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## Kenya Accelerated Value Chain Development Program (AVCD)-livestock component

Analysis of livestock and fodder value chains in arid and semi-arid lands in Kenya



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# Kenya Accelerated Value Chain Development Program (AVCD) - livestock component

## Analysis of livestock and fodder value chains in arid and semi-arid lands in Kenya

Francis Wanyoike, Nelly Njiru, Adan Kutu, Simon Chuchu, George Wamwere-Njoroge and Nadhem Mtimet  
International Livestock Research Institute (ILRI)

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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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## Acronyms

ASAL	Arid and semi-arid land
AVCD	Accelerated Value Chain Development
Adeso	Africa Development Solutions
AHAs	Animal health assistants
AHADI	Agile Harmonized Assistance to the Devolved Institutions
AVCD–LC	Accelerated Value Chain Development–Livestock Component
CAHWs	Community animal health worker
CBPP	Contagious bovine pleuropneumonia
CCPP	Contagious caprine pleuropneumonia
CLMCs	County Livestock Marketing Councils
FMD	Foot-and-mouth disease
IBLI	Index-based livestock insurance
ILRI	International Livestock Research Institute
KACE	Kenya Agricultural Commodity Exchange Limited
KALRO	Kenya Agricultural and Livestock Research Organization
KLMC	Kenya Livestock Marketing Council
KMC	Kenya Meat Commission
KNBS	Kenya National Bureau of Statistics
KES	Kenya shillings
LINKS	Livestock Information Network and Knowledge System
LMAs	Livestock marketing associations
LMIS	Livestock market information system
NGOs	Non-governmental organizations
NRT	Northern Rangelands Trust
PPR	Pests des petits ruminants
PREG	Partnership for Resilience and Economic Growth
REGAL AG	Resilience and Economic Growth in the Arid Lands—Improving Resilience Accelerated Growth

REGAL IR	Resilience and Economic Growth in the Arid Lands—Improving Resilience
Shoats	Sheep and goats
SPS	Sanitary and phytosanitary requirements
USAID	United States Agency for International Development

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## Executive summary

As in many developing countries, the livestock revolution is real in Kenya which presents huge opportunities to improve the livelihoods of the pastoral community through improved production and marketing in the pastoral land-use system. To attain the promise of Vision 2030 and unlock the potential of arid and semi-arid lands in Kenya, intervention strategies and production systems need to be aligned with the ongoing change in: demand/consumption for animal-source foods (ASFs) and in the production environment. The average per capita red meat consumption in Kenya is about 15–16 kg, approximately 600,000MT<sup>2</sup> of red meat nationally. Of this, about 80–86% comes from the pastoral production system, while 20–25% of the meat supply comes from the neighbouring countries (through formal and informal cross-border livestock trade) with Ethiopia, Somalia, Uganda and Tanzania.

The Livestock component of the Accelerated Value Chain Development (AVCD) program recently undertook a livestock and fodder value chains analysis to inform design and implementation of high impact and targeted interventions across five counties in northern Kenya (Isiolo, Garissa, Marsabit, Turkana and Wajir). Operating with the framework of the United States Agency for International Development (USAID)-funded Feed the Future Initiative in Kenya. The program promotes and upscales the utilization of improved technologies and innovations of selected value chains (livestock, dairy, and staple root and drought-tolerant crops) to competitively and sustainably increase productivity, promote agricultural growth and improve nutrition and food security, particularly among women and children. The International Livestock Research Institute (ILRI) leads the AVCD livestock value chain whose main goal is to increase incomes from the sales of livestock by 50% by 2018, lifting an additional 50,000 households in selected regions of Kenya out of poverty and improving their nutritional status.

The study targeted the core activities in the livestock value chains (production and marketing) and fodder production as a support value chain. Primary data was collected from two counties (Isiolo and Marsabit), while secondary data from recently conducted studies was used for the remaining three counties. Value chain actors were mapped and opportunities and constraints faced by actors in the two value chains identified. Three best-bet county-based interventions were identified as key priority interventions for the AVCD–LC project. The most important livestock in these five counties are: cattle, camel, sheep and goats, with camel becoming more popular than cattle in some areas due to their ability to withstand the changing climate and the fact that camel prices are higher in domestic and international markets.

This report presents the status of livestock and fodder value chains, describing the main actors and their relationships, the value chains functions, support markets and business enabling environment. It also provides an assessment of the existing gaps and missing markets. The challenges and opportunities for upgrading the value chains were identified.

Nairobi and Mombasa are the leading demand centres for slaughter animals and, therefore, serve as the main terminal markets. Per capita consumption in Nairobi and Mombasa is 25.8 kg and 21.2 kg respectively (Farmer and Mbwika 2012; Behnke and Muthami 2011). To meet such high demand for meat, the approximate supply would need to be: 27,839 cattle, 71,555 shoats and 685 camels and 8,178 cattle, 21,021 shoats and 201 camels for Nairobi and Mombasa end-markets respectively (Farmer and Mbwika 2012).

Unfortunately, the bulk of the meat consumed in Kenya is of low quality, but quality preferences vary among consumers. Willingness to pay premiums for quality, reliability and cleanliness is higher among higher-income consumers. Few abattoirs produce superior quality meat and meat products

sold to high end hotels, restaurants, supermarkets and export markets at premium prices. Such abattoirs include Kenya Meat Commission, Quality Meat Packers, Farmers Choice, Alpha Fine Foods and Ngare Narok Meat Industries. Higher-end or export-quality meat at retail points (supermarkets and high-end butcheries) sells for an average of KES770–910 per kg compared to KES380–400 for the low-quality meat sold at meat stalls and ordinary butcheries (Farmer and Mbwika 2012).

Nomadic pastoralism is the dominant system of production in the study area. However, the rangelands are heavily degraded as the community competes for grazing land. This has led to an increased in overgrazed land and to desertification. Firewood dependency is high which has increased resource depletion and further degraded the land. In addition, producers are largely subsistence-oriented and only sell animals when they need money to buy food, pay for medical expenses, school fees, etc.

Some pastoralists said their reluctance to sell their animals was partly a strategy to ensure that when calamities occur, such as drought and the death of livestock, they would still have animals to rebuild their stocks and that they feared losing their indigenous stock which they may not be able to find when it was time to restock. In many cases, therefore, the failure by livestock producers to engage in markets is an adaptation to the formidable environment within which they live.

On the other hand, inbreeding is a common practice in these counties. Results on herd composition reveal a large number (up to 17.5% cattle, 10.4% goats, 7.8 % sheep and 5.8% camels in some areas) of uncastrated male animals. Further, the operating environment for livestock producers in Kenya is characterized by significant risks, including:

- A lack of access to important support services, such as extension, animal health services and market information
- Frequent droughts and livestock disease outbreaks which are closely associated with the ongoing climate change phenomena. In a recent drought, livestock producers in some arid and semi-arid land (ASAL) areas lost nearly 50% of their herds.
- Market failure attributable to problems such as lack of infrastructure, insecurity and rule of law.
- Changing policy and institutional environment.

The following recommendations are the possible areas for AVCD investments and strategies to ensure the proposed interventions deliver the desired outcomes.

### **Stronger vertical and horizontal linkages and enhanced implementation of a co-management model in the management of livestock markets**

Currently, livestock markets in the county are weak. Livestock farmers are forced to travel for long distances to access the livestock markets, making the exercise expensive in terms of time and energy. Some livestock markets in the counties have livestock market associations (LMAs) in place but only a few (<5%) of them implement the revenue sharing co-management model.

The AVCD–LC project should support enactment of county sale yard bill in Garissa, Isiolo and Marsabit counties' and stakeholders' fora to enhance ownership and implementation of the co-management model which will improve livestock market management and sustainability of the model. The project should also support restructuring and the organizational development of both the Kenya Livestock Marketing Council (KLMC) and the county livestock marketing councils

(CLMCs) in all the counties, as well as the establishment of audit systems to promote good governance, accountability and transparency in the management of livestock markets.

Awareness raising among livestock producers by the AVCD–LC project to encourage market off-take is a critical intervention. Farmers should also be encouraged to participate in the market especially when sale prices are high and save the proceeds which can be used later to meet other family needs. Training on finance and awareness raising for pastoralists can increase market off-take and commercial orientation. The project should also link producers to the high-end markets where they can fetch higher prices. This is expected to increase market off-take and reduce conflict which mainly arise as pastoralists compete for scarce resources. AVCD should support the sale of young animals which can be piloted with a few livestock producers and livestock producer groups especially around fodder producing pockets and then link them to buyers. Support for demonstration visits and training workshops is recommended.

AVCD could support the establishment support services like M-Pesa and agent banking services by lobbying telecommunication mobile phone companies to upgrade the cell phone network in the area. Linkage of producers and input suppliers like agro-veterinarian dealers to financial institutions would enable them get loans which they could use to acquire equipment like motorbikes to reach out to the moving pastoralists and build their drug stock capital.

## **Breed improvement and herd management**

Breed improvement efforts are underway in some counties. For instance, in Marsabit, the county government has introduced Galla goats to improve the local goat breeds and intends to introduce Borana and Sahiwal bulls to improve the local cattle breeds. Collaboration between the county governments and the AVCD–LC project to enhance breed improvement would be a key component in improving livestock productivity. Training and awareness raising for the local community on the importance and need for breed improvement is critical. The project could also work towards improved herd management campaigns and targeted commercial breeding and distribution systems that attend to locally-adapted traits. This would mitigate the fears pastoralists have of losing their local genotypes when restocking animals after a long drought.

## **Development of a sustainable livestock market information system**

A key prerequisite in promoting the commercialization of the livestock sector is the development of transparent and competitive markets. The theory of competition assumes perfect information among both buyers and sellers. Results from a survey of livestock producers during this study, however, showed that most were often uninformed about prevailing prices (about 60%) and the desired quality by buyers (76%) in livestock markets where they sell their animals. Among those who claimed to be informed about market conditions, most (88%) cited other livestock producers who have recently visited the market as their source of information. An important challenge related to ‘other livestock producers’ as a source of market information is that messages passed across may not be fully accurate or up to date.

In Kenya, there are many interventions provide market information to smallholder farmers, such as one operated by the Kenya Agricultural Commodity Exchange (KACE) Limited. It covers 42 commodities and collects information on farm inputs. There have also been other initiatives to set up livestock market information systems in pastoral areas in Kenya in the past.

The Livestock Information Network and Knowledge System (LINKS), the Ministry of Livestock and KLMC set up and operated the now dysfunctional National Market Information System. The

sustainability of these project-funded initiatives tends to be a challenge after the project ends. A potential way of mitigating this drawback is by designing an information system that allows for the entry and exit of sponsors with minimal disruptions and which should be hosted at a government ministry or an organization such as KLMC. Such a system could work closely with the LMAs in charge of managing livestock markets which could be used to collect the required market information for dissemination.

However, as a stop gap measure before the establishment of the market information system, the LMAs could be used to gather market information and disseminate it through billboards erected at livestock markets. The LINKS project used to display market information in Garissa and at other livestock markets. AVCD–LC should, therefore, leverage the work being done by KACE and collaborate with county governments and other development partners to establish sustainable interventions to mitigate the challenges related to market information asymmetry in the production and marketing of livestock and livestock products.

Improving the timeliness, accuracy and utility of livestock market information would improve producers' ability and incentives to increase commercial livestock production and sales. The project should develop a Livestock Market Information System which can handle information bundling services and should include information on: prevailing market prices, disease outbreak, forage availability, livestock inputs, etc. The use of local radio FM stations and billboards should also be explored to disseminate market information, especially on prices. The dissemination of information on quality requirements to producers would help them meet the demand side requirements.

## **Establishment of an animal grading system**

The quality of animals presented in domestic livestock markets for sale is generally very poor (Little et al. 2014). The absence of a grading system which clearly identifies livestock attributes, their levels and the different categories corresponding to each animal grade hinders the provision of quality animals to terminal markets and does not encourage livestock producers to improve the quality of their animals and fetch higher prices. It will be important that the project develops and implements this animal grading system with the help of county livestock departments and the national government livestock department which has showed interest in establishing a national grading scheme. The experience in Somaliland of animal grading and ILRI involvement there could provide the required skills, experience and information to develop such a system in Kenya.

## **Support for strategic vaccination and disease surveillance**

Veterinary services offered by county governments are limited and insufficient (Naitos Golden Inspiration 2015 a, b, c). Producers mainly rely on indigenous knowledge to treat their animals. The most common livestock diseases in shoats are: contagious caprine pleuropneumonia (CCPP), coenuroseis which is caused by worm, enterotoxaemia, goat and sheep pox and pests des petits ruminants (PPR). In cattle, the most common diseases are FMD, Contagious bovine pleuropneumonia (CBPP), congolensis dermatopholosis and lumpy skin disease. In camels, the most common diseases are: trypanosomiasis, haemorrhagic septicaemia, camel pox, worms, external parasites and ercia (camel sudden death syndrome), while in young camels, they are orf, ring worms and mange.

A discussion with county veterinary department officials of Isiolo and Marsabit counties revealed that transboundary diseases (e.g. lumpy skin disease, FMD among others) have increased in recent years, almost becoming an annual occurrence mainly due to the failure to impose quarantine due



outbreaks. This has been compounded by a lack of enforcement of livestock movement controls, porous borders and inadequate annual vaccination coverage. It is recommended that the AVCD–LC project raise awareness on: the effects of livestock drugs misuse or wrong drugs usage and administration; and uptake of strategic vaccination and not emergency vaccination which is said to cause death, abortion and loss of animal condition.

The project should also pilot uptake of acaricides which have higher safety margins and support the capacity building of agro-veterinarian dealers through short animal health courses. Collaboration with all the stakeholders (individual farmers, private vet service providers, non-governmental extension providers, government veterinarian and extension providers is highly recommended to enhance the uptake and sustainability of health-related interventions in the county to produce the health-related qualities of livestock demanded by the market.

### **Promotion and support for strategic feed reserve production model (fodder and fodder seed production in potential pockets)**

AVCD–LC could support fodder production in the counties by training the crop producers to integrate fodder in their cropping program and to also expand irrigated land so as to accommodate fodder production. The crop producers should also be trained on fodder conservation such that they can be able to bail and conserve the crop residues and other fodder feeds (like acacia pods) which can be used during drought. Elements of value addition of fodder (like addition of Urea etc.) and local feed formulation should also be given focus. The project can support the fodder production model around the dairy goat farming groups to create fodder market for themselves and others. This model can be scaled up with a few sampled individual producers who can be supported with initial improved goat breeds coupled with fodder production. In addition, AVCD LC should promote and support fodder production through sensitization campaigns/training to especially to people of more limited wealth. Establishment of linkages between fodder producers and demand side should be supported. Pastoralists should also be trained on intensification of livestock production, expected to create fodder marketing opportunities. Research on more cost-effective storage solution should also be supported.

### **Support acquisition of business development skills and economic enterprises**

The AVCD–LC project could support the establishment of linkages and acquisition of business development skills especially to women and young people in alternative economic activities, such as in the food, clothing and agricultural input sectors, such as veterinary and other agro-input services). Private investments in weighing scales by especially the women and young people could be supported. AVCD–LC could also support the processing and marketing of hides and skins especially by working with the producer groups in various counties. This would create employment for many jobless individuals in the counties.

Imparting business development skills on hides and skins would enhance trade in hides and skins. Training should also be offered to flayers, selectors, graders, traders and rural tannery units to increase the quality and prices of hides and skins traded. Linkages with the end market, like Bata Shoes Company, could promote hides and skins business in the county. A few private investors (like Sidai) could be informed of the benefits of stocking industrial salt used in processing of hides and skins.

Targeted business development skills in Turkana county especially in line with: fish farming, harvesting, processing, preservation and trade for women and young people would increase the income sources available to these categories of people. In addition, a few livestock lodges (a sleep over secure holding ground for animals on transit to/from the livestock markets) could be piloted around sampled livestock markets in the study counties. This innovation which is currently practiced in Moyale should be replicated in sampled livestock markets within the study counties.

## I. Introduction and background

The AVCD livestock project is part of the feed the future AVCD program funded by USAID in Kenya which seeks to promote and upscale utilization of improved technologies and innovations in selected value chains (livestock, dairy, and staple root and drought-tolerant crops) so as to competitively and sustainably increase productivity, promote agricultural growth, and improve nutrition and food security particularly among women and children. The AVCD livestock project is being implemented in five counties in northern Kenya including Garissa, Isiolo, Marsabit, Turkana, and Wajir and the goal is to increase incomes from livestock sales by 50% thus lifting 50,000 households out of poverty and improving their nutritional status.

To achieve this, the project has four objectives:

- i. To enhance market access for 60,000 pastoralists, pastoralists and small traders. Proposed activities under this objective focuses on improving market management through capacity development of market associations, producers, traders and entrepreneurs; development of a market information system; introduction of fattening schemes to increase the value of animals sold; and advocacy work to reduce trade barriers along the value chain between counties.
- ii. To increase livestock productivity for 30,000 producers. Suggested activities to achieve this objective include enhancing availability and access to fodder and forage through improved grazing management and fodder production enterprises; improving animal health through market interventions and creating sustained demand for health services; training of producers in disease recognition and working through market associations to improve surveillance of disease out breaks; and improving quality of animals sold through implementing community based herd management.
- iii. To enhance the enabling environment for 20 markets and 30 communities. This will be achieved through establishment of revenue sharing agreements for markets and development of community land use plans.
- iv. To contribute to improved nutrition of women and children among 50,000 households. Planned activities to achieve this include improving the home consumption of milk by children and to increase consumption of milk and meat by women of child bearing age.

The project is seeking to complement activities of other USAID-funded programs, popularly known as Partnership for Resilience and Economic Growth (PREG) partners that include: Two resilience projects i.e. Resilience and Economic Growth in the Arid Lands—Improving Resilience (REGAL IR) and Accelerated Growth (REGAL AG), Kenya Resilient Arid Lands Partnership for Integrated Development, Agile Harmonized Assistance to the Devolved Institutions (AHADI) etc.

## 2. Problem statement and objectives

The arid areas in Kenya constitute about 60% of the land mass and are home for approximately 30% of the population. The land use system in the region is predominantly pastoralism and extensive grazing. The region has the highest levels of poverty, over 60%, exacerbated by poor accessibility and frequent droughts. It is estimated that the drought period spanning 2008–2011, resulted in a loss of USD8 billion in the livestock sector. The impact of frequent drought is severe hunger, malnutrition and extensive loss of livelihood, with diminished resilience. Due to the increased frequency of cyclic droughts in the region, which exacerbate the vulnerability of pastoral communities, the urgency to explore high impact interventions to address the needs of these communities has risen dramatically. Reversing trends of increasing poverty levels, maintaining the trends in reducing food insecurity and malnutrition, and adapting to climate change, calls for sustained support to reforms and development in the pastoralism and agricultural sector. Given the high dependency of pastoralist livelihoods on livestock and livestock products, addressing production and marketing challenges offers the potential to reducing vulnerability, increasing resilience and reducing poverty among these communities.

The purpose of this report is to inform interventions by the AVCD Livestock component. The goals are to (i) come up with a checklist of possible activities and opportunities for the AVCD project to invest in; and (ii) identification of existing information gaps in the value chains by performing a synthesis of recent value chain studies in the project area.

### 3. Data collection and methodology

This research was based on the use of both primary and secondary data. A first phase of primary data collection consisted in field visits/scoping to the five counties and meetings with key-informants, county officials and livestock directors. In the second phase, we undertook a desk research and review of the existing recent literature and data on livestock and fodder value chain analysis in the five counties. From the bibliography search and review, we identified the existing gaps and the specific additional data needs. For Garissa, Turkana and Wajir counties, the existing literature was exhaustive and very recent. We have just added additional information on animal health collected by our ILRI project colleagues.

For Isiolo and Marsabit counties, the secondary data, and the value chain analysis reports identified did not include the required information, and were not recently elaborated. For this reason, we opted to collect primary data for both the livestock and fodder value chains. We first developed and then pretested the tools. We opted for both focus group discussions and individual questionnaires for data collection. Focus group discussions were held with livestock value chain actors (producers, traders, brokers, processors/butchers, county livestock department official), and with fodder value chain actors (producers, traders, etc.). For the livestock value chain, individual face-to-face questionnaires were implemented with producers, traders, brokers, and processors. For the fodder value chain, we individually interviewed producers and traders.

For the focus group discussions, we organized a one-day session for each value chain (livestock and fodder). We previously developed a checklist including different questions in relation to the mapping of the value chain actors, the interactions between the different actors, the prices, the costs and revenues, the main constraints faced, the service providers supporting the value chain, etc.

For the individual surveys, we followed a stratified random sampling to select the villages from each county. We first identified the production systems in each county. Three production systems prevail in both counties and include: pastoral, agro-pastoral (millet sorghum based) and maize based. Then from each production system we randomly selected locations and from each location we randomly selected villages. We opted to visit each village during its livestock market day (if there is a livestock market in the village) or the closet livestock market to that village. We targeted a gender balance when interviewing the value chain actors, but in many cases the number/share of women involved in specific activities across the value chain was very low or almost inexistent. We trained the enumerators and two persons from ILRI team were overseeing the process of data collection and immediately checking the questionnaires after completion. More than two weeks of field data collection in each county were necessary to complete the task.

## 4. Summary of the livestock production and meat sector in northern Kenya

Figure 4 presents a generalized map of the livestock value chain in the five AVCD project counties in northern Kenya. The value chain map is based on the observations, interviews with key informants during the scoping visits, primary data collected from the field work, as well as from recent available literature on livestock and the red meat sector in Kenya including International Development (2014), livestock value chain studies by Naitos Golden Inspiration (2015) in Turkana, Wajir and Garissa which form part of the livestock work by Regal-IR in northern Kenya and a study on the small ruminants sector by Alexovich et al. (2012). Others include value chain studies by Chabari and Njoroge (2014), Matete and Shumba (2015)

The core activities in the value chain comprise of livestock production, marketing, slaughter and/or processing, and meat and meat products marketing. The main actors include pastoral producers, livestock traders (these are of different types including bush, primary and secondary market traders), brokers, butchers, meat sellers, and animal trekkers and truckers hired to transport animals. The sections below present a summary of key issues at different stages in the value chain including the delivery of support services and inputs required by the core actors and the environment (physical, economic, social cultural, technological, political and legal) within which the value chain is immersed and which has implications on its performance.

### 4.1 Livestock production

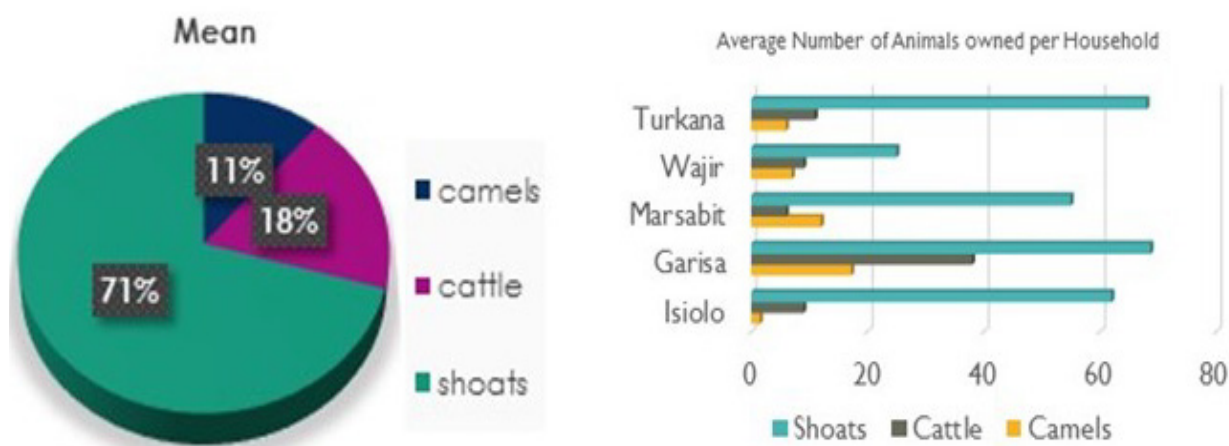
Livestock production is the main activity driving the value chain and is performed by pastoral producers. The ASALs hosts about 70% of the national livestock herd with an estimated value of about KES70 billion annually from 23.2 million animals (Republic of Kenya 2008). The AVCD project targeted counties are predominantly arid and semi-arid and pastoralism is the dominant way of life among communities there. The most important species of animals reared include cattle, camel, sheep, and goats. While the relative importance of these species varies across different counties, the current trend shows reducing importance of cattle perhaps due to their higher vulnerability during drought and growing importance of camels and small ruminants which are more resilient, disease resistant and easy to transfer from one area to another (KIPPRA 2016). Figure 1 shows the average number of animals owned: 71% are shoats, 18% cattle and 11% camels for households in all the five study counties. The average number owned by a household for each county are: 9, 38, 6, 9 and 11 (cattle), 1.5, 17.2, 12, 7 and 6 (camels), 62, 68.7, 55, 25 and 68 (shoats) for Isiolo, Garissa, Marsabit, Wajir and Turkana counties respectively. Garissa county has the highest number of animals owned per household for all animal categories. Animal production and marketing in ASAL areas in Kenya takes place in the back drop of huge social cultural, economic, environmental and other challenges.

Pastoral producers are often not commercial oriented but rather view their livestock as assets and only sell them when there is need for money or due to distress of catastrophes such as drought. With the producers not being responsive to market forces, most (98%) of the animals and meat produced is of low quality. Estimates for 2014 indicate that beef has the largest market share with 527,529 metric tonnes produced.

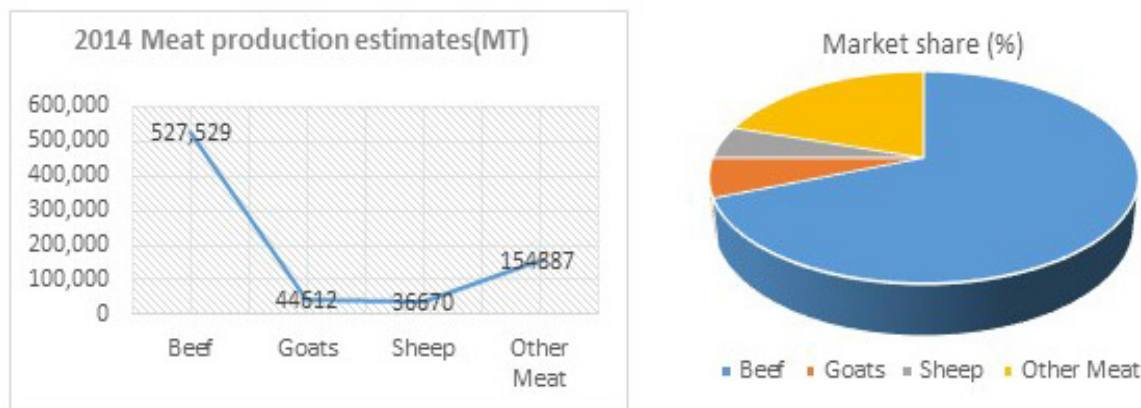
Drought represents a serious threat, with some groups losing up to 50% of their herds during severe droughts. There is a lot of range land destruction due to overgrazing and lack of grazing management. Producers also lack knowledge on grazing and husbandry best practices. On the other hand, animal health services and inputs are widely lacking at the grass roots. The producers

also suffer lack of access to market information including prices and quality requirements by end markets. Roads and other necessary infrastructure are often poor or lacking. The region is ravaged by insecurity including frequent incidences of animal rustling and ethnic conflicts triggered by competition for scarce resources. Women take part in the value chain and are mainly present at production level. They especially take care of the small ruminants and are responsible for milk trading when it is the case. Men are mainly focused on large ruminants (cattle and camels) and migrate with the animals during the dry season looking for pasture for the animals.

**Figure 1. Average number of animals owned by household**



**Figure 2. Year 2014 meat production estimates and % market share**



Source: AVCD LC survey (2016) computation from International Development (2014)

## 4.2 Livestock marketing

Besides locally produced animals, the livestock marketing system in northern Kenya also features export and import of livestock. Imports mainly involve cattle and small ruminants entering the domestic marketing system from Somalia, Ethiopia, Sudan and Uganda through the common boundaries with counties in northern Kenya. The export trade mostly features camels which are often moved to Somalia and Ethiopia and subsequently exported to the Middle East where prices for these animals tend to be relatively high. There is also export of meat and meat products by some export grade abattoirs such as Quality Meat Packers, Farmer's Choice, NEEMA livestock slaughtering investment and the Kenya Meat Commission (KMC) but this often feature animals reared in commercial ranches.



Points of sale for domestically produced livestock include ‘farm gate’, primary, secondary and terminal markets. The different points of sale correspond with different types of livestock traders (bush, primary and secondary market traders) (Naitos Golden Inspiration 2015a,b,c). Value captured by producers often tend to be low due to factors including poor quality of animals sold, lack of a grading system and presence of many intermediaries in the marketing chains who eat up margins (International Development 2014). Discussions with stakeholders’ (producers and county livestock officials) often revealed huge desire to export livestock and meat which has seen construction of export grade abattoirs in many of the counties (most of these abattoirs have not been finalized yet).

