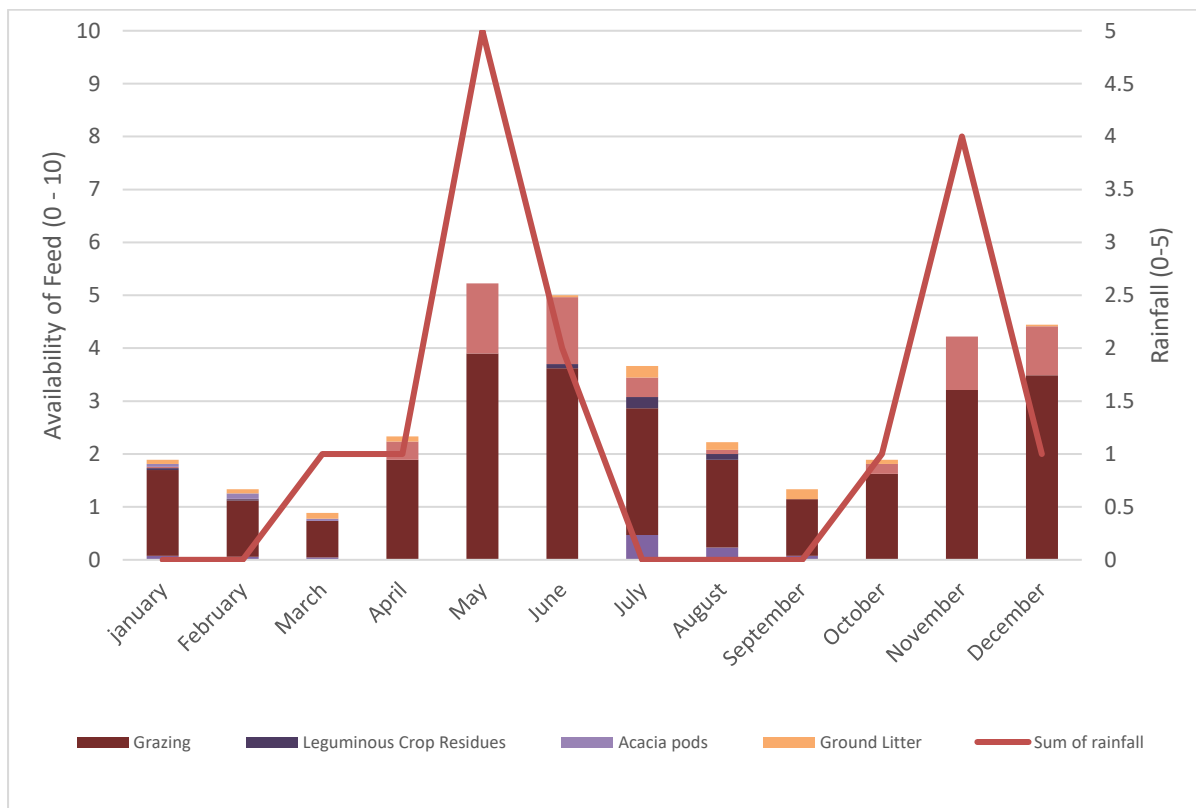


Figure 5. Annual rainfall pattern and corresponding livestock feed availability

The main water sources in Eldas are deep boreholes powered by diesel generators, shallow wells and surface pans. The boreholes and shallow wells are year-round permanent water sources for the pastoralists and livestock, compared to the surface pans which dry up during the dry season.

The boreholes are managed and maintained by the Water Resource Users Association and they set the water tariffs and decide the watering schedules for the livestock. The communities in Eldas design their grazing pattern along with the sources of the water supply, ensuring that the pastoralists utilize the less permanent surface sources during the rains and the boreholes and shallow wells during the dry spells.

The main crops benefitting from irrigation are beans, maize, sorghum, capsicum, bananas, watermelons, guava, tomato, onions and kales. Irrigation systems in the area include drip irrigation and bucket irrigation.

Farmers reported that labour is mostly required during the dry season of January, February and March for watering and herding. During the dry seasons the labour requirements increase as pastoralists need extra labour for drawing water at the shallow wells and for separating the herds.

Wages do not vary with gender but with activity. The minimum and maximum labour costs are KES 300 and KES 1000 per day (USD 2.9 and USD 9.7) respectively which is expensive for the average pastoralist. These rates are affordable for only 25% of the households. Farmers also reported that labour is generally not available because some pastoralists migrate to bigger towns and cities to seek either alternative employment or education.

Livestock dietary composition

Figures 6, 7 and 8 show the dry matter, metabolizable energy and crude protein intake by source. Grazing contributes to all three classes, while purchased feed, collected feed and crop residues combined contribute to less than 12 % of the dietary composition.