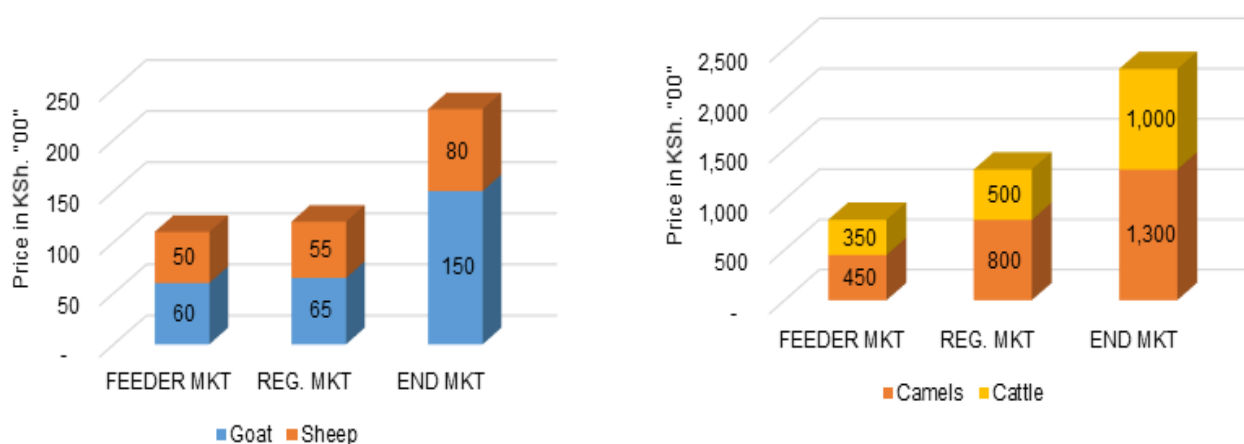
**Table 1. Animal prices in domestic markets (in KES)**

Specie	Feeder Markets	Secondary markets	End markets
Goat	3,000–6,000	4,000–6,500	6,000–15,000
Sheep	2,500–5,500	3,000–5,500	6,000–8,000
Camels	35,000–45,000	40,000–80,000	60,000–130,000
Cattle	28,000–35,000	40,000–50,000	45,000–100,000

Source: Naitos Golden Inspiration (2015a, b, c) and updates from AVCD LC survey data, (2016)

Animals prices in various domestic markets (feeder, regional and end markets) are presented in Table 1 and Figure 3 below. Animal prices vary greatly in all the market categories with higher prices fetched in the end markets for all animal species. Goats fetch a higher price than the sheep in all the markets while cattle fetch lower price than camels across all the markets. A goat can fetch a price of up to KES6,000 in the feeder market and KES15,000 in the end markets while that of camel can be as high as KES130,000. This explains the current trend where camels are replacing cattle in most of the study counties coupled with its resilience to the changing climate.

**Figure 3. Upper quartile prices in different markets**



Source: AVCD LC survey (2016) and Naitos Golden Inspiration (2015a, b, c)

On the other hand, there are a number of licensed abattoirs in Nairobi, its environs and in Mombasa as presented in Table 2 below. Almost all the abattoirs are operating below their full capacity while others are not in operation. Most of these abattoirs provide market for animals coming from the pastoral areas. Much of the meat from these abattoirs is sold locally to wholesalers and retailers (butchers, Kiosks, Supermarkets, and restaurants) with butchereries accounting for about 65% of the meat sold in Kenya.



The end market is also segmented into: high end market, medium-and low-end markets which comprise the highest share of red meat market. Just like the live animal prices, the price for red meat varies from one market segment to another. For example, price ranges from KES200–1,550 per kg based on the market segment. The highest price is for the export grade beef (International Development 2014). Even within the same segment, prices vary based on type of cut (bone meat, or steak and tender, or tough). Tender meat is more priced especially in the middle- and high-end outlets than tough meat. Unfortunately, information access to most players in the livestock value chain is limited while supply of quality meat demanded by higher income market is scarce.

**Table 2. Major licensed abattoirs in Nairobi and Mombasa end markets**

Abattoirs	Catchment livestock markets	Capacity	Status
Njiru	Northeastern-Isiolo, Moyale and Garisa	100 cattle/day	operating
Dagoreti	Migori, Laikipia, Kitui, Mwingi Garissa, Mandera, Marsabit, Isiolo Migori, Kuria, Suba Kajiado, Narok, Turkana, Samburu, Kapenguria, Nandi, Kericho, Bomet, Laikipia Kitui, Mwingi, Machakos, Makueni	400 cattle/day	80% cattle and goats 50% sheep
Mlolongo		15 camels/day	closed
Mariakani-Mombasa		50 cattle/day	?
Bisil		50 cattle/day	?
Kiserian		50–100 cattle/ day	50% cattle and 65% shoats
Ongata Rongai		200 shoats/day 30 cattle/day and 6–8 shoats/day	?
Licensed Export Abattoirs			
Hurlingham quality meat packers		50 head of cattle	Operating
KMC Mombasa	Marsabit, Wajir, Isiolo, Garissa, and the porous borders; Tanzania, Ethiopia, South Sudan, Uganda and Ethiopia	300 head of cattle	150 head cattle/ day  100 sheep/week  100 goat/week
KMC Athi River	Marsabit, Wajir, Isiolo, Garissa, and the porous borders; Tanzania, Ethiopia, South Sudan, Uganda and Ethiopia	1,000 head of cattle; 1,200 sheep and goats on a three-shift basis	1,000 cattle/ week; 1,000 Shoats/day
Halal-Ngong		250 head cattle	Closed
New Mombasa		120 head cattle	Closed
Mnangoni			
Farmers choice (pork)		300 pigs	Operating
Choice Meat (subsidiary of Farmers Choice)		150 head cattle 250 sheep and goats/day	70 head cattle/ day 55 sheep and goats/day

Source: Mbwika and Nthuli (2004); updated January 2012 as quoted in Farmer and Bwika (2012)

Meat exports are relatively small in Kenya with the main export destinations being the Gulf states with very low exports to Asia and Europe (Farmer and Bwika 2012). One main challenge for the export market related to sanitary and phytosanitary (SPS) requirements. Therefore, there is need for the pastoral counties together with the development partners to establish a robust veterinary service delivery system coupled with an enabling environment which will enhance implementation of the required SPS standards. The veterinary department should be supported to enable them implement and enforce screening procedures, embrace strict and thorough vetting of animals at livestock markets before movement and inspection at delivery markets. These measures will strengthen disease surveillance and control, thereby reducing risks and costs to value chain actors as well as improve efficiency along the value chain and promote export of live animals and animal products especially red meat.

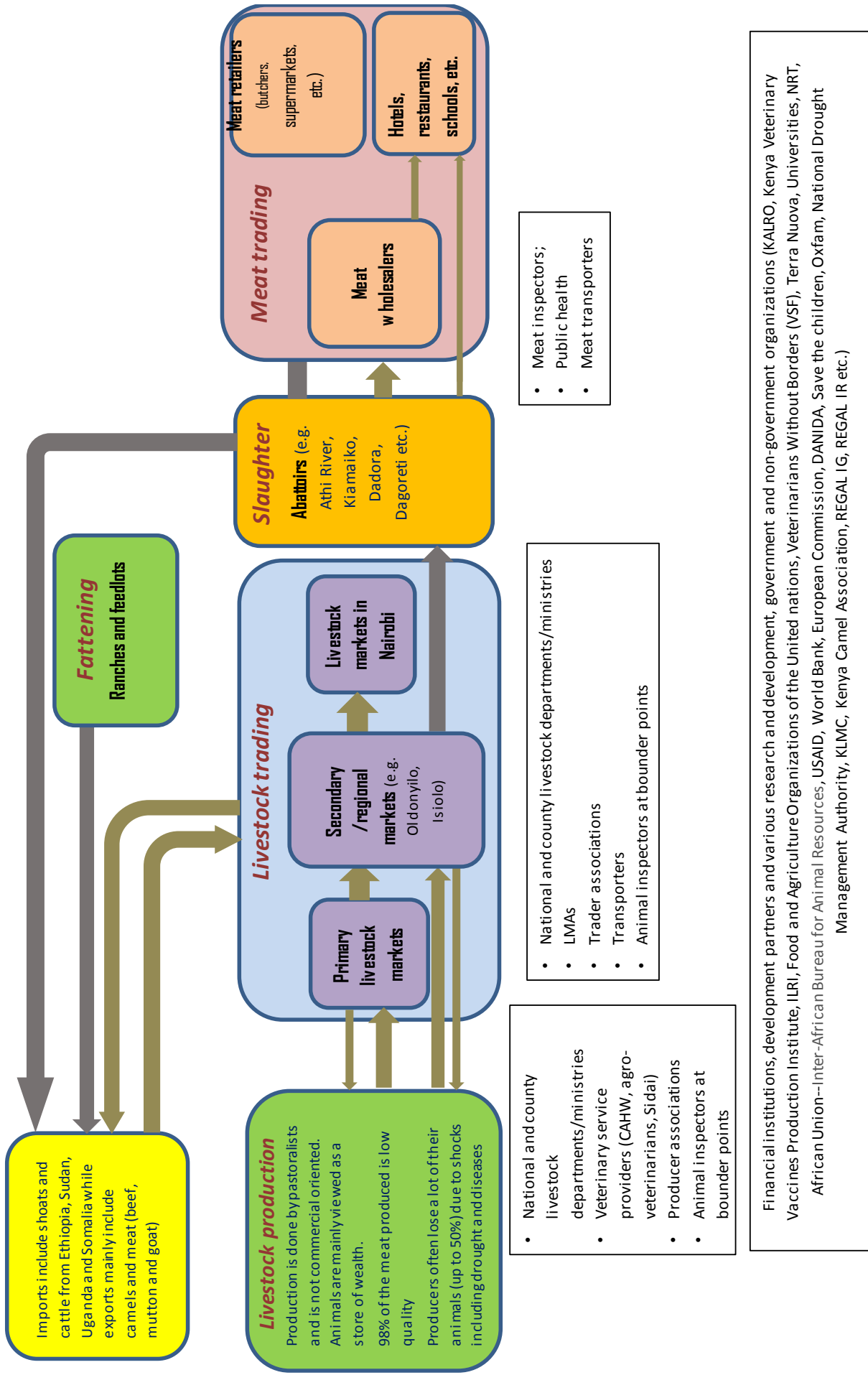
Potential export markets for livestock and meat from Kenya include countries in the East African community and the Middle East. It is however important to note that exporting of live animals is a significantly lower margin opportunity for Kenya (International Development 2014). For meat, the major constraints include: high price of meat due to lack of modern and scalable operations; weak disease control initiatives and poor hygienic standards in comparison to other exporters such as Australia; highly competitive space with countries offering higher quality at lower prices; perceptions that Kenyan meat exporters are unreliable and unable to deliver the quantities and specifications that were originally ordered; associated logistics and delivery companies are inadequate and unreliable; and poor and inconsistent quality of meat and meat products (International Development 2014).

### **4.3 Demand for slaughter animals' meat**

There is huge and rapidly growing demand for meat in Kenya fuelled by population growth, urbanization and rise in people's income (Bosire et al. 2017; Gamba et al. 2005). Nairobi and Mombasa are the leading demand centres for slaughter animals and therefore serve as the main terminal markets. As the demand for meat continues to rise, it is projected that Kenya will find it increasingly difficult to satisfy its local demand for beef and sheep meat through domestic offtake rendering the country increasingly reliant on importation. The bulk of meat consumed in Kenya is low quality and mostly comes from animals raised by pastoral communities. Quality preferences however vary among consumers. Willingness to pay premiums for quality, reliability and cleanliness is higher among higher income consumers (International Development 2014).

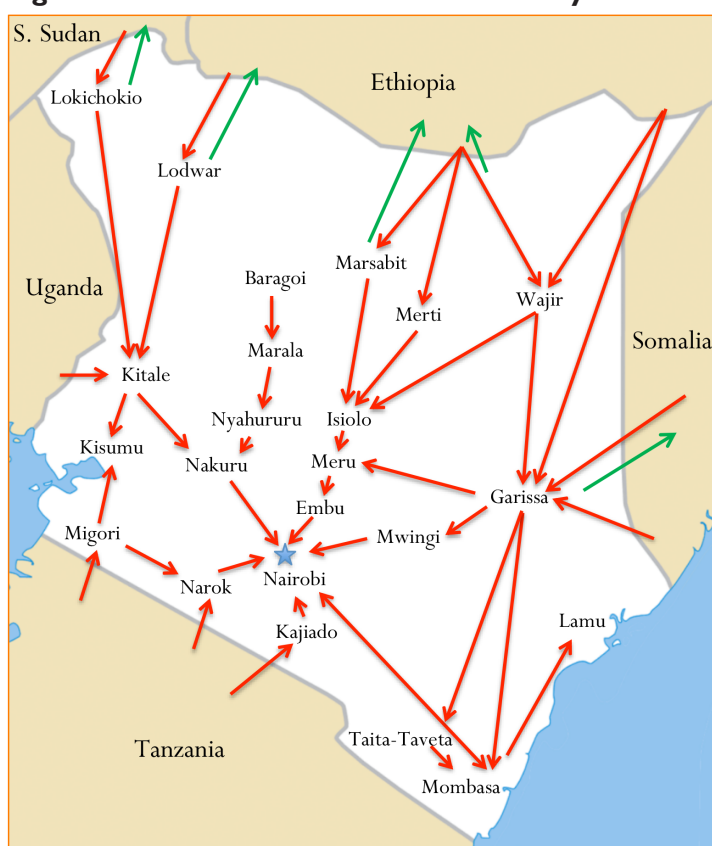
In line with higher willingness to pay for quality among high income groups, some abattoirs seek to produce superior quality meat and meat products which they sell to high end hotels, restaurants, supermarkets and in export markets at a premium. The abattoirs that target high end consumer segments include the KMC, and other privately-owned enterprises such as Quality Meat Packers, Farmer's Choice, Alpha Fine Foods, and Ngare Narok Meat Industries. Ranches form the main source of animals slaughtered for this high-quality meat trade. Higher end or export quality meat at retail points (supermarkets and high-end butcheries) go for an average of KES770–910 per kg compared to KES380–400 for the low-quality meat sold in meat stalls and ordinary butcheries. For policymakers, AVCD and development actors, the important issue should be how to come up with production and marketing strategies that can aid pastoral producers to also participate and benefit from the high-quality meat trade.

**Figure 4. Map of the livestock and meat value chains in Kenya**



Kenya is a meat deficit country, especially when it comes to beef and lamb where the shortage in domestic supply equated to an estimate of 18% for cattle and 19% for sheep, while goat supply exceeded domestic demand by 26% (International Development 2014). Cross-border livestock trade is the main source of meat supply (in form of live animals) to Kenya. Cattle is traded from Ethiopia through Wajir and Marsabit-Moyale markets and then directed to Garissa or Isiolo livestock markets which are considered as hubs for livestock trade from the northern territories to the terminal markets in Nairobi and Mombasa (Figure 5). In western Kenya, Kitale livestock market receives animals sourced in South Sudan (through Lokichogio market), Ethiopia (through Lodwar market), and Uganda, and serves regional livestock markets like Kisumu and Nakuru (Naitos Golden Inspiration 2015a). It is important to highlight that livestock is also exported from Kenya to neighbouring countries: mainly camels and goats to Somalia, and shoats to Ethiopia. However, the volumes/number of animals exported are relatively low compared to the volumes sourced from these countries.

**Figure 5. Livestock trade corridors in Kenya**



Source: Adapted from International Development (2014)

## 5. Livestock and fodder value chains in Isiolo

### 5.1 Overview of Isiolo county

Isiolo county borders Marsabit county to the north, Samburu and Laikipia counties to the west, Garissa county to the southeast, Wajir county to the northeast, Tana River and Kitui counties to the south and Meru and Tharaka Nithi counties to the southwest. The county covers an area of about 25,700 km<sup>2</sup> and has two parliamentary constituencies (Isiolo North and Isiolo South), three administrative sub-counties (Isiolo, Merti and Garbatulla), 10 wards (Wabera, Bulla pesa, Burat, Ngaremara, Oldonyiro, Chari, Cherab, Kinna, Garbatulla and Sericho), 11 divisions, 22 locations and 43 sub-locations (Isiolo county CIDP 2013).

The county's population is 143,294 comprising of 51% (73,694) males and 49% (69,600) females. Several communities are found in this county including: Borana, Turkana, Somali and Meru. Boranas form the largest proportion of the population. There are three main ecological zones in the county: semi-arid (5%), arid 30% and the very arid (65%). The semi-arid zone receives an annual rainfall of between 400–650 mm. The relatively high rainfall is due to the influence of Mount Kenya and Nyambene Hills in the neighbouring Meru county. The arid zone receives an annual rainfall of 300–350 mm while the very arid zone receives about 150–250 mm annually. Land is communally owned and held in trust by the county government with over 80% of the land non-arable (22,000 km<sup>2</sup>) and is used for grazing by the pastoralists but in some wards, such as Kinna, agro-pastoralism is practiced.

There are two ranches in the county namely Lewa and Borana. Lewa is privately owned and is used as a breeding ground for the Black Rhinos. Borana Ranch is a group ranch and is home to over fifty indigenous tree families and over 300 species of bird life. It has three national parks (Samburu, Shaba and Buffalo Springs) and two game reserves (Bisanadi and Buffalo springs) known for their natural beauty and abundance of wildlife. Currently, there are no gazetted forests in the county but two forests, Gotu and Kipsing, are earmarked for gazettement. However, Isiolo county has made immense efforts to domesticate the national policies to county context. The county has a county Integrated Development Plan 2013–2017, Isiolo county livestock strategy and action plan and now in the process of finalizing a livestock sale yard bill. Despite the critical role played by livestock in this county, livestock and livestock products, markets are not vibrant. The county has 15 livestock markets, 5 of which are considered major.

The county has a lot of potential for mining as geological surveys have shown untapped deposits of blue sapphire Saaer minerals in Duse Location and ruby in Raspu and Korbesa locations. Others are limestone and Biromix in Merti, and gas in Merti and Ilango locations. The county has plenty of sand but its exploitation is haphazard and unsustainable.

### 5.2 The Isiolo livestock value chain

In line with the practice in many value chain studies, this analysis of the Isiolo livestock value chain presents information on themes including: (i) core activities in the value chain; (ii) network of partners supplying services and inputs to the main value chain actors; (iii) co-ordination and governance in the chain; (iv) operating environment; and (v) opportunity for upgrading. The analysis focuses on cattle, camel, sheep and goats produced and marketed for meat. The four-animal species are the primary focus of the AVCD-livestock project.

## Core activities in the value chain

Core processes in the chain include: livestock production and fattening; animal trading; slaughter; meat marketing; and ultimately consumption. In correspondence, the main actors in the value chain include livestock producers and operators of animal fattening enterprises including: ranches and feedlots; traders including both small- and large-scale dealers; abattoir operators; meat wholesalers; meat retailers; and eventually consumers.

## Livestock production

### *Herd sizes and sources of feed*

Livestock production is the chief activity driving the chain and is the leading source of livelihood among communities in Isiolo county. The main species of animals kept include cattle, camel, sheep and goats. It is estimated that Isiolo county has a total population of 198,424 heads of cattle, 398,903 goats, 361,836 sheep and 39,084 camels (ROK 2009). Table 3 presents a summary of the size and structure of livestock herds in households surveyed during this study. All surveyed livestock producers kept some small ruminants (sheep and/or goats): 73% kept cattle while only 9% had camels. The number of livestock kept per household averaged about 34 goats, 29 sheep, 9 heads of cattle and 1.3 camels. Mature female animals formed the largest proportion of the herds (30–40%) while mature males accounted for the lowest share (5–9%). The rest of the herds comprised of young and maturing animals.

**Table 3. Numbers of livestock among livestock producers in Isiolo**

	Cattle	Camel	Sheep	Goats
Total herd	8.64	1.28	29.3	34.4
Female calves/kids	1.03	0.16	4.2	5.04
Male calves/kids	0.97	0.11	4.2	4.58
Young females	1.43	0.29	7.49	6.85
Young males	1.11	0.15	1.89	1.14
Adult females	3.32	0.51	8.89	13.81
Mature males (entire)	0.48	0.03	1.88	2.05
Mature males (castrated)	0.31	0.04	0.65	0.93

Nomadic pastoralism is the dominant system of production. Consequently, during the formal survey, majority of producers (98–100% depending on livestock species) reported that they relied on grazing in communal land as a source of feed for their animals (Table 4). Conversely, use of own produced livestock feeds (both crop residues and fodder crops) was documented among only 2–9% of the cattle keepers and 3–8% of the small ruminants' producers. Likewise, use of purchased feeds is scarce having been reported in only 13% and 14% of households with cattle and small ruminants, respectively.

**Table 4. Source of livestock feeds among producers in Isiolo**

	Camels	Cattle	sheats
Number of households keeping different livestock species	7	56	76
Pasture in communal land	100	98	95
Pasture in own land	0	4	3
Crop residues	0	9	8
Own produced fodder	0	2	3
Purchased fodder	0	14	13
Fodder collected from public land	0	9	8
Others	0	2	0

*Herd dynamics*

The size of livestock herds is a consequence of changes that occur in these herds over time. During the formal survey, information on dynamics in livestock herds during the past 12 months prior to this study was collected. Findings showed that the stocks of animals held by producers mainly accumulated through births (Table 5) which accounted for 83–89% of the total animal inflows in the cases of cattle, sheep and goats. On the other hand, purchases accounted for the largest share (45%) of the inflows in camel herds. Essentially, three out of the seven households that kept camels (43%) had purchased some camels during the past year. In all the three cases the type of camels bought were said to be young females (Figure 6).

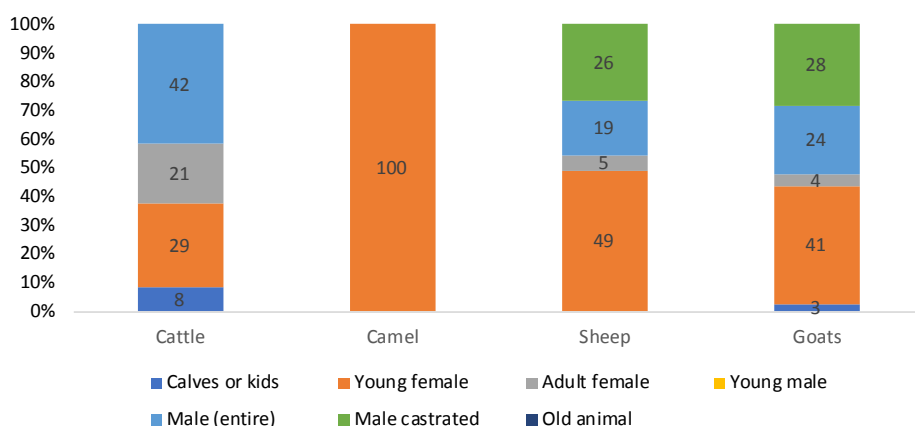
For the other three species (cattle, sheep and goats), animal purchases were only reported among 13–14% of the producers who kept these types of animals. The largest proportion of animals bought were said to be either young females (41–49% of the small ruminants bought) or entire males (42% of cattle bought). Increase in herd size was the most frequently cited reason why animals were purchased (57–100% of households where animals had been purchased) (Table 6). Breed improvement was cited in 18–20% of the households where small ruminants had been purchased and 30% of the households that had bought cattle. Purchasing animals for fattening was only cited in small ruminants (9% and 10% of households where some sheep and/or goats had been bought).

**Table 5. Animal inflows during the last one year in producer households**

	Cattle	Camel	Sheep	Goats
Number	55	7	72	75
Total	3.03	1.57	10.44	10.65
Purchases	0.44	0.71	0.80	0.92
Births	2.5	0.57	9.19	9.50
Gifts	0.02	0	0.20	0.14
Exchanges	0.02	0.29	0.24	0.09
Others	0.07	0	0.12	0



**Figure 6. Percentage of different types of animals among purchased stocks by livestock producers in Isiolo**



**Table 6. Reasons why animals were purchased**

	Cattle	Camel	Sheep	Goats
Number	7	3	10	11
Increase in stock	57	100	80	73
Breed improvement	29	0	20	18
Fattening	0	0	10	9

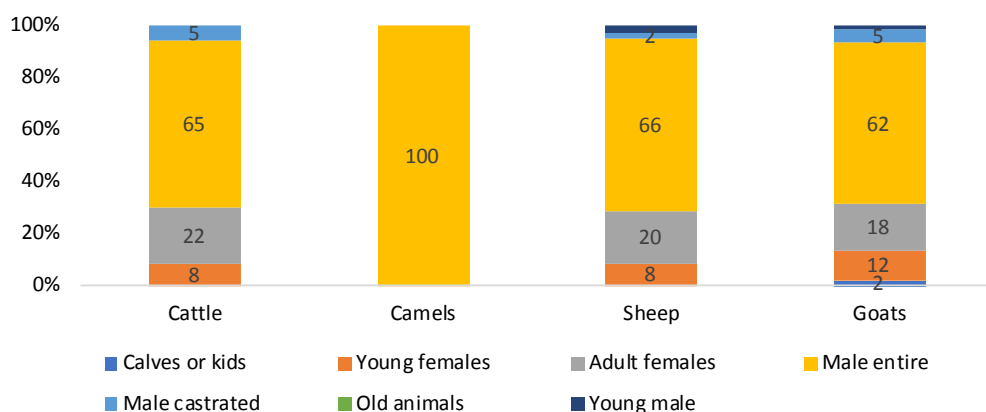
The accumulation of animals in herds through inflows is balanced by reduction through outflows. Sale of animals accounted for most of the outflows (55–60%) from herds of small ruminants and camels (Table 7). Selling of livestock was documented in 55–70% of households with small ruminants, 43% of cattle keeping households and only one of the households that kept and had sold some camels. Surprisingly, the number of heads of cattle lost through death surpassed the number sold which perhaps relates to the vulnerability of this livestock species to the widely prevalent adverse climatic conditions in the study area. On the balance, total outflows differed by a small margin with total inflows across the four species analysed. Mature male animals comprised the bulk of the animals sold (62–66% of the small ruminants, 65% of cattle and a single camel that had been sold in one household (Figure 7). In comparison, adult and young females accounted for only 18–22% and 8–12% of the small ruminants and cattle sold, respectively.

**Table 7. Animal outflows during the last one year in producer households in Isiolo**

	Cattle	Camel	Sheep	Goats
Total outflow	2.30	0.14	11.40	12.24
Sale	0.66	0.14	6.29	7.36
Death	0.80	0.00	1.67	1.46
Exchange	0.00	0.00	0.38	0.13
Slaughter	0.04	0.00	1.03	0.49
Gift	0.09	0.00	0.26	0.16
Lost	0.11	0.00	0.55	0.72
Predator	0.30	0.00	0.73	0.99
Stolen	0.30	0.00	0.49	0.93



**Figure 7. Percentage composition of different types of animals in among the stocks sold by livestock producers in Isiolo**



### *Use of improved inputs among livestock producers*

Use of improved inputs and technologies in agriculture and livestock production has implications on productivity, quality and safety of products produced which ultimately influences the economic performance of the producers. For this reason, this study also sought to take stock of inputs and technology use among animal producers in the study area. The set of important inputs and services in livestock production relate to feeds, animal health and breeding. A recent development in the Kenyan livestock industry has also seen attempts to introduce livestock insurance services to producers in pastoral areas to mitigate the risk of losses usually occasioned by drought.

Ninety-nine per cent of the surveyed producers claimed that they practiced deworming and tick control in their herds of animals. The practice of vaccinating animals to prevent diseases was however less prevalent as it was only reported in 43% of the surveyed households. Government vets were the most frequently cited (66% of producers) source of the vaccination services. Despite agro-veterinarian shops being the most frequently cited source of deworming, tick control and curative treatment services and inputs (about 40% of producers in each case) these input and service providers were only cited as a source of vaccination services by only 19% of the producers. In a total of 43% of cases curative treatment was performed by the producers themselves or their neighbour with or without some professional advice.

Mineral supplementation was documented in 54% of households implying that 46% of the households did not. Only 14% of the producers had bought and fed hay to their animals during the past one year. Despite frequent incidences of drought, only 6% of the producers were engaged in feed conservation. Adoption of the recently introduced insurance-based livestock insurance (IBLI) was documented in only 12% of households. Most of the cattle keepers (69%) used own bull for breeding which presents a high possibility for inbreeding. On the other hand, 34% of the producers utilized other peoples' bulls as artificial insemination services are non-existent.

### *Livestock and meat marketing*

The livestock marketing system in Isiolo features both the marketing of animals by livestock producers and the buying and selling of animals by livestock traders. During the marketing process, animals move from primary markets to regional markets and eventually to terminal markets (mainly Nairobi) where they are sold for slaughter. Before reaching the terminal markets,

an animal may change hands a number of times. This study identified different types of traders depending on point where animals are purchased and where they are sold. The trader types include: (i) traders who procure animals in bush/primary markets in Isiolo and sells in regional markets in the county; (ii) traders who procure animals in markets in the county and sells in markets in the neighbouring counties; (iii) traders who buy animals in regional markets in the county and sells in the same markets; and (iv) traders who procure animals in markets in the county and sells in Nairobi. Thus, in the value chain some of the meat animals' end up being consumed within the county while others go outside the county.

#### *Livestock marketing by livestock producers*

Livestock producers in the bush have several outlets where they sell animals including farm gate, bush/village/feeder markets, and the often far away regional markets such as Odonyiro and Isiolo. For animals sold during the last 12 months in the surveyed households, popularity of market outlets differed with species. Village markets were the most frequently cited point of sale for small ruminants (47–51%) (Table 8). Nevertheless, an appreciable number of producers (41–46%) sold their sheep and goats at regional markets. In contrast for cattle, regional markets were the most frequently cited point of sale (54% of cases). Only 12% and 30% of producers who had sold cattle did so at farm gate and village market, respectively. Prices in regional markets tend to be higher than in bush markets. For example, at the time of this study a bull that could be sold at KES35, 000 in the bush markets could fetch KES40, 000 in the Isiolo market.

**Table 8. Percentage of livestock producers citing market outlets for animals sold during the last one year**

	Cattle	Camel	Sheep	Goats
Number of producers who had sold animals	26	1	40	53
Farm gate	12	100	41	17
Village market	35	0	51	47
Regional market	54	0	46	41

#### *Livestock marketing between primary and regional markets*

While many traders who buy animals in primary markets for reselling in regional markets operate individually, a few operate in partnerships. Purchases tend to be relatively more frequent (in some cases daily) than sale (mean=twice a week) with purchased animals being kept for between two and seven days awaiting accumulation of sufficient volumes for delivery to the sale market. Transactions between buyers and sellers in the primary markets tend to be ad-hoc one-time relationships. Buyers usually pay cash for animals and in about 40% of cases the transactions are mediated by brokers. While buying animals in primary markets, the nutritional status of an animal was the most frequently cited factor (all traders) that influence purchase decisions by traders including whether to buy and/or the price to offer.

The volume of animals procured and sold by traders who operate between primary and regional markets varies widely with the number ranging between 10 and 120 sheep and/or goats per month among those interviewed during this study. (Distance travelled) Transportation of animals from the bush markets to the regional markets is either by vehicles (% of cases) or trekking (% of cases). Besides buying and selling animals in different markets some of the traders intimated that they also buy animals which they keep and sell in another season to exploit both the seasonal and spatial variation in prices.

Table 9 presents the different types of marketing costs incurred by livestock producers and traders between livestock markets in the bush and the Isiolo regional market. For cattle, the highest cost component is the trucking expenses which may go up to KES1,500 per animal. Other costs include county export fee (KES100 per animal even if the destination is within the county), inspection fee (KES100), movement permit (KES30), bribes paid at police road blocks (KES120), security and grazing after arriving in Isiolo pending sale (KES200), holding ground KES50, feed purchase (done during drought season) (KES100). Other costs include accommodation and meals for the seller (producer or trader) and the brokerage fee (KES100). Besides the KES100 brokerage fee, brokers also pocket an indeterminate additional amount generated through haggling with sellers to accept a low price and buyers to pay a higher price. This is made possible because a broker deals with both parties separately implying that the buyer is not privy to the true amount received by the seller and vice versa for the seller.

Table 9 also presents the marketing costs for small ruminants between the bush and regional markets. Again, the highest component is the transport cost (KES30,000 per a lorry of 150 animals). Other costs include county export fee (KES12,000), inspection (KES4,500) movement permit (KES200), bribes in police road blocks (KES800), security and grazing after arriving in Isiolo pending sale (KES20/animal), holding ground (KES10/animal), feed purchase (done during drought season) (KES35/ animal). Buyers of animals in regional markets include distant traders, livestock producers (including some who are engaged in fattening) and butchers.

**Table 9. Livestock marketing costs (KES) between bush markets and the Isiolo market**

	Cattle	Small ruminants
Transport	1,500	200
county export fee	100	80
Inspection	100	30
Permit	30	200 per lorry
Bribes to police	120	800 per lorry
Security and feeding	200	20
Holding ground	50	10
Feed (during drought)	100	35
Brokerage	100 + (farmer price and buyer price)	
Accommodation and meals	1,000	

#### *Livestock marketing between regional and terminal markets*

Major regional markets in Isiolo county include Oldonyilo and Isiolo livestock markets. At the time of this study the Oldonyilo market had been modernised with the funding by the USAID through Regal IR while the construction of the facility in Isiolo was nearing completion. Animals delivered in the two regional markets come from both Isiolo county and other neighbouring counties. In Isiolo market for example, some of the animals come from Marsabit (small ruminants), Saburu, (mainly camels and cattle), Wajir and Ethiopia (mainly cattle). Most livestock buyers in the two regional markets are traders who come from Nairobi, Meru and Central Kenya among other areas. Again, the transactions between buyers and sellers in regional markets are often ad-hoc one-time relationships.

About 66% of the traders who sold animals in the regional markets and over 80% of those who purchased the animals said that the transactions were mediated by brokers. Again, for animals

sold in regional markets, nutritional status was the most frequently cited factor (all the 13 traders interviewed) that was said to influence the decisions by traders on whether to buy and/or the price to offer. While many of the animals in regional markets are for slaughter, some buyers in these markets buy animals for fattening. Essentially, some buyers purchase animals at low prices during the drought season which they go and fatten for resale later at a higher price. It was also noted that local butchers and hotel operators in towns where the regional markets are located buy a significant number of animals for slaughter. In Isiolo, some butchers buy and slaughter camels and then process the meat into Nyirinyiri some of which is sold in Nairobi.

Marketing costs between livestock markets in Isiolo and final markets in neighbouring counties and/or Nairobi include transport charges, government taxes, brokerage fees in the sales markets and other incidentals such as accommodation and meals. Table 10 which presents an analysis of gross margins for different types of traders also shows the marketing costs (KES/animal) incurred. Surprisingly, the transportation costs for small ruminants to neighbouring counties were higher than the transportation costs to Nairobi which probably reflects the effects of bad roads connection with some of the markets in the neighbouring Counties such as Maua. (Brokerage charges are also incurred in terminal markets).

#### *Financial performance of livestock traders in the Isiolo value chain*

Table 10 presents an analysis of gross margins for different categories of traders in the Isiolo live animals marketing chain. The estimated costs and revenues are based on information about the most recently completed buying and selling operations. Although the estimates may be rather imprecise due to the limited number of traders interviewed, they nevertheless provide useful insight about the financial performance of the traders in the value chain. While the margins enjoyed by traders are thin, the level varies across the different categories of traders. Traders who bought and sold animals in same market realised the lowest level of margins of less KES200 per small ruminant which represents about 3% of their total variable expenditure. In comparison, traders who delivered animals to regional markets realised a margin of about KES330–500 per small ruminant and nearly KES900 per head of cattle which represents about 5–11% of their total variable expenses. Goats traders who sold animals in Nairobi enjoyed the highest level of margins KES1,220 which is about 29% of their variable expenses.

**Table 10. Gross margins (KES/animal) for traders in the Isiolo livestock value chain**

Animal type	Buys and sells in the same market		Buys from the bush a market in Isiolo and sells in a regional market			Buys in Isiolo county and sells in in neighbouring counties		Buys in Isiolo county and sells in Nairobi
	Sheep	Goats	Cattle	Sheep	Goats	Sheep	Goats	Goats
Number	1	1	1	5	6	7	9	2
Purchase price	3,700	4,913	17,000	3,078	4,411	3,299	4,544	3,788
Brokerage fee	100	33	100	90	141	95	118	60
Government tax	80	80	150	78	80	77	76	85
Transport cost	0	0	1,500	150	117	326	326	225
Other costs	0	7	358	214	196	138	145	120
Total costs	3,881	5,034	19,109	3,615	4,951	3,942	5,218	4,280
Price received	4,000	5,200	20,000	3,941	5,471	4,291	5,983	5,500
Gross margin	119	166	891	326	520	349	765	1,220
Gross margin/ expenses	0.03	0.03	0.05	0.09	0.11	0.09	0.15	0.29

### *Animal slaughter and meat marketing in Isiolo*

As already indicated, settlement centres and towns in Isiolo also act as outlets for meat animals produced and/or marketed in the county. Among the local communities, women are strongly involved in the meat retail business representing most (57%) of the 14 meat sellers interviewed during this study. All the meat sellers quizzed traded in either mutton and/or goat meat while only a few dealt in beef (5) and/or camel meat (only 1). The high frequency of butchers who sell mutton and /or goat meat perhaps reflect a higher preference for these two types of meat compared to beef and camel meat among the local consumers. In addition, meat goats and sheep may be more readily available as the two species comprise a big part of livestock herds in the county and are also more prolific than cattle and camel. Usually, meat sellers purchase animals (as opposed to animal carcasses) which they slaughter in nearby slaughter slabs or in their butcheries and then sell as meat.

The number of animals slaughtered vary across locations from several sheep and/or goats per day in a single butchery in big towns like Isiolo to butchers who slaughter animals and sell meat only a few times in a week in settlements in remote areas. Surprisingly, while goats often cost more than sheep (on average KES4,500 compared to KES3,000 per mature animal at the time of this survey) both mutton and goat meat retail at the same price perhaps because goats purchased for slaughter were often said to weigh more (estimated mean carcass weight= 14.5kg) compared to 10.4kg for sheep). Essentially, butchers seemed indifferent on which type of small ruminant (goat or sheep) they slaughtered for sale. The retail prices for sheep and goat meat however varied with location ranging from KES280 per kg in centres and villages in remote locations to KES400 in big urban centres.

As is common in buying and selling of livestock in the study region, purchasing of slaughter stocks by butchers also often (about 70% of cases) featured a broker. The fees paid to brokers ranged from KES50–300 for a sheep or a goat and KES250–500 per head of cattle or camel. Frequently, due to the poor quality of animals slaughtered, the meat offered for sale in many outlets tends to be of low quality in terms of attributes such as tenderness and intramuscular fat quantity (marbling). For instance, in 70% of cases of animals recently purchased for slaughter among the butchers interviewed, the stock included uncastrated mature males and/or mature females which usually yields tough meat especially during the dry season when pasture is scarce and animal bodies are therefore not in top condition.

### *Animal slaughter and meat marketing in other Counties where livestock from Isiolo are marketed*

While the largest share of the red meat market in Kenya is for low quality meat, information collected in some towns where livestock from northern Kenya are marketed showed that some butcheries are emerging that are striving to leverage on sale of quality meat to be financially more competitive. In Nanyuki for instance, a number of meat eatery joints were identified where operators only targeted for slaughter young well-nourished cattle including both steers and cull cows. The operators explained that cooked or roasted meat from such animals tends to be tender and good tasting which are attributes that are highly favoured by customers. To meet their customers' needs, the meat eatery joints' operators mainly procure slaughter animals from ranches in Laikipia. Due to better husbandry practices in ranches, the quality of meat from the ranch animals was said to be better than slaughter stocks procured directly from pastoralists. Purchase of slaughter animals from pastoral systems only happens when animals are in top condition.

For cattle purchased from ranches by the operators of the quality conscious meat joints, prices paid are based on live weight. At the time of this study the price for cattle had just risen to KES170 from KES140 per kg of live weight a few weeks before. At the previous price of KES140 per kg of live weight, a 350-kg animal would cost KES49,000. Interestingly, this is equivalent to the highest price received for a mature uncastrated bull among the surveyed pastoral producers who had sold animals during the past one year. The lowest price received by the pastoralist for a mature bull was KES15,000 while the average was about KES23,000. For pastoral producers and traders who can be able to service this emerging quality conscious segment of the livestock market there would be a significant improvement in income received.

Meat retail shops were also identified that are striving to leverage on sale of high quality meat to be competitive numerous other towns including Nyeri, Kenol and Thika. In the three towns however, the interviewed operators procured their meat supplies in the form of carcasses delivered to their shops by meat wholesalers. In the case of goats, young animals weighing about 13kg carcass weight are preferred. Surprisingly, the butchers expressed no desire to procure animals from production areas citing risks including insecurity, high prices due to involvement of brokers, government red tape among others.

As noted by the operators of the quality conscious butcheries, a major limitation for pastoralists is the poor quality of the animals they sell. Nevertheless, while trying to enhance the level of prices from livestock sales among pastoralists it is useful explore ways which could enable their access to this market segment. Essentially, it may be easier for animal sellers from pastoral areas to satisfy the quality requirements of this market segment compared to selling to the very high-end butcheries and meat exporting firms. Perhaps a good strategy would be for the pastoral producers and traders to target to sell selected young animals when they are in top condition to this emerging market segment. The most appropriate time would probably be after the rains when feed is readily available, and the body condition of animals is excellent. Selling such a strategy to pastoralists may however be difficult. A good approach might be to first pilot the strategy with a limited group of pastoralists.

#### *Operating environment*

The performance of a value chain is to a large extent influenced by the environment within which the chain is immersed. The operating environment in the context of a value chain includes prevailing policy, legal and regulatory frameworks that guide business investments and operations in the region of interest. It also includes social cultural, political, economic and physical environments in the region. Physical environment includes not only climatic conditions but also business support infrastructure such as roads, energy, water, communication and market facilities among others. A series of recent studies on livestock value chains in northern Kenya commissioned by Regal-IR present an analysis of the policy and legal frameworks within which livestock production and marketing in the ASAL areas in Kenya take place (Naitos Golden Inspiration 2015a, b, c).

#### *Policy and legal environment*

Important policies on the livestock sector include 'Vision 2030' which spells out agriculture as one of the priority sectors in efforts to transform Kenya into a middle income country; the 'Agriculture sector development strategy' which views agricultural as the backbone of Kenya's economy—and the means of livelihood for most of the rural population hence key to attainment of food security and poverty reduction; the 'Session Paper No 2 of 2008 on National Livestock



Development Policy November 2008' which seeks to achieve appropriate livestock management systems for sustainable development of the livestock industry; the 'Sessional Paper No. 8 of 2012 on National Policy for the Sustainable Development of Northern Kenya and other Arid Lands' whose policy goal is to facilitate and fast-track sustainable development in northern Kenya and other arid lands by increasing investment in the region and by ensuring that the use of the region's resources is fully reconciled with the realities of people's lives; and the 'Isiolo County Integrated Development Plan: 2013–2017' which provides comprehensive guidelines in budgeting, project funding, monitoring and evaluation of all the projects for the next five years.

The set of legal provisions guiding activities in the livestock sector include: the 'Veterinary Surgeons and Veterinary Para-professionals Act of 2011' which provides for the training, registration and licensing of veterinary surgeons and veterinary para-professionals; it also provides for a legal framework for matters relating to animal health services and welfare. The 'Animal Diseases Act, CAP 364 of 1972' which provides for the control of animal diseases and parasites and for measures to promote animal health; the 'Meat Control Act, CAP 356 of 1972' provides for control over meat and meat products intended for human consumption, and over slaughterhouses and places where such meat is processed and also import and export of meat and meat products; the 'Kenya Meat Commission Act CAP 363' that provides for the establishment of KMC; 'National Land Commission Act of 2012' that provides for the functions and powers of the National Land Commission. Other legal provisions include the 'Hide, Skin and Leather Trade Act CAP 359' that provides for the co-ordination and control of the trade and development of the hide, skin and leather industry; the 'Plant Protection Act'.

Gaps in policy and legal framework:

- Absence of an entity to champion, regulate, develop and promote the meat industry is what is stopping from tapping into all the possibilities
- Livestock development policy
- Sale yard bill.

#### *Animal health*

Like everywhere else in Kenya, delivery of livestock health inputs and services in Isiolo is a joint responsibility of both the public and private sector. Under the devolved system of government, the responsibilities of the county veterinary department include: surveillance and control of notifiable livestock diseases; meat inspection; regulation of livestock movement through issuance of movement permits and; monitoring and regulation of the private animal health sector. Again, just as is the case in other counties in northern and northeastern Kenya, the public animal health sector in Isiolo, either on its own or in conjunction with donor organizations, is often involved in delivery of animal health inputs and/or services to livestock producers. Beneficiaries in many of these cases are not charged for the inputs and services which are usually treated as a form of aid.

Numerous challenges undermine the capacity of the Isiolo county veterinary department to perform its functions including inadequate staffing and lack of facilitation. At the time of this survey, the entire department had a total of only 16 technical staff, most (11) of whom were based in Isiolo (either at the county or sub-county headquarters) while the other two remaining sub-counties (Galbatulla and Merti) were being served by only five staff (three and two respectively). Also, the department often relies on borrowing of vehicles (as all their vehicles are grounded) and/

or donor support for and other facilitation to enable their staff to move and work in the field. On staffing, the department urgently needs about four additional lab technicians and 12 diploma-level animal health assistants (AHAs).

Information from the veterinary department showed that the most common livestock diseases in Isiolo county include: lumpy skin disease and FMD for cattle; PPR, CCPP and sheep and goat pox for small ruminants, and; camel pox, trypanosomiasis and haemorrhagic septicaemia for camels. Vaccines for most of these diseases have been developed and can be used to mitigate economic losses that are often occasioned by outbreaks.

The private vet inputs and services sector comprises of private practitioners and agro-veterinarian shop operators. There is a total of about 14 only agro-veterinarian shops in the entire county and this was deemed inadequate. Sidai Africa which started operating in the county in 2013 has a franchise of eight contracted outlets (Oldonyiro, Buresa, Merti, Biriqo, Kinna, Galba Tulla, Sericho and Galfasa) and was estimated to be covering about 60% of the market for animal health inputs. While sales by Sidai have been rising rapidly, government officials and other key informants interviewed conceded that the private vet inputs and services sector is not yet well developed in the county which was blamed on factors including poorly developed road and communication infrastructure, harsh climatic conditions, vastness of the area, insecurity, and lack of interest among students from the local communities to pursue animal health courses in colleges among others.

As a result of the gap left by the poorly developed private animal health input and service sector, numerous complications arise. First, to fill this gap, some general shop operators stock and sell vet inputs and drugs alongside other commodities including food meant for human consumption which not only poses health risks to customers but is also in contravention of the official government policy. This illegitimate sale of vet drugs and inputs also gives room to sale of counterfeits which was cited to be a common problem in the county by Sidai officials.

The problem of counterfeits was particularly said to be serious in the case of acaricides with the most preferred products by producers consisting of higher concentrations of active ingredient than is officially recommended in Kenya. Similar complaints were also received in the case of other drugs. Allegedly, livestock producers who often treat their own animals complain that some of the officially recommended drugs are ineffective. Given the public health implication of misuse of drugs, there is need to investigate the allegations by livestock producers to ensure that prevailing official vet drugs recommendations are appropriate for the region. The situation also underscores a need to strengthen the enforcement capacity of veterinary department and other regulatory institutions in the vet input sector.

Second, while most of the common diseases in the county can be controlled through vaccination, uptake of vaccines is also low due to factors including: unavailability of skilled/competent personnel as many of the Sidai agro-veterinarian shops are manned by persons who are unqualified to administer vaccines; free vaccines provided by government and donors hence unwillingness to pay for these inputs by livestock producers and also; lack of knowledge among the livestock keepers on how these inputs work with many pastoralists being wary about the reactions and side effects that the vaccines usually have on animals.

### *Market information*

A key prerequisite in promoting commercialization of the livestock sector is development of transparent and competitive markets. The theory of competition assumes perfect information among both buyers and sellers. Results from a survey of livestock producers during this study,



however, showed that the majority were often uninformed about prevailing prices (about 60%) and the desired quality by buyers (76%) in livestock markets where they sell their animals. Among those who claimed to be informed about market conditions, most (88%) cited other livestock producers who have recently visited the market as their source of information. An important challenge about 'other livestock producers' as a source of market information is that messages passed across may not be fully accurate or up to date.

Essentially, the widespread lack of awareness about prevailing market conditions among livestock producers partly accounts for the pervasive presence of livestock brokers in livestock markets and the attendant high in transaction costs that impedes market development. It is also important to note that besides livestock producers, buyers also need information on prevailing market conditions. During key informant interviews, some buyers from Nairobi explained that they go out of their way to search for information on availability of animals and prices in livestock markets before they visit to procure animals. Some of these buyers have developed long term business relationships with some brokers whom they call for updates about the prevailing conditions in markets.

It is important to note that there have been initiatives to set up livestock market information systems in pastoral areas in Kenya in the past. An example of these initiatives is the National Market Information System developed and operated by LINKS in conjunction with the Ministry of Livestock and KLMC and which is now dysfunctional. The problem with such project funded initiatives is that sustainability tends to be a challenge when the sponsoring project ends. A potential way of mitigating this drawback is designing an information system that allows for entry and exit of sponsors with minimal disruptions and which should be hosted at a government ministry or an organization such as KLMC. Such a system could work closely with the LMAs in charge of managing livestock markets which could be used to collect the required market information for dissemination. However, as a stop gap measure before the setting up of the market information system, LMAs could be used to gather market information and disseminate it through billboards erected in livestock markets. The LINKS project used to display market information in Garissa and other livestock markets on breed, class and kind of the animal. While such an information system had the potential to increase pastoralists' market participation and improve service delivery to value chain actors (Mude 2016), sustainability was a big challenge (Weber et al. 2005).

#### *Gaps for commercial production*

As is common among nomadic pastoralists in Kenya, most livestock producers in Isiolo are largely not market oriented. Rather majority of the producers treat their animals as a store of wealth. Consequently, in many cases producers only sell animals when there is a need for cash in the household. Data from surveyed households during this study shows the number of animals sold during the last 12 months stood at about seven goats, as well as sheep and less than one camel and cattle. These levels of offtake through sales represent 9–26% of animal herds kept.

Common reasons why livestock are sold among producers include the need for money to pay school fees, hospital bills, purchase food among others. Animals are sold as need arises and thus the number sold each time is usually small. For this reason and particularly in the case of small ruminants the point of sale often tends to be bush/feeder markets (90% of cases) where prices tend to be lower than in bigger markets such as Isiolo and Oldonyiro. For instance, a goat with a live weight of 16 kg fetches about KES5,000 in the bush markets compared to KES6,500 in the Isiolo market. By the same token, a 30–35kg goat commonly fetches about KES7,000 in the bush market compared to KES8,000–8,500 in the Isiolo markets.

A possible way to ensure that producers located far away from big markets get higher prices for their animals is to encourage collective marketing to attain the volumes needed to cover the costs of delivery to the larger distant markets. Where possible this strategy may be integrated with internet marketing which is increasingly gaining popularity in Kenya and which has the potential of allowing producers to negotiate terms with buyers on a one on one basis.

A common phenomenon in livestock marketing in Isiolo is that many transactions are mediated by brokers. This study attempted to unravel why brokers are so pervasive in livestock markets in the county. One of the roles of brokers in livestock marketing is handling of some of the logistics. It was reported that there are cases where sellers contact and send animals to brokers while still at home ahead of their travel to the market. In such cases the broker takes charge when the animals arrive in the market and oversees the offloading, feeding, and security among others. The broker would indemnify the livestock producer if an animal is stolen during this time. The producer appears only during the market day but does not take part in the negotiations.

**Table 11. Sales of animals in households in Isiolo**

	No. of households	No. of animals sold	Ratio of no. sold to the no. kept
Cattle	45	0.4	8.8%
Camel	7	0.6	14.7%
Sheep	57	6.9	26.0%
Goats	59	6.8	20.9%

Source: AVCD LC survey (2016)

The manners in which brokers conduct negotiations between buyers and sellers are such that the two parties do not come into direct contact with each other. While there are standard brokerage fees (KES100 per head of cattle), brokers during negotiations secretly inflate asking prices by sellers and understate the offered prices by the buyer in an effort and then pockets the difference when a deal is eventually agreed and this can be hefty. This practice (malpractice) is a major cause of discontent against brokers by buyers and sellers. Worse for sellers, brokers can conspire to ensure that they do not get any buyers by feeding the wrong information to the buyers including claims that the animals being sold are either stolen or are coming from an area where there has been a disease outbreak. Other roles performed by livestock brokers include facilitating communication between buyers and sellers in cases where they do not speak the same language and acting as a guarantor to buyers that the animals being offered have not been stolen. On the balance however, the activities of brokers serve to increase transaction costs in livestock marketing in Isiolo which acts as a disincentive for buyers to visit markets there and discourage buyers from participating in markets. Because of the exploitative behaviour of brokers, there is need to regulate their activities. Actors surveyed longed for the enactment of the pending sale yard bill which provides for the regulation of brokers. For the AVCD–LC, it is important to support the implementation of the bill once it is it has been signed into law.

### 5.3 Peri-urban enterprises

As already indicated, selling of livestock among pastoralists is needs driven. When pastoralists deliver animals for sale in livestock markets, they often also take that opportunity to procure any items or services that they require. Emergence of vibrant alternative businesses around livestock markets should therefore be encouraged and supported to ensure availability of a wide range of commodities and services as this not only serves to generate jobs but also helps to make the market a more attractive point of selling livestock for livestock producers. Such alternative

businesses include food, clothes, and veterinary and agro-inputs businesses. A common constraint faced business operators is poor management which limits performance. AVCD–LC can assist by linking the business operators to BDS services as a way of ensuring that the emerging businesses are well run and vibrant.

In Ondonyilo, lack of banking services was identified as a challenge. AVCD–LC could support the establishment of banking and M-Pesa agents. This may however require the project to lobby mobile phone companies for an upgrade of the cell phone network in the area. It was also observed that in the market buyers buy animals of different sizes and weight. It might be good for the project to pilot an animal weighing service with either the LMA there or a youth group so that there is more objectivity when negotiating prices among buyers and sellers.

The almost finished export abattoir close to Isiolo town will create direct and indirect jobs. Direct jobs will include skilled (flayers, manager, lab technicians, etc.) and unskilled workers (guards, cleaners, loaders/unloaders, etc.). It will also boost the demand for hides and skins and involve different value chain actors, like collectors, wholesalers, tanners, etc. The indirect jobs will include transportation of animals and of humans, fodder selling, catering, etc.

Close to Isiolo town and nearby the new not-yet finished export-abattoir, there is a big fodder production land managed by the community. The facilities also including a hay/fodder store. The interesting point is that the fodder land is also very close (less than 100 m) to a recently constructed feed lot which is also very close to the export abattoir. This agglomeration of fodder production, livestock fattening/finishing and livestock processing activities will create, once the abattoir is functional, a hub of economic activities and a demand for additional services like transport, catering, mobile battery recharging, airtime buying, etc. where women and youth could be involved in.

## 5.4 Fodder and seeds

Fodder production, conservation and marketing enterprises are yet to gain strength in many parts of Isiolo county. There are however efforts by both government and donor organizations to promote fodder enterprises in areas with relatively high amounts of rainfall and near rivers where irrigation is possible. Around Isiolo town, fodder activities are more vibrant due to favorable climate conditions and high demand from some farmers who practice dairy. Other areas where efforts to promote fodder enterprise have been initiated and some fodder production is taking place include Garba Tulla, Rapsu, Kinna, Maili tano, Guba dhudha, livestock marketing division, and the region along the Isiolo River.

### Fodder production

While dissemination of the fodder technologies is mainly being undertaken through groups, individual farmers form the majority of producers. Many of these individual producers are rather small-scale operators who conduct their fodder production activities in plots of up to one acre. Types of crops planted and utilized as fodder include maize stover, beans straw and Napier which are most common in agro-pastoral areas where farmers practice dairy. Other types of fodder include natural grasses, fodder trees such as leucaena and acacia whose seeds are utilized as goats feed.

The strategy used by producers involved in fodder production using natural grasses simply involves electing fences around plots where they want to establish fodder and letting the grass grow without being grazed. None of the fodder grass producers interviewed uses fodder seeds

and reasons cited included unavailability, lack of knowledge about how to plant and previous experience where seeds failed to germinate after planting due to lack of rain. No labour or costs are also incurred to perform other husbandry practices such as land preparation, planting and weeding. However, where such plots are located near a river, irrigation is sometimes also done. Around Isiolo town many of the fodder producers who cultivate grass do not bail it after harvesting.

## Fodder marketing

Farmers who produce fodder either use it to feed their own animals while some is sold. While marketing is not a big challenge for fodder producers near Isiolo town, their counterparts in distant places such as Galbatulla complained that they were stranded with stocks of hay which they could not sell due to lack of buyers. One challenge for fodder producers who lack market is that often the volumes of fodder involved are rather small to attract buyers. For such producers it may be better to introduce a slightly longer-term business view of the fodder activities. This includes educating the producers that they do not need to sell their fodder immediately after harvesting. Rather, during the rainy season, they should concentrate on production and storing of fodder to accumulate large volumes to sell during the dry season when demand is high. This should be accompanied by capacity building on fodder storage including introduction of simple technologies such as manual bailers.

Around Isiolo town, many fodder producers who cultivate grass often sell it as standing pasture for grazing. Their customers mainly include livestock traders delivering animals in Isiolo market or en route to other markets some of whom come from Moyale and Samburu. An acre of standing pasture grass costs about KES10,000 and can be grazed by about 50 heads of cattle for about a week. The price may however vary depending on the quality of pasture establishment. The main issues that buyers consider when renting such grazing pasture plots include the quality of establishment of grass (the thicker the better as it can be grazed for long), and accessibility and proximity from Isiolo town.

As a pointer to the high demand for fodder around Isiolo town, some fodder plots hired for grazing are booked up to two months in advance and some traders' rent up to five separate plots that are close together. While doing the booking, the traders usually give a down payment of up to a half the total cost. To pre-empt any possible future disputes, such transactions involve witnesses and written agreements. The terms of such agreements include the number of days the piece of land is going to be used for grazing as some tenants may be tempted to take very long. Disagreements may also arise from the buyer claiming that animals are being lost and so land lords are forced to keep data on the tally of animals sold by the tenant each day.

This study identified numerous factors that undermine the development of the fodder value chain in Isiolo county. The impediments include cultural beliefs among the local community that discourage fodder production. While these may take long to change, a sustained campaign is needed to address the situation. Fodder producers located far from high demand centres are not well linked to fodder markets and there is therefore a need to work on a business model that can effectively address this challenge. Lack of water was cited as an important constraint. Given the huge investments that are required to address this constraint it is perhaps better for AVCD-LC to target promotion of fodder production in areas where water is available. It was noted that, to a great extent, many fodder producers lack knowledge on a myriad of issues including

## 5.5 Best-bet interventions

Table 12 summarizes a selection of best-bet interventions that could be implemented in Isiolo county through AVCD–LC project activities and in collaboration with different partners. The scoring of these interventions is reported in Table 13. Scores were allocated in a range from 1 (low) to 5 (high) for the ‘positive’ attributes. For the ‘negative’ attributes related to risk assessment a negative sign was added to the score. An overall score was then computed as the total sum of these individual scores. We opted to provide equal weight to each attribute. A total of four possible interventions were identified: i. Fine tuning the business model for fodder grass producers through participatory knowledge sharing platforms; ii. Development and implementation of a livestock market information system (LIMS); iii. Development and implementation of a livestock grading system; and iv. Supporting the co-management model and upgrading the LMAs. The development and implementation of livestock grading scheme is ranked first, followed by the support of the co-management model, and then the fine tuning of the business model for fodder grass producers through participatory knowledge sharing platforms.