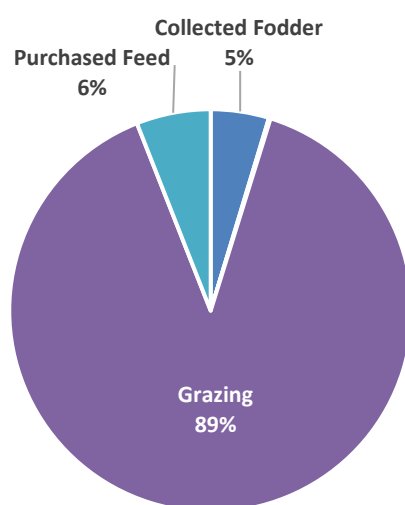


Figure 6: Contribution of various feeds to total dietary dry matter intake in Wajir county

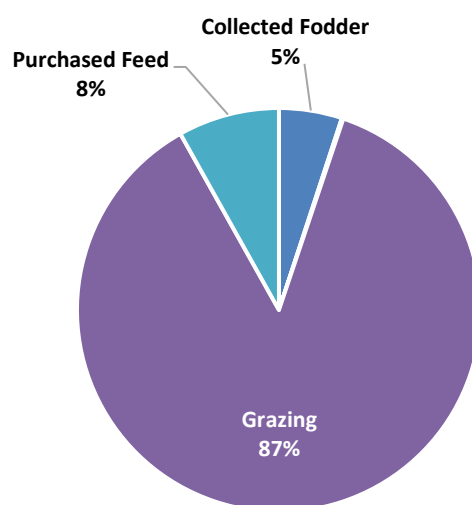


Figure 7: Contribution of various feeds to metabolizable energy intake in Wajir county

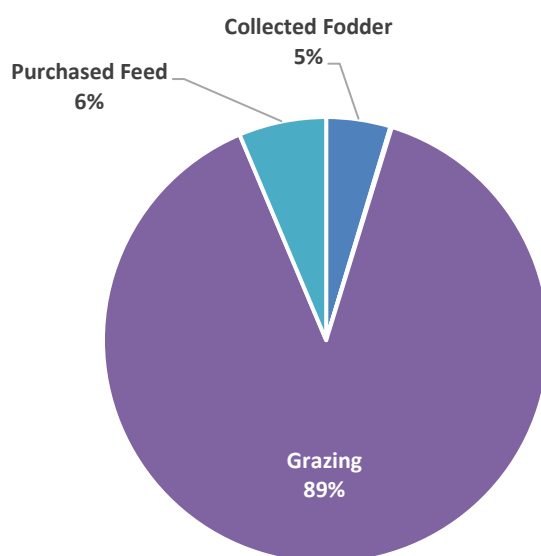


Figure 8: Contribution of various feeds to crude protein intake in Wajir county

Key challenges and suggested interventions

Evidence from the study suggests that interventions addressing the access to sufficient quantity and quality feed, access to sufficient water and an effective animal service delivery system will contribute to a higher level of food security among the nomadic population of Wajir, and reduce their vulnerability to climate change.

Table 3. Key challenges and suggested interventions

Rank	Challenges	Interventions
1	Theft of livestock	Peace meetings
2	Predation	Fencing Scaring away the wildlife
3	Livestock diseases and pests	Vaccination Treatments Spraying Deworming
4	Water	Desilt water pans and drill boreholes
5	Pasture and livestock feed	Legislation on range land management Plant fodder Reduce the settlement
6	Conflict crop/livestock	Set aside lands for different enterprises Reduce dams and settlements regulation

Table 4. Pairwise ranking of the challenges

Rank	Challenges	Pairing	Challenge considered more important
1	Theft of livestock	Problem 1 vs problem 2	2
2	Predation	Problem 1 vs problem 3	3
3	Livestock diseases and pests	Problem 1 vs problem 4	4
4	Water	Problem 1 vs problem 5	5
5	Pasture and livestock feed	Problem 1 vs problem 6	6
6	Conflict crop/livestock	Problem 2 vs problem 3	3
		Problem 2 vs problem 4	4
		Problem 2 vs problem 5	5
		Problem 2 vs problem 6	6
		Problem 3 vs problem 4	4
		Problem 3 vs problem 5	3
		Problem 3 vs problem 6	3
		Problem 4 vs problem 5	4
		Problem 4 vs problem 6	4
		Problem 5 vs problem 6	5

Table 5. Ranking of the challenges in Wajir county

Rank	Challenges	Number of times chosen	Ranking
1	Theft	0	6
2	Predation	2	4
3	Diseases and pests	4	2
4	Water	5	1
5	Pasture	3	3
6	Conflict crop/livestock	1	5

Conclusions

Eldas ward in Wajir sub-county is dominated by smallholder farmers who practise mixed crop livestock production. The main water sources are boreholes powered by diesel engines as well as shallow wells and surface pans. These water resources are managed and maintained by Water Resource User Associations. Labour is generally available, but shortages are witnessed during the dry season when there are increased demands for herding and watering of animals. The farmers usually have different types of livestock not only as a livelihood diversification strategy but also to use the pastures more effectively. Feed quantity and quality are a constraint to improved livestock production. Grazing is the main feed resource contributing to more than 80% of the nutrient and energy requirements. Cereal crop residues contribute to a smaller portion of the feed resource, while leguminous, concentrate and ground feed are not commonly used.