Factors for prioritizing value chain interventions in AVCD

**Table 12. Mapping the attributes of the interventions in Isiolo county**

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit/ outcome/ impact (productivity, price)	Target actor/ investor (farm, market agent, group, regulator)	Skill, knowledge and management requirement, including agent, group, including collective management.	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
I. Fine tuning the business model for fodder producers through participatory knowledge sharing platforms as was done by ILRI-led Improving Productivity and Market Success of Ethiopian farmers (IPMS) in Ethiopia	Working examples include (i) the Mandera fodder value chain (ii) Ethiopia IPMS fodder activities	Increased income to households	Fodder producers, traders, and buyers	Fodder production as a business; husbandry practices in fodder production and; fodder conservation	Target areas should be near rivers where irrigation is possible; Financial resources are needed for fencing	county ministry of agriculture	High prices around Isiolo; Influx of fodder from other counties during the dry season	Competition with fodder imported from other counties.	Women could benefit financially as they are often strongly involved in production	Between 6 months to 1 year	Private investments by the value chain actors



Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit/impact (productivity, price)	Target actor/investor (farm, market agent, group, regulator)	Skill, knowledge and management requirement, including collective management.	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
2. Designing an information system that allows for entry and exit of sponsors with minimal disruptions	IBLI The financial modelling can borrow from KACE	Reduction in transaction costs in livestock markets hence better prices received by producers and reduced prices paid out by buyers	Livestock producers and traders	Trained data/information collectors and processors	Office space to host a server  Human and financial resources	Mobile phone service operators  Government KLMC  Media stations	People have been paying for similar information in the case of KACE	Sponsors LMAs  KLMC/CLMC	Both men and women	Between 6 months and 1 year	Government Sponsors
3. Development of livestock grading scheme	- Currently absence of grading scheme -Somaliland grading scheme	-Transparent pricing system based on animal quality -Better prices to producers -Better quality animals	-All value chain actors but mainly producers, traders and brokers	-Knowledge in animal grading for ILRI team -Basic skills for recipients	-ILRI team -Workshop organization and field activities -Resource AVCD-LC project funds + county funds	-Ministry of Livestock -Counties' livestock departments	-Demand for high quality animals -Higher prices for better animal quality	-Value chain actors -National and county livestock departments better animal quality	-All genders involved in livestock production and marketing, but mainly men	-1 –2 years  -Information needs for LMIS	-Highly sustainable - Value chain actors - LMAs -KLMC

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit/ outcome/ impact (productivity, price)	Target actor/ investor (farm, market agent, group, regulator)	Skill, knowledge and management requirement, including collective management.	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
4. Supporting the co-management model and upgrading the LMAs	-Currently there is a high number of LMAs in Isiolo which are involved in the co-management model	-Better livestock market infrastructure -Higher animal transactions per market day -Better information collected on livestock prices, marketed numbers, diseases, etc.	-county livestock department -LMAs	-Management skills, good financial practices skills, negotiation skills	-Funds for training the LMAs officials and members on management and best practices skills -Funds to organize public participation meeting and sign the livestock bill	-county government -KLMC/CLMC -LMAs	-LMAs management capacities are very low -Lack of transparency in revenue collection and use	-county government -KLMC/CLMC	-All genders involved in livestock marketing	-6 months	-county government -KLMC/CLMC -LMAs



**Table 13. Scoring the interventions in Isiolo county\***

Name of the value chain intervention**	Strength of evidence demonstrated	Is the benefit of the type and scale to meet project objectives?	Are the potential targets many and do they match project objectives?	Are the targets likely to be able to manage the innovation?	What is level of risk of inadequate resources, including during shocks?	Risk of lack of partner capacity, reliability, etc.	Strength of evidence of demand	What is level of risk due to dependence on others?	Does the distribution of benefit suit the project aims?	Does this time period suit the project aims?	Sustainability score	Total score
1	3	4	3	3	-1	-2	4	-1	4	4	5	26
2	5	4	4	3	-2	-1	4	-3	4	3	3	24
3	4	4	4	4	-1	-1	5	-1	4	5	5	33
4	4	4	5	4	-1	-2	4	-2	5	4	4	29

\*Each column, except the first one, scores the attributes of the matching column above in the previous table (1=low, 5=high). For the questions related to 'risk assessment' a negative score was provided

\*\*The same as the previous table

Source: AVCD LC survey (2016)

## 6. Livestock and fodder value chains in Marsabit

### 6.1 Overview of Marsabit county

Marsabit county occupies the extreme part of northern Kenya bordering Ethiopia to the north, Lake Turkana to the west, Samburu county to the south and Wajir and Isiolo counties to the east. The county covers an area of 70,961 km<sup>2</sup> and is divided into four constituencies namely: Moyale, North Horr, Saku and Laisamis, with 20 electoral wards.

Most parts of the county are arid, except for high potential areas around Mount Marsabit including Kulal, Hurri Hills and the Moyale-Sololo escarpment. Rainfall is low, unpredictable and erratic. Generally, rainfall ranges between 200–1000mm annually with mountainous areas receiving moderate rainfall (about 700mm annually) while areas below 700m above sea level receive as low as 200mm. Extreme temperatures are experienced in the county ranging from 10.1–30.2°C with an average of 20.1°C. Drought is quite recurrent posing a major challenge to the development of the county and worsening of water scarcity, loss of livestock, shortage of food and pasture and loss of bio-diversity.

According to Kenya National Bureau of Statistics (2009) the population in Marsabit county is 291,166 comprising 151,115 male and 140,054 females. There are over 12 communities scattered all over the county in both rural and urban areas. Most land is communally owned and only less than one per cent of land is registered. The mean holding size of adjudicated sections is 0.8 ha. The main features are: the Chalbi Desert, Ol Donyo Ranges in the southwest, Mount Marsabit, Hurri Hills in the northeast, Mount Kulal in the northwest and the mountains around Sololo-Moyale escarpment in the northeast. The county has one indigenous forest known as Mount Marsabit. Some 152.8 km<sup>2</sup>, it is the only gazetted forest in the county; the other two (Mount Kulal and Hurri Hills) are non-gazetted forests. Soils are shallow and poor.

Livestock keeping is the main economic activity with limited crop production. There are no registered group or company ranches, however different communities have their own grazing areas resulting to resource based conflicts especially in drought season where community competes for grazing fields. This also results in environmental degradation mainly due to deforestation and forest encroachment. In addition, the county has high potential for a number of mineral deposits. Some mining and open cast quarrying activities of blue Quamline, mica, chromite and sand harvesting is being done in various parts of the county. Exploration of petroleum is also on-going at Maikona, Laisamis and Kargi.

The county has two towns: Moyale and Marsabit and three urban centres: Sololo, Loiyangalani and Laisamis with the main traded goods being: livestock, fruits, vegetables, maize, beans, wheat, teff and millets. Most of the maize and beans comes from other counties, whereas some fruits and vegetables come from Ethiopia through Moyale. There are also some co-operatives societies in the county which are not very vibrant. Most of these cooperatives are involved in marketing livestock products. There are also about 480 self-help groups, most of them are involved in social economic activities like goat keeping, bee keeping, poultry rearing and small micro enterprises.

The road network in the county is poorly developed with a road network of 2,431 km of which 397 km are gravel and 2,034 km are of earth surface. These roads are prone to erosion and are rendered impassable during the rainy seasons leading to high transportation costs. The poor state of roads has led to limited cross border trade and provision of essential services such as health, education, security and extensions services.

## 6.2 The Marsabit livestock value chain

This analysis focuses on cattle, camel, sheep and goats produced and marketed for meat and which are also the primary focus of the AVCD–LC project. Again, in line with the common practice in value chain studies, the analysis presents information on themes including: (i) core activities in the value chain; (ii) network of partners supplying services and inputs to the main value chain actors; (iii) co-ordination and governance in the chain; (iv) operating environment; and (v) opportunity for upgrading.

### Core activities in the livestock value chain

The core processes in the Marsabit livestock value chain include livestock production; livestock trading; animal slaughter; meat marketing; and ultimately meat consumption. In correspondence, the main actors in the value chain include livestock producers; livestock traders including both small and large-scale traders; abattoir operators; meat wholesalers; meat retailers; and eventually consumers.

### Livestock production

Cattle, camel, sheep and goats are the main animal species reared by livestock producers in Marsabit county. While the predominant system of livestock production is nomadic pastoralism, livestock producers around Marsabit, Sololo and Moyale towns also practice crop farming especially maize. In these crop-livestock systems, crop residues including maize stover and beans straw are commonly utilized as fodder. Around Marsabit town where milk prices tend to be high (KES100–120 per litre) some producers practice dairying with exotic animals. Planted fodder and residues from crop farming activities are commonly utilized as feed for the dairy animals.

### Herd sizes, composition and structure

It is estimated that Marsabit county has a total population of 424,600 heads of cattle, 960,000 sheep, 1,143,500 goats and 203,300 camels (county government of Marsabit 2013). Data collected during this study show that a relatively higher frequency of households are engaged in the rearing of sheep and goats (76% and 92% of households, respectively) compared to cattle and camel (61% and 47% of the households, respectively). Table 14 presents a summary of the size and structure of livestock herds in the surveyed households. The number of livestock kept per household averaged about 27 goats, 27 sheep, 11 heads of cattle and 7 camels. Mature female animals form the largest proportion of the herds (34–41%) while mature males accounted for the lowest share (17–18%). The rest of the herds comprise of young and maturing animals.

**Table 14. Herd sizes and structure among livestock producers in Marsabit proper husbandry, harvesting and storage which call for continued capacity building on these.**

	Cattle	Camel	Sheep	Goats
Total herd	11.35	6.53	27.20	27.23
Female calves/kids	1.19	0.66	3.24	2.93
Male calves/kids	1.46	0.88	3.45	3.42
Young females	1.72	0.73	2.42	3.01
Young males	1.15	0.88	2.64	2.59
Adult females	3.82	2.30	11.15	10.69
Mature males (entire)	1.09	0.64	2.12	2.72
Mature males (castrates)	0.92	0.45	2.54	2.03

With nomadic pastoralism being the dominant system of livestock production, pasture in communal land was the most frequently cited source of animal feed (88–98% of the surveyed households) (Table 15). Nevertheless, use of own produced fodder (crop residues and fodder crops) and purchased fodder were also documented particularly in places where arable farming was prevalent. The use of own produced feeds, purchased fodder and fodder collected from public land was relatively more frequent in cattle rearing (22–50% of households) than in the rearing of shoats (12–27% of households) and camels (only 3–20% of households). The use of commercial feeds was documented in a few households (9–13%) but this was confined to households near Marsabit town and Moyale that practiced dairy farming. Given the importance of animal grazing in communal land as a source of livestock feed, the increasing rangeland degradation due to overgrazing presents a major challenge to livestock activities and people’s livelihoods in Marsabit county.

**Table 15. Source of livestock feeds among producers in Marsabit**

	Camels	Cattle	shoats
Number	35	46	74
Pasture in communal land	94	98	88
Pasture in own land	3	39	24
Crop residues	3	50	27
Own produced fodder	6	35	24
Purchased fodder	11	22	12
Fodder collected from public land	20	39	24
Fodder received as donation	0	7	7
Commercial feeds	11	13	9
Agro-industrial by-products	0	0	0
Others	3	0	3

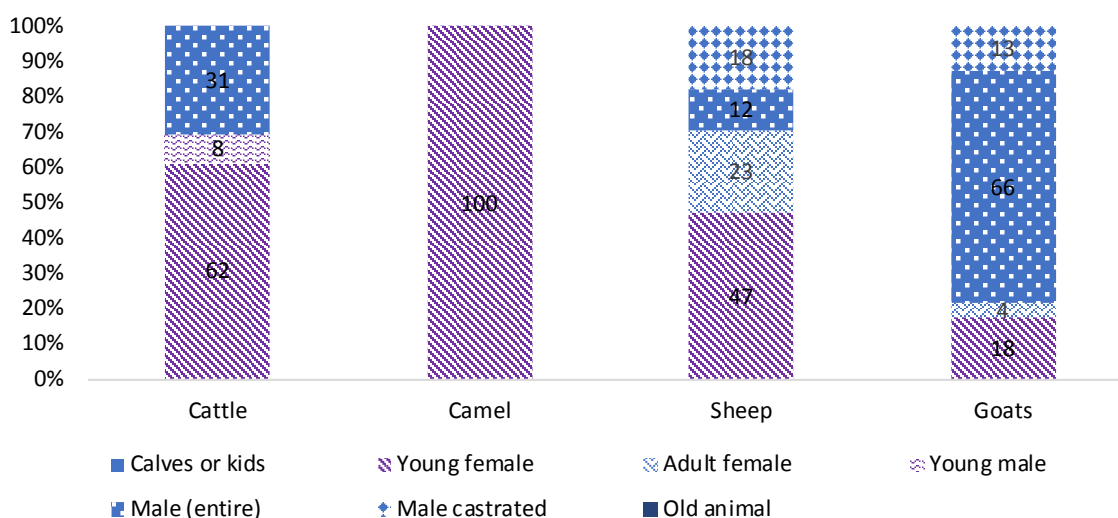
## Herd dynamics

The size of livestock herds held by producers is influenced by the levels of inflows and outflows into and from the herds that take place through time. The main ways in which the stocks of animals held by producers accumulate include birth, purchase, gifts and exchange (Table 16). Over the past 12 months prior to this study, births accounted for largest proportion (74–86% depending on species) of the total inflows. During the period, only a handful of the surveyed producers (about 3–9% depending on animal species) purchased some livestock. Often, young females accounted for the largest proportion of the animals purchased (100% of the camels, 62% of the cattle and 47% of sheep) followed by male entire (66% of goats, 31% of cattle and 12% of sheep) (Figure 8). Reasons why animals were purchased included increase in stock (about 60–100% of cases), breed improvement (up to 30% of cases) and fattening (only up to 10% of cases) (Table 17).

**Table 16. Animal inflows in producer households over the past 12 months in Marsabit**

	Cattle	Camel	Sheep	Goats
Number	46	35	57	69
Total	4.61	3.71	10.21	8.49
Purchases	0.28	0.03	0.30	1.14
Births	3.41	3.4	8.77	6.78
Gifts	0.24	0.2	0.63	0.39
Exchanges	0.11	0.09	0.19	0.04
Others	0.56	0	0.31	0.13

**Figure 8. Percentage of different types of animals among purchased stocks by livestock producers in Marsabit**



**Table 17. Reasons why animals were purchased**

	Cattle	Camel	Sheep	Goats
Number	4	1	6	12
Increase in stock	50	100	83	75
Breed improvement	0	0	17	17
Fattening	25	0	0	17

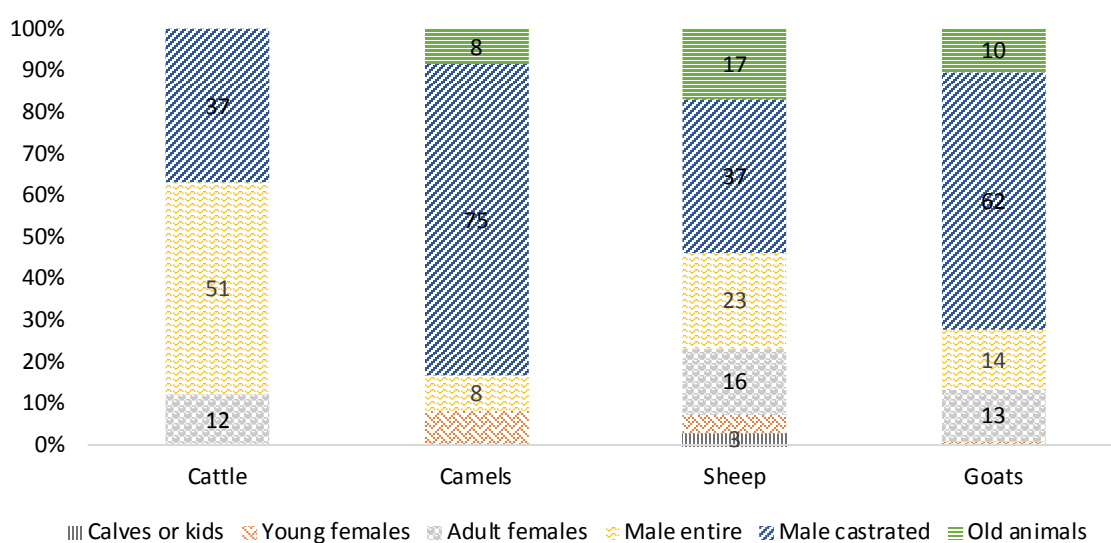
The increase in herd sizes through inflows is balanced by outflows through death, sale, slaughter, exchange and predation among others (Table 18). Levels of outflow in the past 12 months indicated that deaths and sales account for most of the animals that exited from the herds. Surprisingly, a comparison of the two main types of outflows indicated that exits through death surpassed exits through sales. Specifically, loss of animals through death averaged 4.12 sheep, 2.54 goats, 1.41 heads of cattle and 0.46 camels per household. In comparison, the number of animals sold averaged 3.3 goats, 1.86 sheep, 1.24 heads of cattle and just 0.34 camels per household. Note that the apparent low offtake rate for camels remained evident when fractions of livestock keepers that had sold animals were compared across species. Essentially, sale of camels was recorded in only 23% of households with this livestock species compared to 41% for cattle and 38% and 58% for sheep and goats, respectively.

**Table 18. Animal outflows during the last one year in producer households in Marsabit**

	Cattle	Camel	Sheep	Goats
Total outflow	3.72	1.46	8.02	7.52
Sale	1.24	0.34	1.86	3.30
Death	1.41	0.46	4.12	2.54
Exchange	0.02	0.06	0.04	0.01
Slaughter	0.07	0.03	0.75	0.28
Gift	0.24	0.11	0.19	0.12
Lost	0.02	0.06	0.46	0.45
Predator	0.59	0.20	0.37	0.51
Stolen	0.00	0.03	0.16	0.32
Others	0.13	0.17	0.07	0.00

It is also worth noting that the documented average numbers of animals sold during this study represents offtake rates of 12%, 7%, 11% and 5% for goat, sheep, cattle and camel herds/flocks, respectively. These offtake rates compare well with the rates reported by Nyariki et al (2005) for the Kenyan arid lands. In the current study, mature male animals account for the largest percentage of the animals sold (60–about 90%) (Figure 9). In addition, most of the mature male camels, goats and sheep sold (90%, 82% and 62%, respectively) were said to have been castrated suggesting a high prevalence rate of this desirable animal breeding control practice among the communities in the study area. It is also important to note that livestock production among the local communities in Marsabit is generally not commercial oriented, with keeping of many herds being envied as a source of cultural pride. Selling of animals is in many cases only done when there is need for cash.

**Figure 9. Percentage composition of different types of animals in among the stocks sold by livestock producers in Marsabit**



## Use of improved inputs among livestock producers

Use of improved inputs and technologies in agriculture and livestock production has implications on productivity, quality and safety of products produced which ultimately influences the economic performance of the producers. For this reason, this study also sought to take stock of inputs and technology use among animal producers in the study area. The set of important inputs and services in livestock production relate to feeds, animal health and breeding. A recent development in the Kenyan livestock industry has also seen attempts to introduce livestock insurance services to producers in pastoral areas to mitigate the risk of losses usually occasioned by drought.

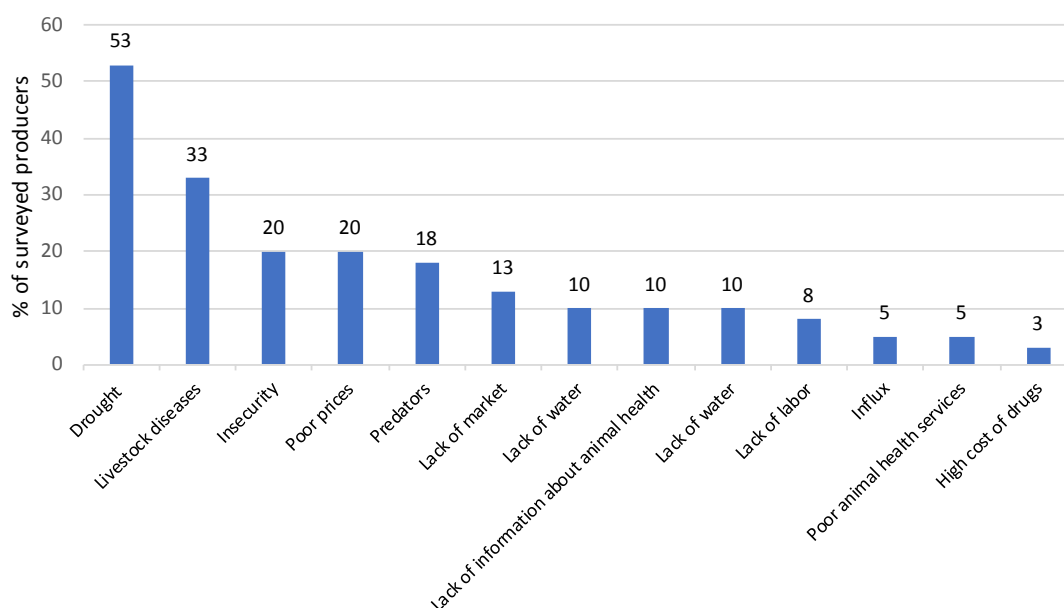
Nearly all the producers interviewed said that deworming, tick control and curative animal health inputs and services were available in their localities and that they used them. Vaccination services were however less frequently used (66% of producers) with nearly 30% of the producers lamenting that the services were unavailable. While most frequently (53% of households) treatment of sick animals was performed by the producer himself or a neighbour with some advice from a qualified professional, in 25% of the cases the owner or a neighbour performed the treatment without any professional advice. An important challenge when people treat their own animals is that there is potential for misuse of drugs by ignorant livestock producers. Particularly in the treatment of camels, it was said that producers frequently administered Amoxicillin which was said to remedy various diseases but which some professionals feared could lead to development of resistance against the drug either in animals or people.

While mineral supplementation was documented in most (70%) households, 30% of the producers did not with some saying that their grazing plans include moving animals to take advantage of naturally occurring minerals in some places in the county for mineral supplementation. Some 41% of the producers had bought and fed hay to their animals during the past one year. Due to frequent incidences of drought 47% of the producers said that they conserved feed for their livestock. Forms in which the feeds were conserved included standing pasture (37% of cases) and bailed and un-bailed hay (37% and 32% of cases, respectively). Adoption of the recently introduced IBLI product was documented in only 8% of households. Most of the cattle keepers (82%) used own bull for breeding which presents a high probability for inbreeding.

## Challenges facing livestock production activities in Marsabit county

The various key informants gave their opinions on challenges facing livestock production in Marsabit. Issues cited included prolonged and recurrent droughts, rangeland degradation, insecurity due to cattle rustling and conflict over pasture with neighbouring communities, livestock diseases and pests, a lack of market and a lack of extension information. The importance of these challenges was confirmed during the formal survey. Challenges that were the most frequently cited during the survey include drought, livestock diseases, insecurity and poor prices (53%, 33%, 20% and 20% of producers, respectively).

**Figure 10. Frequency (%) of producers citing challenges influencing livestock production in Marsabit**



## Livestock marketing channels in Marsabit county

As in other counties in northern Kenya, the livestock marketing system in Marsabit features both the marketing of animals by livestock producers and the buying and selling of animals by livestock traders. During the marketing process, animals move from primary to regional markets and eventually to terminal markets where they are sold for slaughter. Before reaching the terminal markets, an animal may change hands several times. The major livestock markets in Marsabit county include Melile (biggest), Marsabit (second biggest) and Moyale. Melile market operates only on Tuesdays which was cited as a reason why it was more vibrant as the number of animals supplied during the market day tends to be high (over 1,000 shoats, nearly 200 heads of cattle



and over 70 camels) thus attracting many largescale buyers. The feeder markets for livestock supplied in Melile market include Ilaut, Korr, and Itorot. Other animals come from towns including Laisamis, Logologo and Kargi.

Buying and selling of animals in Marsabit market happens daily which makes it less vibrant due to the relatively low number of animals supplied per day (about 50 sheep and goats and a few heads of cattle). This low supply discourages large buyers from distant places from visiting due to a high chance that they may not find sufficient quantities of animals. There are however numerous buyers from the local community who purchase and accumulate animals which they latter deliver for sale in Nairobi. The animals supplied in Marsabit market originate from several feeder markets including North Horr, Kalacha, Forolle, Maikona, Shur, Dukana, Turbi, Badesa and Hadhi. Buyers of animals in both Merille and Marsabit include traders who supply Isiolo market and/or terminal markets including Nairobi, Meru, Nyeri, Karatina and Nanyuki.

The new livestock market in Moyale town constructed by Regal AG with support from USAID was just about to commence operation at the time of this study. Some of the key informants interviewed however observed that a significant amount of livestock trading in Moyale market has moved across to the Ethiopian the side of the border. This shifting was largely attributed to insecurity due to ethnic conflict between the communities (Garbra and Borana) inhabiting the area in Kenya. Nevertheless, a lot of livestock trading still takes place on the Kenyan side of the border fuelled by external traders from major towns in Kenya and buyers from Ethiopia who frequent the town. It was estimated that about three lorries of cattle (60 animals), two of lorries camels (30 animals) and over 150 shoats left Moyale for Nairobi daily and that an average of 500 animals are supplied to the Moyale market daily. In addition, Moyale was cited as an important exit point for camels exported from Kenya to Ethiopia where the animals are again exported to the Middle East.

The thriving cross border livestock trade between Kenya and Ethiopia is not restricted to Moyale and was also documented in Dukana and Forore where buyers from Ethiopia who frequented these areas were purchasing sheep on weight basis (KES100/kg live weight). Young animals weighing 16-30kg on live weight basis were preferred by these Ethiopian buyers leaving the more mature animals which are directed to buyers servicing the Kenyan meat market. Other traders from Ethiopia purchase young bulls (up to 3 years old weighing 260–280 kg) which they sell to feedlots in their country. Some of the animals exported to Ethiopia are re-exported alive to the Middle East while others are slaughtered, and the meat is exported. Owing to this cross-border trade with Ethiopia, the demand for small ruminants in Marsabit tends to be high on the time around the Haji season due to the high demand in Saudi Arabia where some of these animals are ultimately exported. Besides animal exports from Kenya to Ethiopia the cross-border livestock trade between the two countries also feature traders who import female cattle from Ethiopia to Kenya some of which eventually ends up in Nairobi and other terminal markets in the country.

## Livestock and meat marketing

### *Livestock marketing by livestock producers*

Livestock producers have several outlets where they sell animals including farm gate, bush/village/feeder markets, and the often far away regional markets such as Melile, Marsabit and Moyale. Prices in regional markets generally tend to be higher than in bush markets. For example, at the time of this study prices for typical mature slaughter animals in bush markets were reported



as about KES6,000 per goat, KES2,700 per sheep, KES28,000 per head of cattle and KES45,000 per camel. In comparison in Merille market the prices were said to be about KES8,000 per goat, KES3,500 per sheep, KES47,000 per head of cattle and KES80,000 per camel. It should however be noted that marketing costs for many producers may be higher for animals delivered for sale in the often-distant regional markets than in the bush markets due to the high cost of transportation prevalent in arid areas in Kenya.

The type of market outlet used by livestock producers often differed with the species of animals sold. Village markets were the most frequently cited point of sale for sheep and goats (43% and 40% of the surveyed producers, respectively) (Table 19). In contrast for cattle and camels, regional markets were the most frequently cited point of sale (74% and 63 of the surveyed producers, respectively). Only 26% and 11% of producers who had sold cattle did so at farm gate and village market, respectively. By the same token, just 13% and 25% of the producers who had sold camels used the 2 types of markets, respectively.

**Table 19. Percentage of livestock producers citing market outlets for animals sold during the last one year**

	Cattle	Camel	Sheep	Goats
Number	19	8	23	40
Farm gate	26	13	30	25
Village market	11	25	43	40
Regional market	74	63	13	23
Terminal market	0	0	4	8
Others	0	0	9	10

#### *Livestock marketing by livestock traders*

This study identified different types of traders depending on point where animals are purchased and where they are sold. The trader types include: (i) small-scale livestock traders who buy animals from producers either in the manyattas or small livestock markets and sell in large markets such as Melile, Marsabit and Moyale; (ii) traders who procure animals in markets in Marsabit county and sell in markets in the neighbouring counties such as Isiolo; (iii) traders in major markets who buy animals during non-market days and then sell them in the same market during the market day; (iv) traders who procure animals in markets in the county and sells in Nairobi and (v) buyers from neighbouring Ethiopia.

#### *Livestock trading in primary markets*

Typically, traders who operate between bush and regional markets buy and accumulate animals which they deliver for sale once a week in the regional markets. To minimize inventory costs, the numbers of animals purchased are adjusted depending on the prevailing level of demand in the sale market. Sellers from whom the animals are procured in the bush markets are often livestock producers. The transactions between buyers and sellers in the primary markets tend to be ad-hoc one-time relationships. The buyers usually pay cash for animals and the transaction may or may not feature a broker in some markets. Where a broker is involved the official charge is KES20–100 per sheep or goat and KES200-400 per head of cattle. At times the trader can pay brokerage changes both during procurement and again when selling.

### *Livestock trading in regional markets and beyond*

Livestock sellers in regional markets mainly include traders who procure animals from small markets in the bush and villages, traders in the regional markets who buy animals during non-market days which they accumulate and sell during the market day, and some livestock producers. Buyers mainly include traders who sell animals in market in the neighbouring counties and/or in Nairobi, livestock exporters in the case of Moyale and local butchers and hotel operators. Transactions between buyers and sellers are often mediated by brokers which is attributable to a number of reasons. In some cases, local sellers do not understand Kiswahili—the language commonly spoken by visiting traders—thus necessitating the services of a broker to enable the two parties to communicate and transact. Brokers also help in conflict resolution especially in cases of disputed animal ownership. In addition, some brokers keep regular contact with large buyers with both parties continuously appraising each other about the prevailing conditions in livestock markets in the production areas and the terminal markets in Nairobi. Through this information exchange a trader can minimize the risk of going for animals when market conditions are unfavourable. On his part the broker can keep a royal bunch of clients who are willing to pay some fees for his services. It was observed that in some cases, failure to go through a broker may lead to a buyer paying a higher price for an animal. On the other hand, some producers complained that buyers and brokers often collude to fix prices in livestock markets.

Traders who purchase animals in regional markets in Marsabit for sale in markets outside the county including Nairobi incur a myriad of expenses. Table 20 for the case of animals transported from Melile to Nairobi. During purchase the traders pay a brokerage fee of KES200 per head of cattle and KES30 per sheep or goat. Movement permits cost about KES2,000 per head of cattle. A county government cess of KES8,000 and KES5,000 is also levied per a lorry load of cattle and small ruminants, respectively. One lorry carries about 150 sheep/goats and or 18–22 heads of cattle depending on the size of the animals. For security reasons every lorry transporting animals is required to engage police escort between Melille and Isiolo which costs KES4,000. Some further KES8,000 in the case of cattle and KES5,000 in the case of small ruminants are spent on the services of caretakers who ride with the animals during transportation. Payment at police road blocks average about KES3,000 per trip. In livestock markets in Nairobi, the traders pay KES3,000 per lorry of animals to brokers who do the selling on their behalf. In addition, a levy of KES500 per a lorry load of small ruminants and KES200 per a head of cattle is charged for using the market. Using this information together with purchase and sales prices experienced during the last completed transaction, the rate of return among the livestock traders involved was estimated to be between 16% and 18% of their variable expenses.

The traders who deliver sheep and goats to Nairobi often purchase and mix together animals of different size and price which they sell wholesale to retail traders who offer an average price per animal in a batch. This mixing together of animals of different size and price was attributed to the fact that these requirements vary among buyers in the terminal markets. The wholesale selling of animals facilitates the trader get rid of the flock of animals delivered to the market much faster than selling individual animals. In turn, the prompt sale of animals helps minimize both the inventory holding costs and the risks associated with holding stocks of animals over an extended period.

**Table 20. Gross margins (KES/animal) for traders procuring animals in regional markets for sale in terminal markets**

	Cattle	Sheep	Goats
Purchase price	36,364	3,160	4,800
Brokerage fee	200	30	30
Animal movement permit	100	20	20
county cess	364	50	50
Transport cost	1,136	167	167
Police escort	182	27	27
Other costs during procurement	22	31	31
Police road blocks	136	20	20
Care taker person during transport	364	33	33
Brokerage fee	200	20	20
Government charges in during sale	200	3	3
Other costs during sale	25	43	6
Total costs	39,292	3,604	5,207
Price received	46,000	4,100	6,000
Gross margin	6,708	496	593
Rate of return	0.18	0.16	0.17

A major challenge to livestock marketing in Marsabit county is inadequate and poor livestock market facilities which forces producers and traders to travel for long distances to sell or buy animals. This not only makes the process of livestock marketing expensive, but also leads to loss of animal condition and hence value during transportation. Even where market facilities exist, they are not well run or organized such as is the case for Kalacha, Songa, Karare, Forolle and Marsabit livestock markets which have no market days. Melile market (best running) is however an exception and provides an example of what can be done to ensure more vibrancy in livestock markets in Marsabit county. In Melile the running of the livestock market is delegated to a LMA comprising elected representatives for various stakeholders involved in livestock production and marketing among the local pastoral communities that use the market. The tasks of the LMA include revenue collection, protection and maintenance of the infrastructure in the livestock market, ensuring security for buyers and sellers and conflict resolution. Under a signed revenue sharing agreement with the county government the money collected is divided between the LMA (40%) and county government (60%). The share that goes to the LMA is used in the running and maintenance of the livestock market.

Other challenges to livestock marketing in Marsabit include low supply of animals in livestock markets, poor quality of animals especially during drought, brokers who sometimes exploit livestock sellers and buyers, lack of market information among sellers and buyers, lack of feed and water supply in livestock markets which leads to loss of animal body condition hence value, insecurity with buyers and sellers occasionally losing animals or money to rustlers and thieves, transboundary diseases which occasion livestock movement burns. Note that some of these constraints can be addressed at least to a certain degree if the running of the livestock markets was improved as is the case of Melile. For instance, supply of animals may increase in well running markets. Likewise, supply of water and other services may improve if became more vibrant.

### *Animal slaughter and meat marketing in Marsabit county*

Settlement centres and towns in Marsabit county also act as outlets for meat animals produced and/or marketed in the county. Among the local communities, women are strongly involved in the meat retail business representing 40% of the 10 meat sellers interviewed during this study. Most of the meat sellers quizzed traded in either mutton (60%) and/or goat meat (100%) while only 1 dealt in beef and none for camel meat. The high frequency of butchers who sell mutton and /or goat meat perhaps reflect a higher preference of these two types of meat compared to beef and camel meat among the local communities. In addition, meat goats and sheep may be more readily available as the two species comprise a big part of livestock herds in the county and are also more prolific than cattle and camel. The local meat sellers in the county usually purchase animals (as opposed to animal carcasses) which they slaughter in their butcheries (six of the butchers interviewed) or in nearby slaughter slabs (four butchers) and then sell as meat.

The number of animals slaughtered vary across locations from several sheep and/or goats per day in a single butchery in relatively bigger towns like Moyale and Marsabit to butchers who slaughter animals and sell meat only once in a week in settlements in remote areas. Surprisingly, while goats often cost more than sheep (on average KES6,000 compared to KES4,500 per mature male but the two types of meat retailed at the same price (about KES390 per kg). As is common in buying and selling of livestock in the study region, purchasing of slaughter stocks by butchers also often (about 80% of cases) featured a broker. The fees paid to brokers ranged from KES30 to 200 for a sheep or a goat and KES500 per head of cattle.

Based on types of animals slaughtered, the meat offered for sale in many outlets can be categorized as being of relatively low quality. Specifically, in about 60% of cases of animals recently purchased for slaughter, the stocks included old or uncastrated mature males and/or mature females which usually yields tough meat especially during the dry season when pasture is scarce and animal bodies are therefore not in top condition.

### *Animal slaughter and meat marketing in other Counties where livestock from Marsabit are marketed*

While the largest share of the red meat market in Kenya is for low quality meat, information collected in some towns where livestock from northern Kenya are marketed showed that some butcheries are emerging that are striving to leverage on sale of quality meat to be financially more competitive. In Nanyuki for instance, a number of meat eatery joints were identified where operators only targeted for slaughter young well-nourished cattle including both steers and cull cows. The operators explained that cooked or roasted meat from such animals tends to be tender and good tasting which are attributes that are highly favoured by customers. To meet their customers' needs, the meat eatery joints' operators mainly procure slaughter animals from ranches in Laikipia. Due to better husbandry practices in ranches, the quality of meat from the ranch animals was said to be better than slaughter stocks procured directly from pastoralists. Purchase of slaughter animals from pastoral systems only happens when animals are in top condition.

For cattle purchased from ranches by the operators of the quality conscious meat joints, prices paid are based on live weight. At the time of this study the price for cattle had just risen to KES170 from KES140 per kg of live weight a few weeks before. At the previous price of KES140 per kg of live weight, a 350kg animal would cost KES49,000. Interestingly, this is equivalent to the highest price received for a mature uncastrated bull among the surveyed pastoral producers who had sold animals during the past one year. The lowest price received by the pastoralist for a mature bull was KES15,000 while the average was about KES23,000. For pastoral producers

and traders who can be able to service this emerging quality conscious segment of the livestock market there would be a significant improvement in income received.

Meat retail shops were also identified that are striving to leverage on sale of high quality meat to be competitive numerous other towns including Nyeri, Kenol and Thika. In the three towns however, the interviewed operators procured their meat supplies in the form of carcasses delivered to their shops by meat wholesalers. In the case of goats, young animals weighing about 13 kg carcass weight are preferred. Surprisingly, the butchers expressed no desire to procure animals from production areas citing risks including insecurity, high prices due to involvement of brokers, government red tape among others.

As noted by the operators of the quality conscious butcherries, a major limitation for pastoralists is the poor quality of the animals they sell. Nevertheless, while trying to enhance the level of prices from livestock sales among pastoralists it is useful explore ways which could enable their access to this market segment. Essentially, it may be easier for animal sellers from pastoral areas to satisfy the quality requirements of this market segment compared to selling to the very high-end butcherries and meat exporting firms. Perhaps a good strategy would be for the pastoral producers and traders to target to sell selected young animals when they are in top condition to this emerging market segment. The most appropriate time would probably be after the rains when feed is readily available and the body condition of animals is excellent. Selling such a strategy to pastoralists may however be difficult. A good approach might be to first pilot the strategy with a limited group of pastoralists.

## Operating environment

The performance of a value chain is influenced by the environment within which the chain is immersed. The operating environment where value chains operate includes prevailing policy, legal and regulatory frameworks that guide business investments and operations. It also includes social cultural, political, economic and physical setup including climatic conditions, business support infrastructure such as roads, energy, water, communication and market facilities among others. A series of recent studies on livestock value chains in northern Kenya commissioned by Regal IR presents an analysis of the policy and legal frameworks within which livestock production and marketing in the ASAL areas in Kenya take place (Naitos Golden Inspiration 2015a, b, c).’

## Policy, legal and regulatory environment

Under the new constitution enacted in 2010, the responsibility of development of agriculture/ livestock policies largely falls on the national government while county governments are supposed to domesticate and implement the policies. Important policies on the livestock sector include ‘Vision 2030’ which spells out agriculture as one of the priority sectors in efforts to transform Kenya in to a middle income country; the ‘Agriculture sector development strategy’ which views agricultural as the backbone of Kenya’s economy—and the means of livelihood for most of the rural population hence key to attainment of food security and poverty reduction; the ‘Session Paper No 2 of 2008 on National Livestock Policy November 2008’ which seeks to achieve appropriate livestock management systems for sustainable development of the livestock industry; the ‘Sessional Paper No. 8 of 2012 on National Policy for the Sustainable Development of northern Kenya and other Arid Lands’ whose policy goal is to facilitate and fast-track sustainable development in northern Kenya and other arid lands by increasing investment in the region and by ensuring that the use of the region’s resources is fully reconciled with the realities of people’s

lives; and the 'Marsabit County Integrated Development Plan: 2013–2017' which provides comprehensive guidelines in budgeting, project funding, monitoring and evaluation of all the projects for the next five years.

The set of legal provisions guiding activities in the livestock sector include: the 'Veterinary Surgeons and Veterinary Para-professionals Act of 2011' which provides for the training, registration and licensing of veterinary surgeons and veterinary para-professionals; it also provides a legal framework for matters relating to animal health services and welfare; The 'Animal Diseases Act, CAP 364 of 1972' which provides for the control of animal diseases and parasites and for measures to promote animal health; the 'Meat Control Act, CAP 356 of 1972' provides for control over meat and meat products intended for human consumption, and over slaughterhouses and places where such meat is processed and also import and export of meat and meat products; the 'Kenya Meat Commission Act CAP 363' that provides for the establishment of KMC; 'National Land Commission Act of 2012' that provides for the functions and powers of the National Land Commission. Other legal provisions include the 'Hide, Skin and Leather Trade Act CAP 359' that provides for the co-ordination and control of the trade and development of the hide, skin and leather industry; the 'Plant Protection Act'.

A number of policy and regulatory gaps are identifiable in the case of the livestock sector in Marsabit and Kenya in general. First, as observed by (Naitos Golden Inspiration 2015a, b, c) the meat and meat animals' trade in Kenya is supposed to be regulated by the Kenya Meat Commission, which is also an actor in the value chain and may therefore present conflicts of interest. There is therefore need for the Government to come up with an independent entity to regulate and promote the meat industry akin to KDB in the dairy sector. Second, while the county governments are responsible for issues on livestock husbandry and marketing in their jurisdictions, some work remains to be done on domestication of the national livestock policies and regulations in Marsabit county. While drafting of a county livestock policy was underway with the support of AHADI at the time of this study, the process of putting in place a county livestock sale yard act which is supposed to govern how livestock marketing is done had not yet commenced.

Third, it was also observed that the level of budgetary allocation to the livestock sector by the county government (about 0.2%) is drastically inconsistent with aspirations at national government level which under the Comprehensive African Agriculture Development Programme is committed to allocating at least 10% of the budget to the agriculture sector. This low budgetary allocation undermines provisions of services including animal health and extension which in turn undermines the performance of the livestock sector. Fourth, under the current structure where county veterinary directors' report to chief officers, it was apparent that the veterinary directors' clout in the control of notifiable diseases such as FMD may have suffered. During outbreaks the veterinary officials find it difficult to institute control measures such as animal movement bans due to the huge social economic impacts this has on the local communities occasioning resistance from political leaders. There is therefore need for reforms to ensure local political interference does not compromise efforts in the control of notifiable diseases. This may take the form of having a representative of the national director of veterinary services in the counties for policing purposes.

## Physical and social cultural environment

The physical and social cultural environment within which the livestock sector in Marsabit operates are also challenging. A large part of the county is arid and droughts occur regularly. Like the rest of northern Kenya, Marsabit has one of the lowest rates of literacy in Kenya (about 20% according to ADESO 2014) which undermines efforts to initiate positive change



in the local communities. Livestock production among the local communities is generally not commercial oriented and ownership of large livestock herds is viewed as a source of cultural pride. Unfortunately, not only does the huge livestock herds cause environmental degradation thus undermining sustainability of the production system but also the pastoralists incur huge losses during drought as huge numbers of their animals die. Insecurity is also rampant due to a tradition of livestock rustling and conflicts over pasture among rival communities. Although the new tarmac road from Moyale to Nairobi has significantly eased the problem of transportation in and out of the county, the situation is still far from perfect due to the poor state of roads in the county.

## Support services

The core actors in a value chain rely on an ally of indirect partners who provide them with the inputs/ services they require to perform their functions or who perform some regulatory functions in the value chain. There are various indirect partners who provides support to the core actors in the Marsabit livestock value chain. The most important support services required by the core actors in the value chain include animal health inputs and services, research and extension services, market information and transport. This section looks at provision of key support services and inputs by the indirect partners in the value chain.

## Animal health

Like everywhere else in Kenya, delivery of livestock health inputs and services in Marsabit is a joint responsibility of both the public and private sector. Under the devolved system of government, the responsibilities of the county veterinary department include surveillance and control of notifiable livestock diseases; meat inspection; regulation of livestock movement through issuance of movement permits; and monitoring and regulation of the private animal health sector. Again, just like in other counties in northern and northeastern Kenya, the public animal health sector in Marsabit, either on its own or in conjunction with donor organizations, is often involved in delivery of animal health inputs and/or services to livestock producers. Beneficiaries in many of these cases are not charged for the inputs and services which are usually treated as a form of aid.

Numerous challenges undermine the capacity of the Marsabit county veterinary department to perform its functions chief among them being inadequate staffing and lack of facilitation. At the time of this study, the department had a total of only 26 technical staff including five veterinary officers (four stationed in the sub-counties and one attached to a project), the veterinary director stationed at the county headquarters and 20 para-veterinarians) and was estimated to need six more animal health assistants. Due to lack of financial and other resources the department had been unable to mount a vaccination campaign in response to an outbreak of the lumpy skin disease that was ongoing. In addition, availability of transport to deliver staff to work in the field was often said to be a problem owing to pooling of vehicles at the county administration offices.

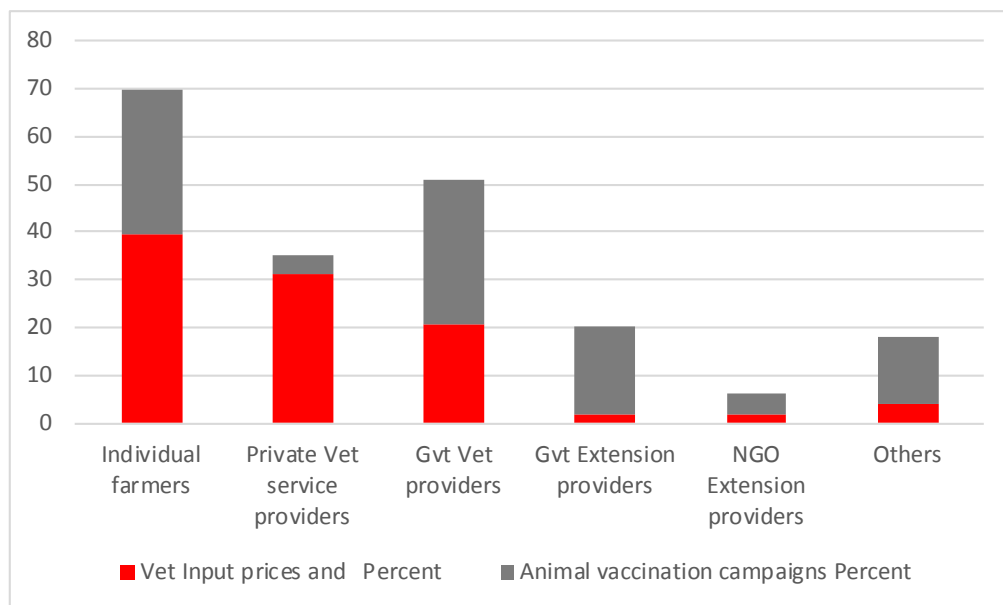
Information from the veterinary department showed that the most common livestock diseases in the county include FMD, CBPP, congolensis dermatopholsis and lumpy skin disease for cattle; CCPP, neurosis, enterotoxaemia, goat and sheep pox and PPR for small ruminants; and thrips, haemorrhagic septaemia, camel pox, worms, external parasites, ercia (sudden death), orf, ring worms and mange for camels. It was however noted that vaccines for most of these diseases have been developed and can be used to mitigate the huge economic losses often occasioned by outbreaks. A good example of the potential impact of use of vaccines is in the prevention of CCPP where the cost of vaccinating an animal is about KES10 only. Vaccination should be performed

twice a year bringing the total cost to KES20 per animal. In comparison treatment for the disease costs about KES600 for five animals excluding the cost associated with loss in condition among animals and the risk that a sick animal may die.

A discussion with Marsabit county veterinary department officials revealed that transboundary diseases have increased in the recent past almost becoming annual cases mainly due to failure to impose quarantine when there is an outbreak. One highlighted reason for not imposing quarantine is livestock market closure resulting to lost revenue which is collected in form of various market and sale levies.

Veterinary services offered by the county government are limited and insufficient. Producers mainly rely on indigenous knowledge to treat their animals. Survey results (Figure 11) reveal that; households get advice/information on veterinary input prices and vaccination campaigns from individual farmers (39.58% input prices and 30% vaccination campaigns), 31.25% for private vet service providers who disseminate information on vet input prices. Government vet providers and government extension providers also help disseminate information on vet input prices as well as animal vaccination campaigns.

**Figure 11. Animal health information sources**



Source:AVCD LC Survey (2016)

The private veterinary inputs and services sector comprises of private practitioners and agro-veterinarian shop operators. Sidai—the leading agro-veterinarian input and service provider—has a franchise of 10 shops scattered in different locations (Shur, Turbi, Maikona, Korr, Laisamis, Sololo, Kalacha, North Horr, Mount Kulal and Logologo) across the county to build resilience of pastoralists against livestock diseases. Various agro-veterinarians together with Sidai fill the service gap of limited extension services. Some of the services they offer include; technical services to livestock producers, vaccination of animals, offer clinical services, conduct outreach programs to market the drugs, sell drugs over the counter and, training of organized groups and community disease reporters. Sidai has also partnered with the county government in procurement of livestock drugs that they use mainly for vaccination

It was, however, observed that the private veterinary inputs and services sector in Marsabit is weak and this is attributable to factors including poor roads and communication infrastructure,



harsh climatic conditions, vastness of the area and insecurity. Other challenges faced by the private veterinary inputs and services providers in the county include seasonal migration of livestock keepers in search of pastures, competition with inputs and services offered as aid by development organizations, competition with ordinary shopkeepers who illegally stock and sell veterinary drugs, prevalence of illegal animal health products especially acaricides, low uptake of vaccines by livestock producers, high rates of default on credit offered to livestock keepers by input sellers especially during drought, long delays in procurement due to long distances and poor roads, and lack of financial capital among others.

The current state of animal health services in Marsabit county calls for a number of interventions to ameliorate the situation. These include adoption of policies that could enhance the capacity of the county veterinary department to discharge its mandate. These policies may target issues such as improved funding and staffing which are actionable by the county government. The development of the county livestock policy that AHADI is supporting provide a good starting point in promoting adoption of such policies by the county government. Other activities that development agents could undertake include awareness creation among livestock keepers about effects of drug misuse in order to combat the malpractice; support search and/or promotion of appropriate treatment methods for some camel diseases where these are lacking thus forcing producers to result to administration of improvised treatment; promotion of vaccination in disease prevention together with the appropriate ways of doing it such as vaccinating animals when they are in good condition to avoid negative effects like abortion and loss of animal condition; and supporting emergence of more private animal health input and service providers.

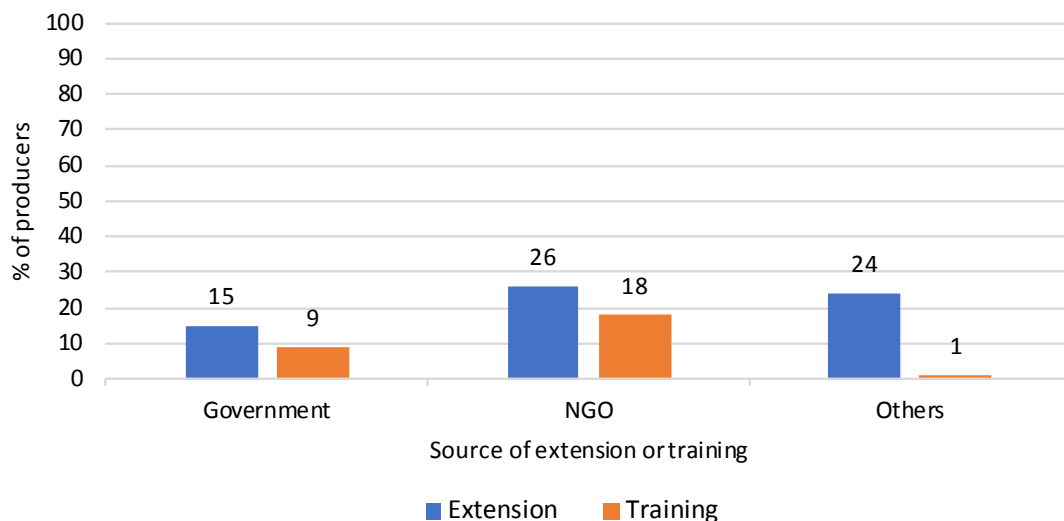
## Extension services

Like in other ASAL areas, providers of extension services in Marsabit mainly include the state and county departments of livestock and various NGOs that are active in the region. The capacity of the two governments departments to deliver extension services is however weak with staffing being the most limiting factor. The entire Marsabit county department of livestock for example has a total of only 15 technical staff (five in Moyale, four in Saku, four in North Horr and two in Laisamis) most of whom are stationed at sub-county headquarters as a strategy for coping with the problem of inadequate number of technical personnel. Other major challenges undermining the ability of the governments departments' livestock to deliver extension services include lack of facilitation to organize extension functions due to a lack of financial resources and skill gaps of the technical staff. To ameliorate the situation, staff at the livestock departments often liaise with NGOs to deliver extension messages and interventions to livestock producers in the grassroots when opportunities for such cooperation become available.

To determine the effectiveness of extension in Marsabit county in reaching livestock producers, respondents during this study were asked whether they had received any extension advice or training during the last one year and if yes, who the provider was. Figure 12 presents the frequencies of the livestock producers who had received some extension advice and/or training during the period. The proportions of the livestock producers reached were rather low (9–26%). NGOs were the most frequently cited source of extension advice and training (26% and 18% of the producers, respectively) compared to government (15% and 18%, respectively). Other sources of extension advice including 'other livestock producers' and veterinary input and service providers accounted a sizable proportion of the producers who had received some extension advice (24%) compared to only a few of the producers who had received some training (1%). Essentially, these

results demonstrate the wide gap that must be addressed in the delivery of advisory services to transform livestock production activities in Marsabit county.

**Figure 12. Percentage of livestock producers who had received extension advise and/training from various sources in Marsabit**



## Market information

A key prerequisite in promoting commercialization of the livestock sector is the development of properly functioning markets that are transparent and competitive. The theory of competition assumes perfect information among both buyers and sellers. Findings during this study however suggest that this assumption is largely untrue in the case of the livestock sector in Marsabit. In the county, about half (50%) of the livestock producers surveyed during this study said that they were often uninformed about prevailing prices and the desired quality of animals by buyers in markets where they sell their livestock. Moreover, majority (80%) of those who claimed to be informed about the market conditions, cited other livestock producers who had recently visited the market(s) as their source of information (Table 21). An important challenge when producers rely on ‘other livestock producers’ as a source of market information is that messages passed across may be inaccurate or outdated.

**Table 21. Access to information on prevailing livestock prices in markets**

Source of information	Frequency	Per cent	Cumulative
Individual farmers	40	80	80
Farmer groups	1	2	82
Mass media	2	4	86
Other sources	7	14	100

Source: AVCD LC Survey (2016)

The tendency for pastoral livestock producers to be less informed about prevailing market conditions has also been reported by the LINKS project (MacOpiyo 2008 et al.) and Mukhebi (1999) and serves to increase transaction costs during livestock marketing. For example, during visits in livestock markets during the current study, cases were documented where attempts by pastoralists to sell animals were unsuccessful because the prevailing prices when they took the animals to the market were too low compared to the levels that they were anticipating based on the information they initially had. Rather than accept a low price some of the sellers opted to go back home with their animals which they then tried to sell at a later date at the same or a different

market. When such a decision is made the seller incurs added costs of transporting the unsold livestock back home, transporting them again to the market and maintenance during the time the animals are in his custody.

To improve the efficiency of livestock marketing activities in Marsabit and other pastoral areas there is need for a reliable livestock market information system. It is however important to note that there have been initiatives to set up livestock market information systems in pastoral areas in Kenya in the past. An example of these initiatives is the National Market Information System developed and operated by LINKS in conjunction with the Ministry of Livestock and KLMC and which is now dysfunctional. The problem with such project funded initiatives is that sustainability tends to be a challenge when the sponsoring project ends. A potential way of addressing this drawback is designing an information system that allows for entry and exit of sponsors with minimal disruptions and which should be hosted at a government ministry or an organization such as KLMC. Such a system could work closely with the LMAs in charge of managing livestock markets which could be used to collect the required market information for dissemination. However, as a stop gap measure before the setting up of the market information system, LMAs could be used to gather market information and disseminate it through billboards erected in livestock markets. The LINKS project used to display market information in Garissa and other livestock markets.

## Gaps for commercial production

Majority of livestock producers are subsistence oriented and with low market offtake. Households mainly sell animals based on the amount of money required to meet emergency needs like; food, school fees, medical expenses or when a baby is born. The low commercial orientation and low offtake even in times of drought is mainly attributed to: need-based selling behaviour of the pastoralists, low animal prices especially during draught, low level of education and lack of awareness of the business opportunity that exist while prices are good such that a producer can sell the animals when prices are good and restock after draught, producers are not willing to sell their good breeds since they are not sure of getting the same good breeds when they want to restock.

Distance to the market also influences market participation by pastoralists where pastoralist living very far from the livestock markets participate less in livestock market. In most cases people, animals (shoats) and animal products (milk) are transported together.

Source:AVCD LC Survey (2016)

The lack of a market and market day in Moyale has left producers and traders to trade all over the Moyale market with reduced volume of animals traded daily. AVCD–LC project could however collaborate with KLMC, the county government and other development partners to strengthen efforts of relocating the livestock market back to Kenya and support formation of new LMA for Moyale livestock market and adoption of co-management model.

Awareness creation among livestock producers by AVCD–LC project to encourage market offtake especially of the male animals leaving only a few in the stock is a critical intervention. Also, on market participation when prices are high and then bank the proceeds which can later be used to meet other family needs. Financial education and sensitization for pastoralists can increase market offtake and commercial orientation. The project could also link producers to the high-end markets from where they can fetch higher prices. This is expected to increase market offtake and reduce conflict which mainly arise as pastoralist fight and compete for scarce resources.

AVCD could support sale of young animals which can be piloted with a few livestock producers and livestock producer groups especially around fodder producing pockets and then link them to buyers. Support of exposure visits and training workshops is recommended.

### 6.3 Peri-urban enterprises

Financial services are not sufficient in the county. Actors in need of loan facilities are limited by lack of collateral, yet the sharia compliant loans are not available. For example, fodder traders and fodder producers expressed the desire to own a tractor since they are dependent on one government tractor which is not reliable. The survey established that Equity bank has recently been giving loans to different actors using feed the Hungry as guarantor. Although Safaricom and other mobile service providers have made efforts to enhance access to mobile network by subscribers, this is still a big challenge in Marsabit county. Access to mobile phone network is also another big challenge which has also impacted negatively on delivery of financial services. For example, most M-Pesa entrepreneurs are unable to operate due to network accessibility challenges since their clients are unable to access money in their mobile phones. If Safaricom and other network providers can enhance mobile network and agency banking services by installing more network boosters, this then can promote banking and money transfer services which is essential in livestock marketing. This would also mitigate the challenge of insecurity where traders risk carrying high/big amounts of money to the markets. With increasing number of people owning mobile phones in the county, this is an opportunity which AVCD–LC can seize and target to use for disseminating information (Extension messages, prices, disease outbreak etc.) It can also be used to promote use of agency banking and M-Pesa services.

Notable is entrepreneurs in Moyale (Galmate Self Help Group) who are running a livestock lodge. This is a place where the animals stay/sleep over night. This group charges KES20 and 10 for cattle and shoats respectively. The holding capacity of this facility is 300 cattle and 220 shoats and in a day the facility serves about six clients who come from as far as Wajir and Ethiopia. This group is also selling water and fodder for the livestock. AVCD–LC project can support more such entrepreneurs and link fodder producers to such off-farm business opportunity to create market for their fodder. Such a facility which is highly needed by both livestock producers and traders to keep animals overnight as they await sale or transportation to terminal markets can be used as an avenue to deliver some services.

### 6.4 Fodder and seeds

Fodder is an important component in livestock value chain in Marsabit county following feed shortage and challenges facing livestock producers. Actors in the fodder value chain in Marsabit are; fodder seed sellers, fodder producers, traders, livestock producers, brokers, transporters and bailers. Most of the seed sellers double as fodder producers and seed producers who produce fodder but wait for seed production and harvesting before they can harvest their fodder. On the other hand, fodder producers either produce as individuals fodder producers or in groups. Group fodder producers are majority in Marsabit county (mainly to access donor funding either from development partners or from the county government).

Fodder traders are either large scale trader or small-scale fodder traders. There are two large-scale fodder traders, one in Marsabit township and the other one in Sololo. They are viewed as the most powerful actors since they control fodder prices. The small-scale fodder traders mostly double as fodder producers and fodder traders. Most of them are found in Sololo, Kalacha and Marsabit town-ship. NGOs and development partners are supporting fodder production in the county for example in Kalacha, some fodder producers were given initial seeds by Solidarity NGO. In Hurri Hills

and Chaldesa two fodder production plots have been funded by draught resilience and sustainable livelihood project. REGAL-AG has also funded construction of fodder stores for the two large scales fodder traders and are now supporting an individual fodder producer who intends to do animal fattening and finishing. There is great potential for fodder production in Marsabit county especially in specific pockets which receive higher amount of rainfall like Marsabit Township, Mount Kulal, Chaldesa and Hurri Hills and other pockets where irrigation is possible like Kalacha.

The other important actors in fodder value chain are the livestock producers who are either individual pastoralists or livestock producers rearing dairy animals under zero grazing system (mainly dairy cattle and goats). Brokers are also starting to emerge in the fodder value chain. They are found between fodder producers and traders or between fodder producers and livestock producers. Transporters are necessary especially where farms are located away from the store since most stores are located near the producers' residence for security purpose. Bailers offer bailing services to fodder producers. It is mainly done by youth groups as well as individual entrepreneurs (like Pastor Muthaura). Other service providers include; the county government and NGOs who buy fodder and give it to livestock producers especially in times of drought (Emergency fodder).

## Fodder production

The fodder types produced are; the grasses, agroforestry trees and leguminous fodder. Different grasses are grown which include: *Cenchrus ciliaris*, Boma Rhodes, Maasai love grass (*Eragrostis superba*), Napier grass, Pokot grass and Sudan grass. The most commonly produced grass is *Cenchrus* sp a local variety which is liked by many animals and is most suitable for this area producing many light seeds. Together with Maasai love grass, *Cenchrus* grass does best in Marsabit soils. The second most produced fodder grass is Boma Rhodes. It has better quality seeds which are heavy with more biomass and the seeds fetch higher prices. On the other hand, Sudan grass has heavy seeds although it is not very nutritious to the animals. The commonly grown fodder trees in Marsabit are: *Sesbania sesban*, Calliandra, Lucina and Malberry. Other leguminous fodder produced include: Lucerne and Desmodium.

The average acreage for groups producing fodder is 10 acres while a few individual fodder producers around Kalacha area are producing on half an acre of land. The most active fodder producers come from: Saku constituency in Marsabit central (Sagante and Karare); North Horr constituency (Bubisa, Hurri hills, Kalacha, Maikona); Moyale sub-county (Sololo -Ramata-Guleid farm, Uran, Sololo Makutano); Laisamis sub-county; (Mount Kulal, Ngurunit).

The costs incurred when producing fodder are: costs for seeds which range between KES700–1,000 per kg. For example, requirements for one acre of land are: 4 kg of *Cenchrus* sp seeds; KES10,000 for land clearing in case of virgin land and zero if the land was previously cultivated (clean farm); KES2,000 for ploughing using a tractor and in-case harrowing is required KES1,000. Two people are needed during planting at the rate of KES500 each. No manure or fertilizer is applied during planting. In addition, labour required for weeding vary based on land condition. For example, a virgin land has more labour requirements than a previously cultivated land. One acre requires two people to weed about five times during the entire growing period and each person is paid KES500 per day each time. In case land is leased, the land rent is KES2,000 per year.

Fodder harvesting is done twice a year. Early harvesting is done when a producer is not in need of seeds. But where seeds are needed late harvesting is done. Costs for harvesting and bailing fodder are KES100 for a 15-kg bail and KES200 for a 30-kg bail. On average 180–200 bails are harvested from one acre during the first harvest and 230–240 bails during the second harvesting.



Harvesting can be done for about five years before replanting a fresh. The first three years are the most productive however manure can be used/ applied to boost productivity two years after planting. The Seeds harvested from one acre of cenchrus is between 50–100 kg seeds. Labour for harvesting seeds is about KES100 per kg.

## Fodder marketing

The selling price for 1 kg is KES700 when sold to farmers and KES1,000 per kilo when sold to the government or NGOs. On the other hand, producer price for a 15-kg machine bailed hay is KES300–400 during dry season. Fodder traders sell a 15-kg bail at KES450–500. In case of a wooden bailed bailer weighing 8 kg the price ranges between KES250–300 per bail.

Discussions from the focus group discussion revealed that individual fodder producers are more persistent than fodder producers in groups. One major challenge that was raised by producers in a group was group management including decision making. Some of the challenges and hindrances to fodder production include: lack of storage facilities, lack of technical skills on fodder production (agronomic practices), lack of harvesting tools and equipment, lack of market for fodder and culture. In fact, some fodder producers were found to store their fodder on trees.



Source:AVCD–LC Survey 2016

Culture was found to influence the local people's preferences. For example, the locals prefer milk from local breeds than that produced by grade cattle which would increase demand for fodder claiming that milk from the latter has a characteristic smell. Another cultural belief is that animals should not be left to stay in one place for long hence the nomadic attribute of the pastoralists. Thirdly, they believe that grass is a public good 'nyasi ni ya kila mtu'. Important also is the communal land which limits fencing by individuals interested in fodder production yet it is critical to avoid invasion. Human wildlife conflict is common- wildlife especially the Elephant destroy growing or stored fodder and fodder trees.

Training fodder producers on fodder agronomics practices and support sampled producers with harvesting and bailing equipment can help demonstrate best ways of producing and harvesting fodder. On the other hand, most fodder producers operate informally with no contracts with other value chain actors. There is need to strengthen the relationship between fodder/fodder seed producers and the county government (ministry of livestock) so that they can purchase emergency seed and fodder from county fodder producers.

Exposure visits and training to both livestock producers and fodder producers would impact on them the basic skills needed to produce and conserve fodder. This would in future ease the burden of rangeland dependence and massive animal death especially during droughts. The county government should also consider organizing agricultural shows where different exhibitors can demonstrate technologies and innovations from which producers can learn from. Such platforms

would be necessary for establishing linkages between different players including service providers like financial institutions. Another important service which would support fodder value chain actors is artificial insemination services, especially for dairy animals' producers who are important players in fodder value chain.

## 6.5 Best-bet interventions

Table 22 summarizes a selection of best-bet interventions that could be implemented in Marsabit county through AVCD–LC project activities and in collaboration with different partners. The scoring of these interventions is reported in Table 23. Scores were allocated in a range from 1 (low) to 5 (high) for the 'positive' attributes. For the 'negative' attributes related to risk assessment a negative sign was added to the score. An overall score was then computed as the total sum of these individual scores. We opted to provide equal weight to each attribute. A total of six possible interventions were identified: i. strategic vaccination; ii. Livestock producers group marketing; iii. Regular training and demonstrations on rangeland reseeding and environmental conservation; iv. Development and implementation of a livestock grading system; v. development of livestock market information system; and vi. Supporting the co-management model and upgrading the LMAs. The comparison of overall scores shows that the development and implementation of livestock grading scheme was ranked first, followed by the training and support of the LMAs. Developing a livestock producers group marketing and linking it to the end-market/processors in Nairobi was ranked third. It requires lower resources, but better internal organization and planning.



**Table 22. Mapping the attributes of the interventions in Marsabit county**

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, regulator price)	Target actor/ investor (farm, market and agent, group, regulator)	Skill, knowledge and management including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
1. Strategic Vaccination	-ILRI - Kenya Veterinary Vaccines Production Institute -Agro-veterinarians	-Reduced mortality rate -Reduced loss in productivity in animals -Reduction in treatment costs	-Livestock rate producers - animal health service providers	-Technical skills on animal health	-Human/ animal health service providers -financial resources -Vaccines	-county government -Individual livestock producer – Community disease reporters -Private Vets stakeholders e.g. AVCD–LC	-Common highlighted diseases during FGDs and Key informant interviews	-Livestock producers	Both gender since women mostly control small ruminants while men control large stock	12–18 months	-Individual pastoralist involvement and training to adopt the strategy/ intervention  - Private investment by the local producers
2. Livestock producer group marketing	NRT which have supply contracts with some high-end butcheries	Producers will participate and benefit from the high-quality meat trade and high prices.	Producer groups	-End market linkages	Human/ animal health service providers -financial resources	-AVCD/ NRT - county government -Individual livestock producer – KLMC/CLMC/ LMAs	-Few good/ high quality animals supplied -High demand from the end market	-Livestock producers -Traders -End market	Both gender	12–24 months	-Private investment by the local producers  - Individual pastoralist involvement and training to adopt the strategy/ intervention

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, regulator price)	Target actor/ investor (farm, market and agent, group, regulator)	Skill, knowledge and management including collective	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, most competitors) benefit)	Gender and equity implications (who captures most projects, government investment, private investment)	Time to achieve impact depend on? (new projects, government investment, private investment)	Sustainability post project would depend on? (new projects, government investment, private investment)
3. Regular training and demonstrations on rangeland reseed and environmental conservation	Establishment of community conservancies by the county government	Controlled grazing achieved	-Local communities -county government	-Technical skills on reseed/rehabilitation -Skills on herd management	Human/ animal health service providers -financial resources -Seeds	Livestock producers -Local communities -county government	Land degradation/ depleted resource	Livestock producers -Local communities -county government	Both gender months pastoralist involvement and training to adopt the strategy/ intervention -Community Management committees -Highly sustainable -Value chain actors - LMAs -KLMC	12-18	- Individual months pastoralist involvement and training to adopt the strategy/ intervention -Community Management committees -Highly sustainable -Value chain actors - LMAs -KLMC
4. Development of livestock grading scheme	- Currently absence of grading scheme -Somaliland grading scheme	-Transparent pricing system based on animal quality -Better prices to producers -Better quality animals	-All value chain actors but mainly producers, traders and brokers	-Knowledge in animal grading for ILRI team -Basic skills for recipients	-ILRI team -Workshop organization and field activities -Resource AVCD-LC project funds + county funds	-Ministry of Livestock -Counties' livestock departments	-Demand for high quality animals -Higher prices for better animal quality -Information needs for LMS	-Value chain actors -National and county livestock departments but mainly men	-All genders involved in livestock production and marketing, but mainly men	- 1-2 years - 1-2 years	- 1-2 years - 1-2 years

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ investor (farm, market and agent, group, regulator)	Skill, knowledge and management including collective	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
5.Sustainable livestock market information system	-Existing KACE and OLX model  -LMA management staff collect data on prices by species and livestock supply	- Better prices for livestock producers  -Reduced transaction cost for all value chain actors  -Better informed policy and decision makers	-Livestock and fodder value chain actors (producers, traders, brokers and consumer)  -county government  -Research organizations	-Data collectors and reporters  -Software for information transmission	-Trained personnel  -Servers	-KLMC and CLMC  -Media station  -Mobile phone network providers for improved mobile network connection  -Counties and national livestock departments	-Poor and lack of a currently functional livestock information dissemination platform  -Lack or poor access to information for livestock producers	-county government  -National livestock department  -Partners and sponsors like KLMC	-Both gender	-1-2 years	-county government  -Partners and sponsors like KLMC

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ investor (farm, market and agent, group, regulator)	Skill, knowledge and management including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
6. Supporting the co-management model and upgrading the LMAs	-There are a number of LMAs in Marsabit which are involved in the co-management model	-Better livestock market infrastructure -Higher animal transactions per market day -Better information collected on livestock prices, marketed numbers, diseases, etc.	-County livestock department -LMAs	-Management skills, good financial practices negotiation skills	-Funds for training the LMAs members on management and best practices skills	-county government -KLMC/CLMC -LMAs	-LMAs management capacities are very low -Lack of transparency in revenue collection and use	-county government -KLMC/CLMC	-All genders involved in livestock marketing	-6 months	-County government -KLMC/CLMC -LMAs

Source: AVCD LC Survey (2016)

**Table 23. Scoring the interventions in Marsabit county\***

Name of the value chain intervention <sup>3**</sup>	Strength of evidence of demonstrated or potential success	Is the benefit of the type and scale to meet project objectives?	Are the potential targets many and do they match project objectives?	Are the targets likely to be able to manage the innovation?	What is level of risk of inadequate resources, including during shocks?	Risk of lack of partner capacity, reliability, etc.	Strength of evidence of demand on others?	What is level of risk due to dependence on others?	Does the distribution of benefit suit the project aims?	Does this time period suit the project aims?	Sustainability score	Total score
1	4	4	4	4	-3	-2	4	-3	4	4	2	22
2	4	5	3	4	-3	-2	4	-2	4	3	5	25
3	3	3	3	4	-4	-3	5	-2	4	4	4	21
4	4	5	4	4	-2	-2	5	-1	4	4	5	30
5	4	4	4	3	-2	-2	4	-2	4	4	3	24
6	4	4	4	4	-1	-2	4	-2	5	4	4	28

\*Each column, except the first one, scores the attributes of the matching column above in the previous table (1=low, 5=high). For the questions related to 'risk assessment' a negative score was provided

\*\*The same as the previous table

## 7. Livestock and fodder value chains in Garissa

### 7.1 Overview of Garissa county

Garissa county covers an area of 44,174 km<sup>2</sup> and borders the Republic of Somalia to the east, Lamu county to the south, Tana River county to the west, Isiolo county to the northwest and Wajir county to the north (Garissa County Development Profile 2013). The county is flat and low lying without hills, valleys and mountains. The major physical features are seasonal Laghas and the Tana River Basin on the western side. The River Tana has tremendous effect on the climate, settlement patterns and economic activities within the county. Principally, the county is semi-arid with an average rainfall of 275 mm per year. There are two rainy seasons: short rains (October–December), and long rains (March–May). Temperatures are generally high throughout the year averaging 36°C.

Given the arid nature of the county, there is great potential for expansion of agriculture through harnessing of Tana River and Laghas. The soils range from the sandstones, dark clays to alluvial soils along the Laghas, Tana River Basin and the Lorian swamp. White and red soils are found in Balambala Constituency where the terrain is relatively uneven and well drained. The soils have low water retention capacity but support vegetation. These soils have potential for farming. The rest of the county has sandy soils that support scattered shrubs and grasslands which are ideal for livestock production. The county's land is highly erodible.

The county has seven sub-counties (Fafi, Garissa, Ijara, Lagdera, Balambala, Dadaab and Hulugho) with a total population of 700,050 consisting of 376,327 males and 323,723 females (Garissa county 2013). Land in the county is communally owned. It is held in trust for the community by Garissa county Government. Majority of the local communities in the county lives in informal settlements. The land use system is predominantly nomadic pastoralism. Much of the county's livestock population are indigenous sheep, goats and cattle, found in the southern parts which receive more rain while camels occupy the drier north.

The total road network in the county is 1,804 km comprising 29.9 km of bitumen surface, 1,479 km of earth surface and 304 km of gravel surface. This means that most county roads are in poor conditions and impassable during rainy season. The county is served by three mobile phone service providers and twenty-two financial institutions including; eight commercial banks, thirteen village banks and one micro-finance institution. There are eight urban centres namely: Nanighi, Hulugho, Dadaab, Modogashe, Bura East, Balambala, Garissa township and Masalani township.

### 7.2 Livestock production and marketing

Livestock contributes directly to the survival and livelihood of over 95% of the population in Garissa. Camels are the most important species, followed by cattle and then shoats. The livestock population is estimated at 1,104,184 beef cattle; 191 dairy cattle; 290,000 camels; 1.2 million goats; 900,000 sheep; 160,000 and 200,000 poultry (Naitos Golden Inspiration 2015a). Presently, households own fewer livestock on average estimated at 17.2 camels, 68.7 shoats, 38 cattle than they did before the 2010 drought (19.9 camels, 80.5 shoats and 63.4 cattle). Productivity is low with milk production averaging 1–1.5 litres daily in camels, 0.5 litres in the indigenous goats and 1–1.5 litres in cows. Producers in Garissa seem relatively more commercial oriented than other pastoralists with majority selling cattle when they have reached weight and age for the market or when the herd has become too big. Distress selling is however also common due to drought and diseases outbreaks.

Garissa is part of the northeastern and Somalia stock routes which covers Somalia, Mandera and Wajir counties. It is also served with tarmac road that links to the main terminal markets in the country, i.e. Nairobi and Mombasa. Garissa livestock market, considered as the largest livestock market in East Africa, has the best infrastructure in the county with: loading rumps, separate sale yards for cattle, shoats and camels. It serves as a regional hub receiving livestock from primary markets within the county and from neighbouring counties (Mandera and Wajir). Garissa market receives more than 50% of cattle from Somalia. Fewer camels are brought to the Garissa market. Instead, many camels from Garissa are sold in Somalia where prices are higher due to the lucrative export market for camels the country has in the Middle East.

In addition, there are 19 interior market centres located in different parts of the county. Most of the other markets lack adequate infrastructure for instance they have sale yards which combine all species of animals. Consequently, producers are left to depend on distant markets and those who cannot make to travel such distances are exposed to exploitation by middlemen. In addition, the livestock body condition is wasted when animals are trekked for long distances. While all markets in the county have LMAs in place, no livestock market is implementing the revenue sharing co-management model.

Notably, destinations for animals from Garissa county vary. Trekking is among the cheapest method of transport where on average a trekker is paid KES50–100 per cow depending on the distance covered. The costs for truckers range from KES200–270 and KES30 per cattle and per goat respectively, and KES4,500 for a truck load of goats. On the other hand, brokers are found in both primary and secondary markets. Those in Garissa market have negotiated for a flat rate of KES400, KES600 and KES100 per cow, camel and goat respectively. The purchase price of a cattle, camel, sheep or goat varies depending on the type of market (primary or secondary), on the condition of the animal, and on the period of the season, and occurrence or not of drought. On average the purchase price for a live cow and a shoat is KES32,000 and KES4,000 respectively. The sale price in end market is about KES35,150 and KES4,450 respectively. The butchers retail meat at KES340–1,000 per kg depending on the location of the butchery and whether it is meat from shoat or cow. Offal is retailed at KES150–200 per kg.

In general goats fetch higher prices compared to sheep (Table 24). For instance, in 2015, the average price of a goat was around KES4,500 while a sheep was sold at KES2,500. This price differential reflects the preference of Kenyan consumers for goat meat. In 2010 drought year, pastoralists opted for destocking mainly cattle and sheep which are the most vulnerable species, and preferred keeping camels and goats. In general, 2010 livestock unit prices were far below the market prices of the following years due to the increase in the supply side and to the lower body conditions of animals. For 2016 and 2017, the expectations and planned annual volumes variations are positive especially for cattle and goats.

With regard to policy and the legal framework for the livestock sector, policy formulation and enacting is a mandate of the national government as stipulated in the new Kenyan constitution. In the devolved governance system, county governments are at the nascent stages of development and are still grappling with the realities of devolution. Most of them are in the process of developing and implementing integrated frameworks for county developments. Efforts are being made to help the counties in domestication of some of the national level policies. Garissa stills lacking a sales yard bill that regulates the livestock market activities and its surrounding environment. Garissa county has a first Integrated Development Plan 2013 as a blue print for development priorities in the next five years.



**Table 24. Livestock sales records—Garissa county**

	Animal type	Cattle	Camels	Sheep	Goats	Total
Year 2010	Numbers sold	132,000	1,680	8,280	54,000	195,960
	Average annual price (KES)	13,000	37,500	1,500	2,200	----
	Value of sales (millions of KES)	1,716	63	12.4	118.8	1,910.2
Year 2011	Numbers sold	66,500	4,680	5,400	63,000	139,580
	Average annual price (KES)	13,500	50,000	2,500	3,650	----
	Value of sales (millions of KES)	897.7	234	13.5	230	1,375.2
Year 2012	Numbers sold	115,200	5,400	3,600	72,000	196,200
	Average annual price (KES)	15,750	45,000	3,500	4,500	----
	Value of sales (millions of KES)	1,814.4	243	12.6	324	2,394
Year 2013	Numbers sold	177,600	4,680	6,300	108,000	296,580
	Average annual price (KES)	25,000	37,500	4,000	4,100	----
	Value of sales (millions of KES)	4,440	175.5	25.2	442.8	5,083.5
Year 2014	Numbers sold	108,000	4,680	2,160	9,750	124,590
	Average annual price (KES)	24,750	30,000	3,000	4,250	----
	Value of sales (millions of KES)	2,673	140.4	6.5	41.4	2,861.3
Year 2015	Numbers sold	118,818	5,120	2,425	11,200	137,563
	Average annual price (KES)	27,000	35,000	2,500	4,500	----
	Value of sales (millions of KES)	3208.1	179.2	6.1	50.4	3443.8
2016 target setting (Oct 2015–Sept 2016)	Planned % annual increase in # of animals	10	8	10	15	----
	Price consideration (annual average price)	28,000	40,000	2,800	4,800	----
	Planned total increase (# of animals)	130,700	5,530	2,668	12,880	----
	Planned total value (millions of KES)	3,659.6	221.2	7.5	61.8	3,950.1
2017 target setting (Oct. 2016–Sept. 2017)	Planned % annual increase in # of animals	10	5	6	8	----
	Price consideration (annual average price)	29,000	41,000	3,000	5,000	----
	Planned total increase (# of animals)	143,770	5,806	2,828	13,910	----
	Planned total value (millions of KES)	4,169.3	238.1	8.5	69.5	4,485.4

Source: Department of Livestock production and county livestock marketing council—Garissa county (\*\*\*)

## Animal health

There are significant gaps in the access to inputs and delivery of animal health services to pastoralists. The Naitos Golden Inspiration (2015a) study showed that the majority (almost half of the respondents) of pastoralists, who have little or no skills at all in animal treatments, rely on themselves to treat their animals. The rest of the farmers either hire the services of the community animal health worker (CAHW) or invite a neighbour for help. Very few of them pay the services of trained animal health personnel. The low educational level of pastoralists, in addition to the lack of advice on the use of drugs, dosage, withdrawal periods and safe handling of drugs, result in high likelihood of misuse of drugs and consequently potential drug residues in animal products. Counterfeit drugs mainly smuggled from Somalia also constitute a serious issue affecting the efficacy of the treatment and distorting the market by reducing registered agro-veterinarian shops incomes. These results highlight the gaps in animal health services delivery to pastoralists and suggest an entry point for government institutions, NGOs and development partners to tackle these issues.

Livestock producers' access to drugs is not directly linked to the health service suppliers they are in touch with. In fact, agro-veterinarians are the main source of drugs for pastoralists. Livestock traders, CAHWs, and neighbours are at lower extent another source of animal drugs provision. Most livestock producers located in rural and remote areas are mainly served by agro-veterinarian fixed or mobile operators who buy drugs from the big agro-veterinarian shops in Garissa and then sell it to pastoralists.

Drug handling and delivery is a serious issue especially for those drugs and vaccines who need to be refrigerated. A recent study by Waithanji et al. (2015) on the delivery of the CBPP vaccine in northeastern Kenya (Ijara—Garissa county) indicated the existence of a private public vaccine delivery hybrid model. The study revealed that the poor infrastructure and delivery mechanisms (bad road conditions, use of public transports to deliver the drugs, etc.) affect the cold chain which is frequently broken resulting in low efficiency of the vaccine. The authors also indicated that livestock producers are willing to pay a higher premium to access better quality and more efficient vaccines.

Drug prices purchased from livestock traders or CAHWs are higher compared to those offered by agro-veterinarians. The total annual cost of treatment remains high, with the average cost for treatment per household estimated at KES10,318 for cattle, KES6,096 for shoats, KES10,667 for camels and KES1,000 for poultry. The county government is supplying free drugs and services to livestock producers but on the grassroots, the coverage is too low and irregular (Naitos Golden Inspiration 2015a). county or government supplies of free of charge drugs and vaccines, although desirable when sensitive disease outbreaks occur, generally distort the market and negatively affect the private sector activities and incomes. Moreover, investment by the private sector in delivery of services and inputs beyond the urban areas has remained unattractive due to factors including high delivery costs due to the vastness of the area and poor road infrastructure, livestock mobility, seasonality in demand, insecurity in some areas and generally harsh climatic conditions, etc. Consequently, producers lose a significant number of animals each year (on average, 4.3 cattle, 20.1 shoats, 2.6 camels per household) due to diseases. The reviewed literature highlights a number of diseases affecting livestock in Garissa county (Table 25). Worm loads and tick infestations are common diseases affecting the different livestock species. Other diseases are specie specific and could result in contagious effect and incur high animal mortalities.

**Table 25. Most common livestock diseases in Garissa county**

Most common diseases	
Worm loads	PPR
Tick infestations	Sheep and goat pox
CCCP	haemorrhagic Septicaemia
Camel trypanosomiasis	Mange
Heart water	Camel pox
	CBBP

Source:AVCD LC survey (2016) extracted from Naitos Golden Inspiration (2015a)

Aware about the economic and social importance of the livestock sector in the ASAL regions, the national government and the county government undertake regularly vaccination campaigns. In 2015, the veterinary department of Garissa county implemented the fifth vaccination campaign of livestock with an estimated budget of KES11 million. Over one million animals were vaccinated in five rounds. Livestock keepers were asked to pay small fees of KES2 per shoat, KES5 per cattle, and KES10 per camel head.

Garissa is among few counties in Kenya that are equipped with a veterinary laboratory providing services for disease diagnostic, disease investigation and vaccine performance monitoring. The laboratory currently can only do tests for CCPP and to a limited level CBPP. Also, diagnosis for haemoparasites from blood smears. But, residue testing in animal products. Has not yet commenced. Better collaboration with the private sector and use of the laboratory installations will reduce the spread of diseases, improve livestock health in the county, and insure better quality and residues free products for the end consumers. AVCD LC can therefore partner with the county government and other development partners to improve this satellite laboratory.

## Market information

The economic theory highlights non-access to information among the drivers of markets inefficiency and imperfection. Lack of available, reliable and sustainable livestock market information system (LMIS) in developing countries is one of the major constraints affecting livestock marketing and trade. Livestock market information improves decision making of players in the value chain. In most cases livestock market information is skewed to traders disadvantaging other players in the chain (MacOpiyo 2008; Mukhebi 1999). This is the case in Garissa livestock markets, where traders and brokers have better access to information through their contacts and buyers in secondary and terminal markets. Broker's intervention in the transaction between livestock seller and buyer not only distort the prices, but also impede both parties to know the real price of the animal. A recent study by Mwanyumba et al. (2015) on pastoralists' livelihood in Garissa county, indicated that a high proportion of pastoralists (30%) visits the market to get information on market prices, others ask their neighbours (18%) or buyers (10%) and a minority (6%) decides the price on their own without outside information. The remaining pastoralists (around 33%) used a combination of these methods. These results highlight the gaps in producers' access to pastoralists and the needs for a reliable and updated source of information.

The collection and dissemination of market price information bears a high cost and in pastoral areas the systems for its dissemination are often not good enough to reach the level of the producers (Naitos Golden Inspiration 2015a). Initiatives to collect and disseminate livestock market price information in the past have been directly donor-funded without inbuilt sustainability mechanisms hence they have deteriorated and vanished over time. In Kenya, a previous attempt

to collect and disseminate livestock market information system called the 'Livestock Information Network and Knowledge System' (LINKS), was developed through donor funding and in collaboration between KLMC, the International Livestock Research Institute (ILRI), and the Ministry of Agriculture, Livestock and Fisheries. The system collapsed few time after the program stopped.

In Garissa county, has many livestock markets (primary and secondary). However, co-management model is not yet formalized. Of the KES290 loading fees collected per animal in Garissa livestock market only KES15 goes to the LMA while the rest goes to the county government. This co-management model represents an opportunity for the development of LMIS. In fact, LMA management staff is able to collect data on livestock supply and prices by species during the market day. Other type of information related to livestock diseases, conflicts, range access and availability could also be collected. In the current AVCD–LC project, the LMIS is supposed to have a wider range covering at least the five project counties. Garissa pastoralists and other livestock value chain actors will benefit from the development of the LMIS. Moreover, tight collaboration with local radios, will allow better information dissemination and coverage in the remote areas of Garissa. The improvement of mobile network connection within the county is also an important driver for the dissemination of livestock market information through SMS. Value chain actors and stakeholders will be able to access timely and precise information by paying small fees (KES2 or KES3 by type of information required).

## Gaps for commercial production

There are various gaps impeding higher and more efficient commercial production in Garissa county. The first constraint relates to the absence of a clear and transparent livestock grading system which affects the provision of high quality animals to the markets. In fact, livestock producers are unable to categorize their animals into different grades (grade I, grade II, grade III, etc.) to fetch the corresponding price interval. Currently the 'eye ball valuation' of animals is done in small stock the brokers mainly assess the lumber region for meat coverage to inform the price decision. There is therefore no clear attributes and their corresponding levels that allow such classification. Kenyan livestock stakeholders can borrow from the existing Somali livestock grading scheme which relies on animal attributes such as sex, age, conformation, and body condition to categorize the animals. The Somali grading scheme segments small ruminants into four categories (Grade I, Grade II, Grade III, Local), cattle into 2 categories 'mature' (including 3 grades) and 'immature' (including 2 grades), and camels into 2 categories too: 'mature' (including 2 grades) and 'immature' (including 2 grades). The development and establishment of a recognized grading scheme will allow smallholder livestock producers to improve the quality of the animals sold to fetch higher prices. It will also provide the desired livestock market information system with more precise livestock prices correlated with the grade of the animal.

The cross-borders livestock trade represents an opportunity for Garissa county to boost the demand and supply of animals from inside and outside Kenya placing Garissa livestock market as a regional hub. However, the informal and non-controlled cross-borders trade brings challenges in term of animal health and disease outbreaks. If the local authority does not take effective and efficient veterinary measures in controlling the flow of animals coming to Garissa from Somalia and Ethiopia (through Wajir and Mandera), the risk of outbreaks will remain very high and might result in the shutdown of livestock markets and trade in Garissa. In its Vision 2030, the Government of Kenya aims to establish four disease-free zones. The first being at the Coast, covering the counties of Kwale, Mombasa, Kilifi, Tana River, Lamu and parts of Taita-Taveta. The other three zones will be established in the Laikipia-Isiolo complex, Uasin Gishu and Garissa Counties. None of these

have been completed yet (International Development 2014). The establishment of these disease-free zones will ease the exports of meat to the Middle East and Europe (although Kenya is a meat deficit country). More importantly it will improve the animal health status in the county but will also increase the transaction costs for doing livestock business, and will increase meat prices.

The poor condition of the roads within the county is another constraint for commercial production. It increases transport costs and restrict smallholders' access to secondary and primary livestock markets. Mwanyumba et al. (2015) mentioned that high transport and labour costs are among the main marketing constraints faced by pastoralists in Garissa. The authors also highlighted the lack of or inadequate water and forage along the way. There is no direct trade, no verbal or written agreements between livestock producers and private slaughterhouses and meat processors in Nairobi, or fattening ranches in Mombasa and the coastal region. A recent study conducted few months ago by ILRI-KLMC assessing the LMAs in Garissa county, showed that livestock producers were more present in the LMA composition in the primary livestock markets (like Balambala), while the biggest secondary markets (Garissa and Bura) are mainly controlled by traders and brokers. These facts show the limited access to and control for livestock producers over the main livestock markets in the county.

### 7.3 Peri-urban enterprises

The national government and the Garissa county government are putting in place infrastructural development initiatives which include the construction of an export abattoir, a tannery, and two camel milk processing units, however none of these interventions have been completed. These investments once finalized, will create new jobs especially in the peri-urban areas of Garissa city and the other major towns in the county. The construction of the export abattoir will provide direct jobs to the persons who will be employed by the abattoir (manager, slaughter men/women, flayers, lab technicians, veterinarians, unskilled workers, etc.), and will also create indirect jobs like livestock transporters, meat transporters, food and tea service providers, etc.

The tannery will provide direct jobs for skilled (manager, accountant, textile engineer, technicians, etc.) and unskilled workers. It will also create additional jobs in the hides and skins value chain including hides and skins collection (collectors), wholesaling, transportation, etc. The tannery will mainly source its raw material from the export abattoir, and the butcheries and abattoirs within the major towns. Slaughter slabs will also be targeted as source of hides and skins. The development of the hides and skins value chain will provide jobs for women, who could be involved in hides and skins salting and drying, and youth who could be involved in the collection and transport of the hides and skins. The most important threat/constraint to take into account is that the value chain will be highly interrelated with the export abattoir performance.

Camel milk demand in Garissa is increasing and the few shops around the city are not able to fulfil the demand, especially during Ramadan and festive seasons. One of the camel dairy shops' owner interviewed indicated he has two main clients: consumers buying fresh or fermented (sour) camel milk from his outlet, and hotels to whom he delivers the milk. He mentioned that very frequently during the dry season (June–September) he is not able to meet the demand and has to compromise on the delivery for hotels and restaurants. Prices also increase by 25% in comparison with the wet season. Camel milk collection is very challenging with large producers being located far from the urban centres. Young people could be involved in the booming business of camel milk collection. The local small processors are trying to get health and product certification from the Kenya Bureau of Standards to sell their products in Nairobi in supermarkets and delicatessen shops, if it happens, this will require transport logistics where young persons could be involved.

## 7.4 Fodder and seeds

Communal grazing is common in Garissa county just like many other ASAL counties. Inadequate pasture and water scarcity are among the challenges affecting livestock value chain. Community grazing management committees help in management of grazing land such that, the grazing plan is scheduled in a way that during the dry season animals move to the delta in Garsen. But, when the drought is prolonged animals move across the border to Taita-Taveta county while others move to Somalia leaving behind the remnant herd (lactating and in-calf animals and calves). In fact, about 90% of pastoralists depend on pasture grass. Costs incurred when animals migrate during drought include: KES18,000 for leasing pasture land, KES7,450 for herdsman, KES5,300 miscellaneous costs while KES2,000–6,000 being costs for buying fodder for the remnant animals.

Fodder value chain actors mainly comprise of: Fodder producers operating as individuals or in groups who produce fodder under rain fed or irrigated. The cost for irrigated fodder is about KES270–305 per bail. Some of the constraints facing fodder producers include: Lack of a ready market, lack of storage facilities, high cost of producing irrigated fodder, lack of storage facilities and lack of bailing equipment. Some fodder producers use bailing boxes of 15 kg or 25 kg while other store it as loose hay. In fact, there are no bailing machines in the whole county. Invasion by wild livestock and animals is also common. Access to pasture seeds and culture also influence greatly fodder production. AVCD–LC project can therefore support fodder seed production by both groups and individual fodder producers. Moreover, sampled fodder producers can be supported with fodder harvesting and bailing tools and equipment. This same category can be trained on agronomic practices of fodder production as well as fodder harvesting and storage techniques. The trained producers can then be tasked to train the other fodder producers.

### Fodder production

Even though Garissa county has great potential for fodder production especially along riverine of Tana, there is limited exploitation of this potential. Fodder production and conservation across the county is an opportunity if exploited can be used as strategic feed reserve for use during the dry season. Very few (10%) pastoralist produce and conserve fodder mainly due to high cost of irrigation, limited storage facilities, lack of finances among others. However, efforts to promote market value of produced animals through integration of fodder are underway. For example, Africa Development Solutions (Adeso) in collaboration with KALRO had plans to put up feedlots, unfortunately the project was terminated. AVCD–LC can collaborate with Adeso to scale up fodder production especially in pockets where fodder production is feasible.

The commonly grown fodder in Garissa county is: Sudan grass, *Cenchrus ciliaris* and Rhodes grasses which are preferred due to their superior water-use efficiency under limited soil moisture content, fast germination rates, deeper and extensive rooting systems, high biomass and crude protein. Other types include: *Eragrostis superba* and Napier grass. Notable is the scarcity of fodder seeds. AVCD–LC project should also support production of fodder seeds through training interested new and existing fodder producers in the county. Priority should be given on local draught resistant varieties which are high producing. In addition, the project can support the existing groups to strengthen their organizational structure in order to effectively manage and monitor the business enterprise and facilitate linkages between the groups and the service providers like; input suppliers, financial institutions and also link the fodder producing groups to the market.



## Fodder marketing

Livestock producers and livestock traders play an important role in fodder value chain. They provide market for Fodder. During market days fodder is largely traded to the tune of 10–15 lorries for each market day. In fact, about 300 bales of fodder are traded every market day in Garissa livestock market which is the largest in the county. Sometimes livestock producers buy standing fodder at KES200 per 10 square metres and they have a high preference for green fodder since pastoralist believe dry fodder has lost its nutritive value. On the other hand, fodder traders in Garissa county are mainly women groups who buy fodder at a wholesale price of KES200 per bale which they later sell at KES250–350 per 15 kg bale. At times the price can be as high as KES400 per bale during drought and as low as 200 in non-drought years. AVCD–LC should therefore support fodder commercialization model of both group and individual fodder producers for especially women and youth so that they can take up fodder production as a business enterprise producing in bulk so as to enjoy the economies of scale. Unfortunately, very few women who bring fodder to the market own Farms. They go into other people's farm and beg to harvest the grass. Some pay for it, others don't. Fodder production can be approached from traders with farms who are interested in fattening of animals.

Transporters are also useful, they are hired by fodder producers or fodder traders to transport fodder to the end users or to the market. Bailleurs mainly use wooden boxes and the cost involves hiring about six men paid KES300 per day to make 40 bales. They however lack bailing equipment, therefore the youth can be targeted and supported to offer fodder bailing services as a business to support the fodder value chain.

## 7.5 Best-bet interventions

Table 26 summarizes a selection of best-bet interventions that could be implemented in Garissa county through AVCD–LC project activities and in collaboration with different partners. The scoring of these interventions is reported in Table 27. Scores were allocated in a range from 1 (low) to 5 (high) for the 'positive' attributes. For the 'negative' attributes related to risk assessment a negative sign was added to the score. An overall score was then computed as the total sum of these individual scores. We opted to provide equal weight to each attribute. A total of 6 possible interventions were identified: i. Fodder and fodder seeds production; ii. Livestock vaccination; iii. Development and implementation of a livestock market information system (LIMS); iv. Development and implementation of a livestock grading system; v. Promotion of livestock insurance uptake; and vi. Supporting the co-management model and upgrading the LMAs. The comparison of overall scores shows that the development and implementation of livestock grading scheme was ranked first, followed by the promotion of livestock insurance uptake by pastoralists. The remaining three proposed interventions have almost similar scores, but some variation is observed in terms of their sustainability.



**Table 26. Mapping the attributes of the interventions in Garissa county**

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ Skill, investor (farm, market and agent, group, regulator)	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most government investment, private investment)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
I. Strategic feed reserve production model (fodder and fodder seed production)	Adaptation research centre initiative in Ijara sub-county which piloted Sudan grass and Cenchrus ciliaris	- strategic feed reserve for use during the dry season -lower/ affordable fodder and fodder seed prices -increased livestock products especially milk	-fodder and fodder seed producers, traders and livestock producers -KALRO -AVCD -county Government	- Fodder Agronomic practices -Fodder storage and conservation and bailing equipment -Fencing of fodder fields	-Appropriate fodder seed species -Fodder harvesting and bailing equipment	-fodder producers -KALRO -AVCD and other NGOs -county Government -livestock producers	-migration of animal to other counties - especially during drought.	-Sponsors gender integrating the youth	-6 months to 1 year	-Fodder value chain actors - NGOs - KALRO -Government

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ Skill, investor (farm, market and agent, group, regulator)	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, most competitors) benefit)	Gender and equity implications (who captures most government investment, private investment)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
2. Strategic livestock Vaccination	-Regular vaccination campaigns by the county government  -Presence of a veterinary laboratory	-Health and quality livestock products	-Livestock producers  -county government	-Vaccines  -public and private Veterinary Personnel	-Livestock producer  -county government veterinary department  -Private veterinarians  -AVCD-LC	-Producers in disease prevention/treatment  -Gaps in veterinary input access high disease prevalence	-Livestock producer ability to adopt this intervention  -Private and public veterinary input and service providers	-Both male and female  -Youth who can invest in provision of veterinary inputs and services	-1-2 years	-Livestock producer  -county government veterinary department  -Private sector
3. Sustainable livestock market information system	-Existing KACE and OLX model  -LMA management staff collects data on prices by species and livestock supply	- Better prices for livestock producers  -Reduced transaction cost for all value chain actors  -Better informed policy and decision makers	-Livestock and fodder value chain actors (producers, traders, brokers and consumer)  -county government  -Research organizations	-Trained personnel  -Servers  -Data collectors and reporters  -Software for information transmission	-KLMC and CLMC  -Media station  -Mobile phone network providers for improved mobile network connection  -Counties and national livestock departments	-Poor and of a functional livestock information dissemination platform  -Lack or poor access to information for livestock producers	-National livestock department  -Partners and sponsors like KLMC	-Both gender  -One to two years	-One to two years	-county government  -Partners and sponsors like KLMC

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ Skill, investor (farm, market and agent, group, regulator)	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
4. Development of livestock grading scheme	- Currently absence of grading scheme -Somaliland grading scheme	-Transparent pricing system based on animal quality -Better prices to producers -Better quality animals	-All value chain actors but mainly producers, traders and brokers	-ILRI team -Workshop organization and field activities -Resource AVCD-LC project funds + county funds	-Ministry of Livestock -Countries' livestock departments	-Demand for high quality animals -Higher prices for better animal quality	-Value chain actors -National and county livestock departments	-All genders involved in livestock production and marketing, but mainly men	- 1-2 years	-Highly sustainable - Value chain actors - LMAs -KLMC
5. Promotion of livestock insurance uptake	-Currently available in Marsabit, Isiolo and Wajir	-Mitigates producer livestock losses	-Livestock producers	-Sensitization on the existence of the product which complies with Sharia rules -Funds to organize sensitization workshops	-Insurance company (Takaful) -county livestock department -National Livestock department	-Frequent occurrence of droughts -High mortality rates due to droughts	-Livestock producers -Insurance company	-all genders involved in livestock production	- 1 to 2 years	-Private insurance company investment -ILRI IBLI team in improving the product

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ Skill, investor (farm, market and agent, group, regulator)	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, most competitors) benefit)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
6. supporting the co-management model and upgrading the LMAs	- The LMAs in Laikipia are doing quite well	- Better livestock market infrastructure - Higher animal transactions per market day - Better information collected on livestock prices, marketed numbers, diseases, etc.	- county livestock department - LMAs	- Management skills, good financial practices - Funds for training the LMAs officials and members on management and best practices skills - Funds to organize meetings with the county livestock officials and attorney	- county government - KLMC/ CLMC - LMAs	- No co-management or revue sharing model implemented yet - Revenue collection by the county government could be highly improved - Generally poor market infrastructure	- county government - KLMC/ CLMC	- All genders involved in livestock marketing	- 1 year to 18 months	- county government - KLMC/ CLMC - LMAs

Source: AVCD-LC Survey (2016)

**Table 27. Scoring the interventions in Garissa county\*\***

Name of the value chain intervention**	Strength of evidence of demonstrated or potential success and scale to meet project objectives?	Is the benefit of the type and scale to meet project objectives?	Are the potential targets many and do they match project objectives?	Are the targets likely to be able to manage the innovation?	What is level of risk of inadequate resources, including during shocks?	Risk of lack of partner capacity, reliability, etc.	Strength of evidence of demand	What is level of risk due to dependence on others?	Does the distribution of benefit suit the project aims?	Does this time period suit the project aims?	Sustainability score	Total score
1	4	4	4	4	-3	-3	5	-2	4	4	3	24
2	4	5	3	4	-2	-1	4	-3	4	3	4	25
3	3	5	4	4	-3	-2	5	-3	5	4	3	25
4	4	5	4	4	-1	-1	5	-1	4	5	5	33
5	3	4	3	5	-1	-1	4	-2	5	3	5	28
6	4	4	5	3	-2	-3	4	-3	5	4	4	25

\*Each column, except the first one, scores the attributes of the matching column above in the previous table (1=low, 5=high). For the questions related to 'risk assessment' a negative score was provided

\*\*The same as the previous table

Source:AVCD-LC Survey (2016)

## 8. Livestock and fodder value chains in Turkana

### 8.1 Overview of Turkana county

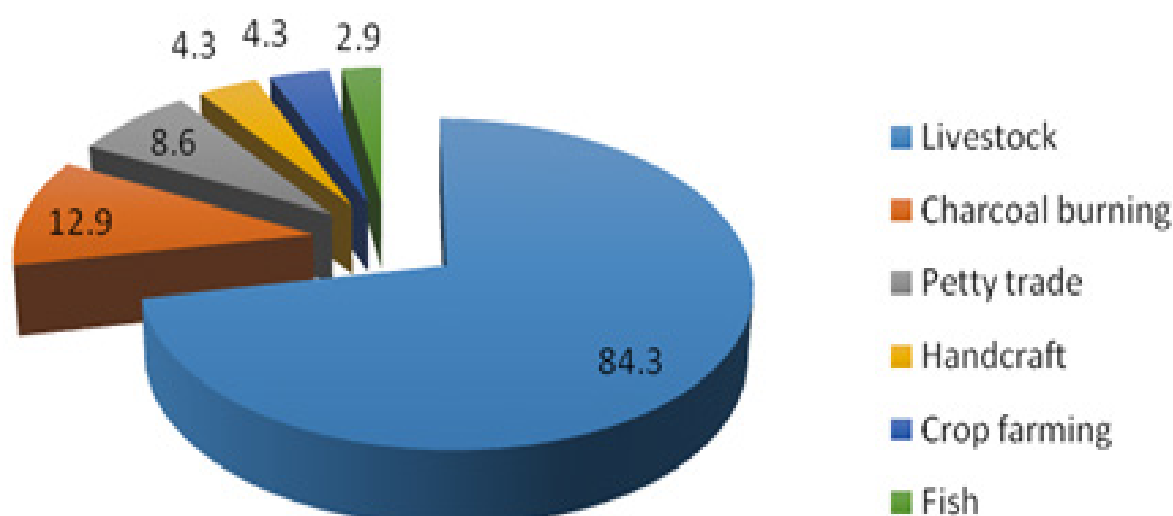
Turkana county lies north of the equator and South Sudan to the north, Uganda to the west and Ethiopia to the northeast. The county is neighbouring West Pokot and Baringo counties to the southwest, Samburu county to the southeast and Marsabit county to the east (CRA 2011). It has six sub counties including: Turkana North, Turkana West, Turkana Central, Loima, Turkana South and Turkana East.

Although the county is one of the largest in Kenya, 68,680 km<sup>2</sup>, it is rated as semi-arid (19%), arid (42%) or very arid (38%) (County government of Turkana 2013). The county receives very erratic rainfall of between 150 mm and 400mm annually with an average precipitation of 250 mm. Temperatures ranges between 20–41°C, with an average of 30.5°C. As a result of this low rainfall and high temperatures experienced in the county, Turkana residents face persistent threat of starvation and lack of water for both people and livestock.

The population is 855,399 people: male (52%) and female (48%) (KNBS 2009) with the dominant community being the Turkana people who is the second largest community after the Maasai in Kenya. Several other tribes have settled in the county such as El Molo people who live on the southern shores of Lake Turkana. It is believed to be the cradle of humanity with the discovery of ‘Turkana boy’ 1.6 million years ago.

Livestock farming is the main economic activity as presented in Figure 13 below. However, there is also fair level of basket weaving especially among women in Lodwar and other urban centres. Fish farming and trade is practiced in Lake Turkana primarily by El Molo people (CRA 2011). The main land use system is nomadic pastoralism and livestock kept are; cattle, donkeys, camels and goats. These animals are the main source of food and wealth of the households. Notable is recent establishment of irrigation schemes for crop production along Kerio and Turkwel rivers.

**Figure 13. Households’ main economic activities**



The county is low lying with open plains, mountain ranges and river drainage patterns and is endowed with the world's largest desert lake: Lake Turkana. Rivers found in the county include: Tarach, Kerio, Kalapata, Malimalite and Turkwel giving the county great potential of producing large amounts of food, if properly utilized. Recently, commercially viable oil has been discovered in Ngamia I by Tullow oil (CRA 2011).

Soils in Turkana county are not well developed due to aridity and constant erosion by water and wind, often they are capped by stone mantles. Colluvial soils tend to be reddish over the basement system and generally grey buff or white over the volcanoes. Aeolian soils are dune sands either active or fossil; Alluvial soils range from coarse sands to flash flood silts, while black or brown clays occur locally in areas of impeded drainage. Due to the low rainfall and high temperatures there is a lot of evapo-transpiration resulting into deposition of salt in the soil and capping on the surface. As a result, only about 30% of the county's soil can be rated as moderately suitable for agricultural production.

Road network in the county is appalling. The main roads (from Kainuk to Lodwar and the Lodwar to Lokichoggio) are in poor state. Feeder roads are also dilapidated causing movement of people and goods difficult especially during the rainy season. The county has got one airport and 22 airstrips spread across the county which are not well developed.

National electricity grid is connected only to one shopping centre, Kainuk. Unreliable Kenya Power Company diesel generators are used to generate and distribute power in Lodwar town (Turkana county Development Plan 2015). The available financial institutions are concentrated within one central place – Lodwar. They include; three commercial banks (Kenya Commercial Bank, Equity Bank and Post Bank) and several micro finances serving the local residents, including the Kenya Women Financial Trust, Kadet Micro-Finance, Elimu Sacco and Turkana Teachers Sacco. This leads to low savings rate, low borrowing and slow uptake of investment opportunities within the county. In addition, three mobile companies are found in the county.

With regard to policy and legal framework for the livestock sector, policy formulation and enacting is a mandate of the national government. In the devolved governance system, county governments are at the nascent stages of development and are still grappling with the realities of devolution. Most of them are in the process of developing and implementing integrated frameworks for county developments. Efforts are being made to help the counties in domestication of some of the national level policies. Turkana county has now a second annual development plan 2015/2016 to guide the county development agenda. They also developed a County integrated development plan (county government of Garissa 2013) as a blue print for development priorities in the next five years.

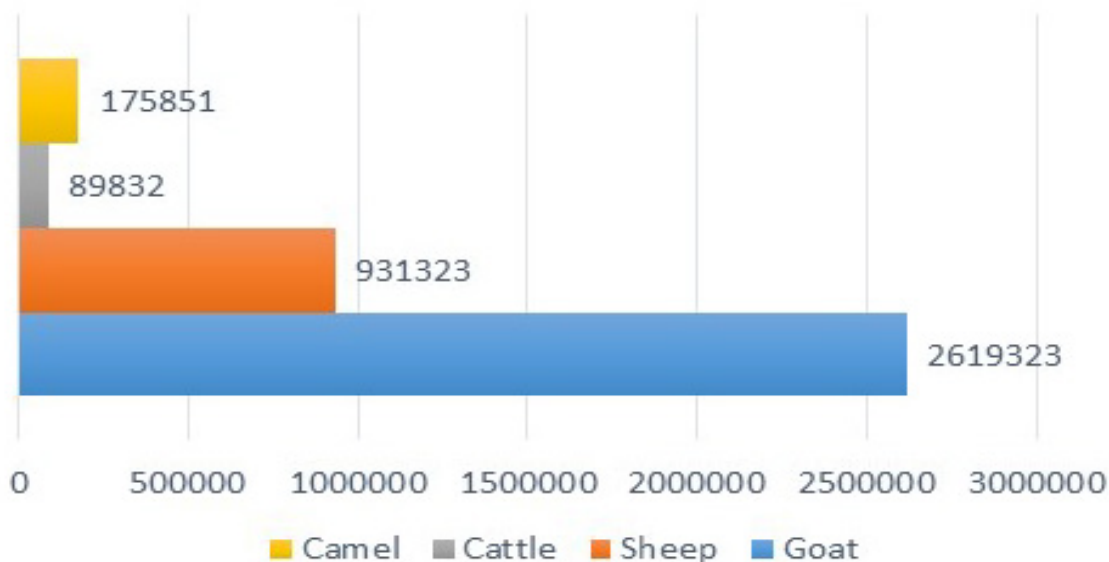
## 8.2 Livestock production and marketing

The species of animals kept include small ruminants (sheep: 931,323 and goats: 2,619,323), cattle: 89,832 and camels: 175,851 as indicated in Figure 14 below. The system of production is mainly pastoral exhibiting both 'boom and burst' cycles (livestock population builds up and bursts from various weather facts-draught and natural disasters). As a result, most pastoralists are either moving away, branching out, hanging in, or stepping up based on degree of vulnerability and resilience status. Meat goat value chain is considered as the high priority value chain in the county. The numbers of livestock kept (especially cattle) seem to be on a downward trend. This reflects the impact of external shocks such as droughts and diseases and presents a value chain that is constrained by low local supply especially for cattle and heavily dependent on livestock



flowing in from other counties and countries. The breeds of animals kept are indigenous types and often tend to be of low genetic potential. For instance, the Small East African Goat, though well adapted for ASAL areas has a very low production potential with regard to milk and carcass outputs. Likewise, the breed of camels kept, that is the Turkana camel, is also a low milk producer compared to the Somali and Pakistan camels.

**Figure 14. Livestock population estimates in Turkana county**



Source: AVCD LC survey (2016) computation from Ruge Goshen (2014)

Turkana county is part of the northwestern livestock trading route supplying Nairobi (Turkana county Development Plan 2015). The catchment areas are; West Pokot, Baringo, Marakwet and extending beyond the national boundaries into Ethiopia, South Sudan, and Uganda. The county is well positioned for both aggregation and transit area between Kenya and vast pastoral areas of South Sudan. Livestock from the county is traded in primary markets, secondary markets and end markets (Nairobi, Eldoret and Nakuru for cattle). The trend of cattle sales during the period 2010–2015 shows a stagnation of the number of cattle sold varying between 7,000 and 7,600 heads/year (Table 28). However, average unit prices of cattle significantly increased during the same period (+79%) which indicates a high demand for beef meat in and outside the region. Goats are generally preferred to sheep and fetch slightly a higher price (10–15% more) in the markets. In 2015, camel sales witnessed the highest increase in sales volumes during the period 2010-2015 with 69% more animals sold in comparison with the year 2011 (lowest transactions recorded).

Bett et al. (2009) in their study in Turkana county, found that of the livestock species kept, goats and camels were always ranked as the most important species for a family’s survival. In order of importance, the participants ranked the benefits of keeping goats as food, dowry and money. Camels were mainly kept for food (milk, blood and rarely meat) and paying dowry. The authors concluded that interventions targeted at improving the productivity of goats and camels would have the greatest immediate positive impact on the livelihoods of the Turkana pastoralists. The data presented in Table 28 confirm that the preference for camels and goats (higher prices compared to the other large/small ruminants, and increasing sales volumes) still holding.

**Table 28. Livestock sales records—Turkana county**

	Animal Type	Cattle	Camels	Sheep	Goats	Total
Year 2010	Numbers sold	7,215	4,517	49,200	62,035	122,967
	Average annual price (KES)	14,000	26,000	2,000	2,600	----
	Value of sales (millions of KES)	101	117.4	98.4	161.3	478.1
Year 2011	Numbers sold	7,674	3,710	45,922	64,030	121,336
	Average annual price (KES)	15,000	26,000	2,000	2,600	----
	Value of sales (millions of KES)	115.1	96.5	91.8	166.5	469.9
Year 2012	Numbers sold	7,480	4,610	42,925	62,035	117,050
	Average annual price (KES)	16,000	26,000	2,700	3,000	----
	Value of sales (millions of KES)	119.7	119.9	115.9	186.1	541.6
Year 2013	Numbers sold	7,538	4,680	63,335	45,920	121,473
	Average annual price (KES)	18,000	30,000	3,300	2,800	----
	Value of sales (millions of KES)	135.7	140.4	209	128.6	613.7
Year 2014	Numbers sold	7,031	4,868	43,651	65,800	121,350
	Average annual price (KES)	18,000	30,000	3,000	3,360	----
	Value of sales (millions of KES)	126.6	146	130.9	221.1	624.6
Year 2015	Numbers sold	7,584	6,264	54,000	71,941	139,789
	Average annual price (KES)	25,000	30,000	3,500	4,000	----
	Value of sales (millions of KES)	189.6	187.9	189	287.8	854.3
2016 target setting (Oct. 2015–Sept. 2016)	Planned % annual increase in # of animals	15	12	10	12	----
	Price consideration (annual average price)	26,000	32,000	3,700	4,250	----
	Planned total increase (# of animals)	8,722	7,016	59,400	80,574	----
	Planned total value (millions of KES)	226.8	224.5	219.8	342.4	1,013.5
2017 target setting (Oct. 2016–Sept. 2017)	Planned % annual increase in # of animals	18	15	12	14	----
	Price consideration (annual average price)	27,500	33,500	4,000	4,500	----
	Planned total increase (# of animals)	10,291	8,068	66,528	91,855	----
	Planned total value (millions of KES)	283	270.3	266.1	413.3	1,232.7

Source: CDLP'S Annual reports/county Livestock Marketing Council

The numbers reported in Table 28 correspond to average estimates of livestock species prices sold in Turkana county without taking into account the type of market where the animals are sold, neither the seasonality of the demand and the supply. Table 29 below, includes the average price information for primary, secondary and end markets.

The average live animal prices within the county are; KES13,000–30,000 for cattle, KES1300–6,000 for goats, KES1,200–5,000 for sheep and KES15,000–40,000 for camels. The prices vary greatly based on the size of the animal and the market site. Accordingly, prices for meat vary with between the four animals: beef KES360–400/kg, mutton/chevon KES300–520/kg and KES360–400 for camel meat. The highest prices being in Lodwar, Kakuma and Lokichoggio. The number of sheep and goats supplied to Nairobi from Turkana has however been on a downward trend and is currently estimated to be one to two truckloads of 250–350 shoats per week. Reasons for this decline include rising demand in the neighbouring towns of Kitale, Eldoret and Nakuru; high

cost of transportation (KES80,000 to 100,000 per truck load of 250–350 goats or 35–40 cattle); and increased demand for livestock products in Turkana due to factors including the Tullow oil project, a high refugee population in Kakuma and the devolution of government functions.

**Table 29. Seasonal livestock price variations in Turkana county**

Livestock	Market levels					
	Primary market		Secondary market		End markets	
	Low (KES)	High (KES)	Low (KES)	High (KES)	Low (KES)	High (KES)
Goats	3,500	5,500	4,000	6,500	6,000	7,000–8,000
Sheep	2,500	5,500	4,000	6,500	6,000	7,000–8,000
Camels	35,000	70,000	50,000	100,000		
Cows	35,000–40,000 with a shorter value chain					
Donkey	8,000–15,000					

Source: Regal-IR (2015)

On the other hand, prices for hides and skins are extremely low. The community also, trades less in hides and skins due to alternative uses (beddings) of these products. The average price for hides is KES500 and skins is KES50. However, a new JICA funded tannery in Lodwar town is expected to enhance trade of hides and skins and general leather development in the county.

## Animal health

The livestock value chain in Turkana is characterized by huge gaps in accessibility of crucial support services by core actors. Animal health care and delivery and regulatory services are under the county directorates of veterinary services. Unfortunately, animal health services in the county are unavailable to most producers due to a number of factors including mobility of pastoralists with livestock, vastness of the area, harsh climatic conditions, poorly developed road and communication infrastructure, high poverty rates, and low educational level of pastoralists among others. Consequently, like in Garissa county, most pastoralists treat livestock themselves generating high chances of drug abuse and incorrect dosage leading to resistance of drugs and drug residues in livestock products. A lower proportion of pastoralists invite trained animal health personnel. While CAHWs are also a common source of animal health services for producers there is lack of a policy framework governing their training and practice.

The reviewed literature highlights a number of diseases affecting livestock in Turkana county (Table 30). Worm loads and tick infestations are common diseases affecting the different livestock species. Other diseases are specie specific and could result in contagious effect and incur high animal mortalities. The geographical location of Turkana county which borders three countries (Ethiopia, Uganda and South Sudan) is an enabling factor for the widespread and endemicity of livestock diseases due to cross-border trade and uncontrolled livestock movements. Bett et al. (2009) found that livestock movements, limited access to veterinary services and sometimes insecurity, as being the main factors that contributed to the high prevalence and persistence of livestock diseases. Most of these diseases were contracted in the dry season grazing areas where many pastoralists congregated to use the available (but few) grazing and watering points.

**Table 30. Most common livestock diseases in Turkana county**

Camels	Cattle	Shoats
Trypanosomiasis	Anthrax	Haemorrhagic septicaemia
Mange	CBPP	<b>PPR</b>
Tick infestation	Lumpy skin	CCPP
Haemorrhagic septicaemia	Mange	<b>Pox</b>
Diarrhoea	Heart water	Mange
Pneumonia	Rinderpest	Anaplasmosis
Anthrax	Foot rot	Heartwater
Camel pox	Worms	Worms
Rabies	Black water	Foot rot
Tuberculosis	FMD	Ticks
Foot rot	Trypanosomiasis	Orf
Helminthiasis	East Coast fever	Eye infections

Source: Regal-IR (2015)

Other challenges in the delivery of animal health services in Turkana county include proliferation of fake drugs and quacks, selling of expired drugs, misuse and poor handling of drugs by pastoralists, drug handlers and CAHWs, high prices and irregularity in drugs supply. The capacity of the county department of vet services to perform its regulatory roles (meat inspection, issuing of animal movement permits, disease control including enforcing quarantines during disease outbreaks) is very limited mainly because of very low staffing, lack of effective infrastructure for delivery of services as well as resource limitations.

## Market information

Advisory services and market information are also often lacking for producers. The traditional extension system has proved ineffective in reaching producers due to understaffing, lack of financial resources to facilitate extension activities, mobility of pastoralists, low population densities within expansive areas and insecurity among other factors. Likewise, existing market information systems are ineffective in reaching producers leading to information asymmetry that leaves producers vulnerable to exploitation by traders. In addition, most of the market information collection and dissemination initiatives are supported by donor funding and, in many cases, are not sustainable after the exit of the donor funding.

In Turkana county, there is high number of livestock markets-bush, primary and secondary (Watson and Binsbergen 2008) some of which are co-managed between the LMAs and the county government. Out of the 32 livestock markets, 27 of them have LMAs and 10 markets are implementing the revenue sharing model in the management of markets. In addition, nine markets have market monitors employed by CLMC (county Livestock Marketing Council) to collect and disseminate livestock market information to traders and livestock producers. As highlighted in the previous chapters, this co-management model represents an opportunity for the development of LMIS. In fact, LMA management staff are able to collect data on livestock supply and prices by species during the market day. Other type of information related to livestock diseases, conflicts, range access and availability could also be collected.

There is also need for the Turkana CLMC to play a greater role in building capacity of LMAs and lobbying for improved enabling environment for livestock marketing. The current AVCD–LC project undertook a situational analysis of a representative sample of LMAs in the five study

counties. A major challenge highlighted by all LMAs is the lack of external traders in the livestock market. LMAs should therefore be coached on market promotion, identification and adoption of an efficient security enhancement model to mitigate incidences of insecurity in the county. Other identified constraints are: Low management capacities and poor organizational and documentation practices of the LMAs. AVCD LC should support restructuring of KLMC, CLMCs and LMAs to enhance their capacity in livestock and fodder production and marketing.

## Gaps for commercial production

The gap between supply and demand of livestock products is reflected by high prices. For instance, the price of a mature goat in Lodwar and Kakuma is about KES6,000–8,000 which are comparable to prices in Nairobi. Due to poor roads, expansive land area and non-developed livestock markets in the interior, livestock marketing channels in Turkana are rather long with many intermediaries which increase transaction costs. It is estimated that an animal can change hands between four to five intermediaries before the main buyer in one market, leading to an increase in cost by KES1,000–1200 per animal. Livestock prices vary between rainy and dry seasons as well as by types of markets (primary, secondary and end markets) as previously indicated in Table 29.

On the other hand, the co-management model implemented between the LMAs and Turkana county Government is not fully working. Field visits and interviews with key informant revealed that in many markets (especially the secondary markets like Lodwar) livestock traders and brokers are the ones with higher representation in the LMA officials and members. Livestock producers are almost absent from these associations. The stranglehold of mainly brokers on the LMAs is negatively affecting pastoralists by providing higher power to the former group. Actually, Turkana county government refuses to develop and signs the sales yard bill, till this monopolistic situation is not resolved. KLMC and its branch CLMC in Turkana have an important advocacy and awareness raising role to play to unlock the situation and ensure higher representation and weight is allocated to livestock producers in the LMAs management team and membership. The current situation discourages pastoralists to sell animals in the markets, even worsening the low off-take rate and decreasing potential amounts of cess collection for the county and the LMAs. Previous studies indicated that pastoralists sell their animals only on a need based behaviour.

Turkana county has poor roads infrastructure which negatively affects the livestock sector and livestock marketing. The long road connection with end-markets in Nairobi increase the marketing costs through higher energy fuel transportation costs, road taxations, bribes, security costs (paid to government security staff), and decreasing livestock quality (non-existence of holding grounds, animal stress during transport, dehydration, etc.). Livestock traders and processors in Nairobi terminal markets take into account all these costs and constraints before making the decision to send trucks or not and buy animals from Turkana. To be competitive with livestock sources from other ASALs production areas, Turkana livestock traders and brokers would pay little money to the producers. Our observations reveal that it is not economically sustainable to sell Turkana livestock to end-markets in Nairobi. It is more attractive to first focus on the booming local market (raise of higher income consumers' category related to the oil industry, and those involved in the private sector), and on the regional markets (neighbouring countries and counties).

Meat processing and value addition is lacking in Turkana county. Lomidat Slaughterhouse, a community management abattoir dealing with procurement and slaughtering, processing and marketing of meat (targeting both local and export markets), faces many challenges to source the raw material (livestock) from pastoralists and to market its product (meat) within and

outside the county. The company is buying cattle and shoats on a weight basis which is supposed to favour producers. Our field visit and discussions with pastoralists revealed that the latter were complaining from the low prices/kg live weight offered by the company and delays in payment. These issues discouraged livestock producers to provide consistent livestock supply for the company which was turning far below its technical capacities inducing problems of fund liquidities. AVCD LC team discussions with Terra Nuova NGO staff, who was involved in the project, revealed that the company business plan initially developed was mainly based on the high demand of meat during the period of nineties and two-thousands in Turkana county mainly fuelled by the high number of South Sudan refugees and the national and expat staff working for the international relief organizations based in the county. The stabilization of the political situation in South Sudan and return of the refugees has negatively impacted the business of Lomidat. There is a need to review the business plan and revive the company that represents an asset for the community and a market source for pastoralists. Buying on live animal weight, if it works, could be seen as a novel way of marketing that could encourage other livestock markets in the region to adopt this model

### 8.3 Peri-urban enterprises

Performance of rural and urban based economic activities in Kenya has remained low with weak linkage between the urban incomes and performance of the rural economy. Turkana county is not an exemption, investments in peri-urban business enterprises is low. One major hindrance especially to private investors is insecurity common in the county (livestock rustling and banditry activities). Such hostile territories are barriers to effective trade in live animals and for private investment in other economic activities. Mobile cash transfer should be promoted by creating strong linkages between mobile phone service providers and banking agency products so as to upgrade mobile phone network access in the area. The AVCD–LC project can, therefore, support the establishment of such linkages and the acquisition of business development skills, especially for women and young people in alternative economic activities, such as the food, clothing, agricultural-related input (veterinary and other agro-input services) sectors. Private investment in weighing scales by especially the women and young people could be supported.

AVCD–LC can also support processing and marketing of hides and skins especially by working with the already existing groups in Lokori, Lokichar and Eliye Springs. This will create employment to the many jobless individuals in the county. Impacting business development skills on hides and skins will enhance trade in hides and skins. Training should also be offered to flayers, selectors, graders, traders and rural tannery units so as to increase the quality of hides and skins traded which are likely to fetch better/ higher prices. Linkages with the end market like Bata Shoes Company among others can promote hides and skins business in the county. The public awareness of a few private investors could be raised to stock industrial salt used in processing of hides and skins.

Fish farming is common in the county especially in Lake Turkana. Targeted business development skills especially in line with: fish farming, harvesting, processing, preservation and trade for women and young people would increase the income sources available to this category of people. In addition, a few livestock lodges could be piloted in the county especially around the livestock markets.



## 8.4 Fodder and seeds

Livestock feed is a big challenge in Turkana county for the livestock value chain especially during drought years. Unfortunately, fodder producers in Turkana lack a business model for commercialization which has contributed to low fodder production, conservation and marketing in the county. Efforts to promote irrigated fodder production have begun championed by the county government, NGOs and other development partners. For example, Turkwel fodder production group is supported by the Catholic diocese. They are producing foxtail grass on two acres of irrigated land. However, most livestock producers depend on natural pasture land but they also demand fodder for their remnant stock which are grazed around the Manyattas. Some producers harvest acacia pods to feed the animals during the dry spell.

### Fodder production

Although locally produced fodder is scarce in Turkana county, a few people are growing fodder in through enclosures which serve as feed reserves during the dry periods (Lugusa et al. 2016). Great potential for fodder production exists especially along Turkwel and Kerio rivers and with the discovered underground water in Lotikipi plain which could be tapped for fodder production. However, AVCD–LC could support fodder production in the county by training the crop producers to integrate fodder in their cropping program and to also expand irrigated land so as to accommodate fodder production. The crop producers should also be trained on fodder conservation such that they can be able to bail and conserve the crop residues which can be used during drought. The project together with the county government could support reseeded of grazing land/ reserves especially in strategic identified sites mentioned above. Some of the grass species that could be used include *Cenchrus ciliaris* and others that are adapted to the prevailing climatic conditions.

#### *Fodder marketing*

The majority of livestock producers in Turkana county rely on communal land for grazing their animals with about 70% of them grazing their remnant herd around Manyattas, 16.7% buy feed while 10% graze on leased land with only 3.3% purchasing hay (Naitos Golden Inspiration 2015b). On average a bale of hay costs KES500, a price perceived to be a bit high by some (12.9%) livestock producers. Much of this fodder comes from the neighbouring counties like Trans Nzoia. However, locally produced fodder is much cheaper. For example, the Turkwel fodder production group sells to Turkana catholic diocese at KES250 per bail.

The main challenge facing fodder producers is lack of harvesting and bailing equipment. On the other hand, the few fodder producers in the county have limited skills on fodder agronomic and conservation practices. AVCD–LC could, therefore, partner with other development partners to promote fodder and fodder seed production by such groups and by individual fodder producers. Some of the interventions of the program could be training on agronomic practices, bailing, conservation and storage techniques. Business development skills could also be impacted on women on fodder production, while the young people could be a good target for fodder bailing enterprises.

In addition, AVCD–LC can partner with Lodwar Catholic diocese who are implementing a successful model where they breed local mixed breeds with Galla goats having two objectives in mind: to breed a bigger goat with a bigger frame and higher weight than the local mixed breed and secondly breed a higher milk producing breed to increase the potential for milk production.



The diocese supports 56 goat groups with 30 members each. The groups receive improved Galla bucks, which rotate inside the groups, each member keeps the buck for 15 days. They are required to select the best does and mate them with the buck. Fodder producers could, therefore, be supported and trained around the dairy goat farming groups to create fodder market for themselves and others. This model could be scaled up with a few sampled individual producers who could be supported with initial improved goat breeds coupled with fodder production.

## 8.5 Best-bet interventions

Table 31 summarizes a selection of best-bet interventions that could be implemented in Turkana county through AVCD–LC project activities and in collaboration with different partners. The scoring of these interventions is reported in Table 32. Scores were allocated in a range from 1 (low) to 5 (high) for the ‘positive’ attributes. For the ‘negative’ attributes related to risk assessment a negative sign was added to the score. An overall score was then computed as the total sum of these individual scores. We opted to provide equal weight to each attribute. A total of 6 possible interventions were identified: i. hides and skins processing and business development skills coupled with better nutrition campaigns; ii. Development and implementation of a livestock market information system (LIMS); iii. Livestock breed improvement and disease control; iv. Development and implementation of a livestock grading system; v. promotion of livestock insurance uptake; and vi. Supporting the co-management model and upgrading the LMAs.

The comparison of overall scores shows that there are no large differences between the proposed activities. The livestock grading scheme was ranked first, followed by the hides and skins processing and business development skills, coupled with better nutrition campaigns. The development of a market information system was ranked third, while the remaining interventions received almost the same scores.

Factors for prioritizing value chain interventions in AVCD

**Table 3.1. Mapping the attributes of the interventions in Turkana county**

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit/ outcome/ impact (productivity, price)	Target actor/ investor (farm, market agent, group, regulator)	Skill, knowledge and management requirement, including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors)	Gender and equity implications (who captures most benefit)	Time to achieve impact on?	Sustainability post project would depend on? (new projects, government investment, private investment)
I. Hides and skins processing and business development skills coupled with better nutrition campaigns	-Existence of Bata leather shoes company	-Better prices for hides and skins -Enhanced nutrition - Strengthened producer marketing groups and increased local consumption and processing of fish as an economic enterprise.	-livestock and fish producers Women and youth	-Hides and skins processing skills -Fish harvesting, processing and preservation skills	-Trained personnel -Private investors	-Private investors	- Low prices for hides and skins -Low income allocated to balanced household food consumption	-End market processors and the youth to one year	Both gender and integrate	-6 months to one year	-Livestock producers -Private investors

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ investor (farm, market agent, group, regulator)	Skill, knowledge and management requirement, including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, most benefit competitors)	Gender and equity implications (who captures)	Time to achieve impact on?	Sustainability would depend on? (new projects, government investment, private investment)
2. Livestock market information system	- Existing KACE and LINKS	-information access on (prices, diseases, etc.)	-livestock value chain actors (producers, traders, input suppliers etc.)	-Skills on bundled information and reporting	-AVCD county Government -Trained personnel -Server	- Mobile phone service providers -county Government -KLMC and CLMC -Media stations -county government -Livestock producer -ILRI/AVCD project	-Lacking advisory services and market information	-Actors in livestock value chain	- Both gender	-12-18 months	-county government -KLMC and CLMCs -AVCD/ NGOs -Value chain actors
3. Livestock Breed improvement and disease control	-ongoing interventions by the Catholic diocese of Lodwar	-improved livestock quality -Strategic disease prevention and control	-Livestock Producers -county government	-Animal breeding skills	-improved animal breeds or semen -vaccines and livestock drugs	-Animal breeders -Livestock producer -ILRI/AVCD project	-Low yielding livestock breeds in the county	-Animal breeders -Livestock producer uptake of improved breeds/ semen	-Both gender	12-18 months	Animal breeders -Livestock producer uptake of improved breeds/ semen

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ investor (farm, market agent, group, regulator)	Skill, knowledge and management requirement, including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, most benefit competitors)	Gender and equity implications (who captures)	Time to achieve impact on?	Sustainability post project would depend on? (new projects, government investment, private investment)
4. Development of grading scheme	- Currently absence of grading scheme -Somaliland grading scheme	-Transparent pricing system based on animal quality -Better prices to producers -Better quality animals -Mitigates producer livestock losses	-All value chain actors but mainly producers, traders and brokers	-Knowledge in animal grading for ILRI team -Basic skills for recipients	-ILRI team -Workshop organization and field activities -Resource AVCD-LC project funds + county funds -Funds to organize sensitization workshops	-Ministry of Livestock -Counties' livestock departments	-Demand for high quality animals -Higher prices for better animal quality -Information needs for LMIS	-Value chain actors -National and county livestock departments	-All genders involved in livestock production and marketing, but mainly men	- 1-2 years	-Highly sustainable -Value chain actors -LMAs -KLMC
5. Promotion of livestock insurance uptake	-Currently available in Marsabit, Isiolo and Wajir	-Livestock producer losses	-Livestock producers	-Sensitization on the existence of the product	-Insurance company (Takaful) -county livestock department -National Livestock department	-Frequent occurrence of droughts -High mortality rates due to droughts	-Livestock producers -Insurance company	-all genders involved in livestock production	- 1-2 years	-Private insurance company investment -ILRI IBLI team in improving the product	

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ investor (farm, market agent, group, regulator)	Skill, knowledge and management requirement, including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors)	Gender and equity implications (who captures most benefit)	Time to achieve impact on?	Sustainability
6. supporting the co-management model and upgrading the LMAs	-The LMAs in Laikipia are doing quite well	-Better livestock market infrastructure -Higher animal transactions per market day -Better information collected on livestock prices, marketed numbers, diseases, etc.	-county livestock department -LMAs	-Management skills, good financial practices skills, officials and negotiation skills	-Funds for training the LMAs members on management and best practices skills -Funds to organize meetings with the county livestock officials and attorney	-county government -KLMC/CLMC -LMAs	-No co-management or revue sharing model implemented yet - Revenue collection by the county government could be highly improved -Generally poor market infrastructure	county government -KLMC/CLMC	-All genders involved in livestock marketing	-1 year to 18 months	-county government -KLMC/CLMC -LMAs

Source:AVCD LC Survey (2016)

**Table 32. Scoring the Interventions in Turkana county\*\***

Name of the value chain intervention**	Strength of evidence of or potential success	Is the benefit of the type and scale to meet project objectives?	Are the potential targets many and do they match project objectives?	Are the targets likely to be able to manage the innovation?	What is level of risk of inadequate resources, including during shocks?	Risk of lack of partner capacity, reliability, etc.	Strength of evidence of demand	What is level of risk due to dependence on others?	Does the distribution of benefit suit the project aims?	Does this time period suit the project aims?	Sustainability score	Total score
1	4	4	5	5	-2	-2	4	-2	4	4	4	28
2	4	4	5	5	-2	-3	4	-2	4	4	4	27
3	4	4	4	4	-2	-2	4	-2	4	4	4	26
4	4	5	4	4	-2	-3	5	-1	4	4	5	29
5	3	4	3	4	-1	-2	3	-2	5	3	4	24
6	4	4	5	3	-2	-3	4	-3	5	4	4	25

\*Each column, except the first one, scores the attributes of the matching column above in the previous table (1=low, 5=high). For the questions related to 'risk assessment' a negative score was provided

\*\*The same as the previous table

Source:AVCD LC Survey (2016)

## 9. Livestock and fodder value chains in Wajir

### 9.1 Overview of Wajir county

Wajir county covers an area of 61,651 km<sup>2</sup>. It borders Somalia to the east and Ethiopia to the north, Counties of Mandera to the northeast, Isiolo to the southwest, Marsabit to the west and Garissa to the south. The county comprises of six sub-counties namely: Wajir East, Wajir West, Wajir North, Wajir South, Eldas, Tarbaj. Temperatures are very high ranging between 21-36 C and an average of 28 C. The county receives low rainfall ranging between 200 mm and 700 mm and an average of 240 mm per annum. The higher areas of Bute and Gurah receive higher rainfall of between 500 mm and 700mm.

The county has a population of 727,941 people projected at an annual growth rate of 3.2% from 661,941 in 2009 (KNBS 2009). It has 88,574 households with 57% of the population being male and 43% female and a population density of 12 people per km<sup>2</sup>. Most of land in the county is arid and the main economic activity is livestock rearing with some agro-pastoralism being practiced in the northern part of the county. The entire county is categorized as trust land apart from a small percentage of the total area occupied by townships. The main land use system is nomadic pastoralism.

The county is featureless plain with seasonal river and Lake: Ewaso Nyiro and Yahud respectively. It has seasonal swamps and drainage lines which serve as grazing zones during the dry season and are used for cultivation during the rainy seasons. Sedimentary rocks are common in the county and loamy soils in the north. Ground water is the main source of water harvested mainly from: numerous wells, earth pans, dams and boreholes. The county has mineral resources like limestone and sand and has great potential for solar and wind energy.

### 9.2 Livestock production and marketing

Like other counties in northern Kenya, Wajir is predominantly arid and nomadic pastoralism is the main source of livelihood accounting for over 70% of incomes and employing over 65% labour force. Livestock production is not market oriented but rather animals are kept for different needs including food, income when need arises, social cultural needs and insurance or banks. Consequently, animal offtake tends to be very low leading to poor supply to the markets. On the other hand, there is very heavy loss of animals during droughts. Currently, producers have not yet recovered herds lost during the 2010 drought and there is a high possibility of herds of large ruminants to continue declining due to commercialization pressure and potential losses due to external shocks. There is also some gradual moving away from cattle keeping to more shoats. Camels are also highly preferred due to the high prices they fetch, use to pay dowry and tolerance to drought with the Somali breed being dominant Like in any other pastoral community, poverty is typically associated with stockless pastoralists.

Wajir lies on the northeastern livestock trade route (Somalia, Wajir, Mandera, Garissa) that supplies a large proportion of livestock to the terminal markets in Kenya (Nairobi, Mombasa and Coastal ranches). There are two main secondary markets in Wajir county: Habaswein and Wajir. The infrastructure of these two markets is relatively better developed that includes a sale yard, loading rumps and toilets which have been installed through donor support. During our field visit to Wajir market, we noticed a lack of maintenance of the market facilities and infrastructure. The toilets were closed and not working, water which is an important source for both humans and animals was not supplied (a camel producer attending the market, was getting water from neighbours to water his animal), shades for sellers and buyers were not well designed, market gate



was broken, etc. Livestock received in Wajir and Habaswein markets comes from primary markets within the county and the neighbouring counties like Mandera and Marsabit also from neighbouring countries, Ethiopia and Somalia. Most of these animals are sold in Nairobi, Mwingi, Thika, Garissa and Mombasa (Naitos Golden Inspiration 2015c).

The primary interior markets are spread within the county and they include: Griftu, Eldas, Bute, Tarbaj, Kotulo and Sebuli. All the primary markets operate on a daily basis, supplying livestock to the two major secondary markets. These markets do not have adequate infrastructure except Bute, Eldas and Kuturo which have sale yards and loading rumps constructed through donor support. In such markets with no market infrastructure, livestock trading take place under a tree, in the grazing areas or watering points.

While vibrant interior markets can increase uninterrupted market participation of livestock producers especially by eliminating the brokers—who take advantage of the distances to exploit producers—and reduce other en-route charges. These benefits have not been tapped effectively in Wajir due to inadequate or lacking infrastructure in these bush and primary markets. These leaves producers with less/no alternatives, either to depend on distant markets (Wajir and Habaswein) and those who cannot make it to the distant markets are exposed to exploitation by middlemen. Besides the livestock body condition is wasted when trekked for long distances.

On the other hand, co-management model has been adopted in Wajir county though its implementation is variable in different parts of the county. LMAs are operating in the two secondary markets and some of the primary markets, but cess revenue sharing is not yet implemented because of the reluctance of Wajir county government. LMAs have been trained in Wajir and Habaswein markets to facilitate market governance, maintenance of market infrastructure and oversee general operations of the markets. In addition, the two markets have market monitors, employed by CLMC to collect and disseminate livestock market information to traders and livestock producers. Regarding livestock markets in Wajir county, establishment and management of livestock markets is the sole mandate of the county government.

Somalia and Ethiopia have a lucrative export market for camels in Middle East which pulls the flow of camels from Wajir to Ethiopia or Mogadishu. The large number of camels in the county offers a high milk production potential with an estimated 8,000–13000 litres of milk sold in Wajir town. The 2010 drought has drastically impacted the number of livestock traded within the county and affected prices which were more than 50% lower compared to 2011–2015 prices (Table 33). For instance, a sheep, which is less resistant to heat and drought compared to a goat, was sold at an average price of KES830 in 2010. The following year its average price doubled. Although there exists a tendency of pastoralists to shift from cattle production to camels and goats (more heat and drought tolerant), cattle sales have increased during the 2011–2015 period from KES15,000 to more than KES35,000 reflecting the increased demand of beef meat in the county and mainly in the surrounding counties and terminal markets like Nairobi and Mombasa. In 2015, cattle sales (value) overtook those of camels.

**Table 33. Livestock sales records—Wajir county**

	Animal Type	Cattle	Camels	Sheep	Goats	Total
Year 2010	Numbers sold	6,220	5,089	27,965	36,559	75,833
	Average annual price (KES)	7,870	10,750	830	1,065	----
	Value of sales (millions of KES)	48.9	54.8	23.2	38.9	165.8
Year 2011	Numbers sold	11,777	17,133	24,523	79,985	133,418
	Average annual price (KES)	15,395	26,774	1,680	2,770	----
	Value of sales (millions of KES)	181.3	458.7	41.2	221.6	902.8
Year 2012	Numbers sold	13,940	19,886	43,982	72,634	150,442
	Average annual price (KES)	17,985	30,000	1,880	2,950	----
	Value of sales (millions of KES)	250.7	596.6	82.7	214.3	1,144.3
Year 2013	Numbers sold	10,872	11,378	36,361	36,637	95,248
	Average annual price (KES)	14,000	30,000	1,800	3,000	----
	Value of sales (millions of KES)	152.2	341.3	65.5	109.9	668.9
Year 2014	Numbers sold	12,318	13,097	47,354	69,631	142,400
	Average annual price (KES)	14,500	50,000	2,100	3,470	----
	Value of sales (millions of KES)	178.6	654.8	99.5	241.6	1,174.5
Year 2015	Numbers sold	26,105	16,690	46,250	65,250	76,821
	Average annual price (KES)	35,500	29,900	2,440	3,740	----
	Value of sales (millions of KES)	926.7	499	112.9	244	1,782.6
2016 target setting (Oct. 2015–Sept. 2016)	Planned % annual increase in # of animals	30	26	12	18	----
	Price consideration (Annual Average Price)	30,800	33,000	2,700	4,100	----
	Planned total increase (# of animals)	33,937	21,029	51,800	76,995	----
	Planned total value (millions of KESs)	1,045.2	694	139.9	315.7	2,194.8
2017 target setting (Oct. 2016–Sept. 2017)	Planned % annual increase in # of animals	10	7	8	15	----
	Price consideration (annual average price)	32,000	34,000	2,800	4,200	----
	Planned total increase (# of animals)	37,330	22,501	55,944	88,544	----
	Planned total value (millions of KES)	1,194.6	765	156.6	371.9	2,488.1

Source: county Office of Director Livestock Production

## Animal health

As in the case of other Kenyan ASALs counties (Garissa, Turkana, Marsabit, etc.), livestock value chain in Wajir is characterized by deficiencies in the delivery of animal health services and veterinary products and drugs (Naitos Golden Inspiration 2015c). These drawbacks are mainly due to poor roads infrastructure, vastness of the area, livestock mobility, seasonality in the number of animal to diseases, harsh climatic conditions, etc. Cross-border trade is another constraining factor, where livestock are informally imported/exported from/to neighbouring countries (Ethiopia and Somalia) with absence of veterinary controls and health certification.

Similar to the Garissa county animal health situation, the majority of pastoralists, who have little or no skills at all in animal treatments, rely on themselves to treat their animals. The rest of the farmers either hire the services of the CAHW or invite a neighbour for help. Very few of them pay the services of trained animal health personnel. The low educational level of pastoralists, in addition to the lack of advice on the use of drugs, dosage, withdrawal periods and safe handling of drugs, result in high likelihood of misuse of drugs and consequently potential drug residues in animal products. Counterfeit drugs mainly smuggled from Somalia also constitute a serious issue affecting the efficacy of the treatment and distorting the market by reducing registered agro-veterinarian shops incomes. In a previous study (Naitos Golden Inspiration 2015c) the results from a household survey in Wajir county indicated that on average 7.8 cattle, 18.1 shoats, 2.8 camels and 3.4 poultry had died per household in the last 12 months due to diseases. The treatment costs are KES989.8 for cattle, KES2,538.6 for shoats, KES2,975.8 for camels and KES55.4 for poultry per year (Naitos Golden Inspiration 2015c).

The AVCD–LC animal health team organized few months ago various focus-group discussions (FGDs) in different villages in Wajir county. The FGDs included the participation of livestock producers, livestock traders, CAHWs and county veterinary officers. The main objective of these FGDs was to identify and rank the most important livestock diseases in the region in terms of their impacts on pastoralists' livelihood (Table 34).

**Table 34. Listing and ranking of the main important livestock diseases in Wajir county**

Camels	Cattle	Shoats
Trypanosomiasis	FMD	PPR
Haemorrhagic septicaemia	Anthrax	CCPP
Sudden death syndrome	Lumpy skin	Sheep/goat Pox
Anthrax	Helminths	Helminths
Mange/abscesses	CBPP	Enterotoxaemia
Joint pain	Pox	FMD
Wry neck	Three days sickness	Heart water

Source: AVCD–LC animal health team (2016)

Trypanosomiasis, Haemorrhagic septicaemia and sudden death are the most important and first ranked camels' diseases by livestock producing communities in Wajir. During AVCD survey team field visit in February 2016 an unknown disease was detected as affecting the camels in the region. The symptoms of the disease appear few days before the death of the animal. A high number of camel losses was reported due to this unknown disease. county veterinary officers as well as the Nairobi national veterinary services collected blood as well as meat samples from the disease dead camels for analysis. The veterinary technicians/scientists were not able to identify the causes of the disease, and few months later, the disease disappeared. The same situation was reported years ago (around 2007) and the disease disappeared without any results from the veterinary services (Naitos Golden Inspiration 2015c). These recent and past incidences provide an overview of the low animal health services efficiencies in the region. For cattle, the most important diseases highlighted by the participants were FMD, anthrax and lumpy skin. For small ruminants, PPR, CCPP and sheep and goat pox were the most important diseases reported during the FGDs.

## Market information

Like in other ASALs areas, advisory services and market information are also often lacking for producers. The traditional extension system has proved ineffective in reaching producers due to understaffing, lack of financial resources to facilitate extension activities, mobility of

pastoralists, low population densities within expansive areas and insecurity among other factors. The devolution system is supposed to provide county government's higher autonomy and the sovereignty to decide on the allocation of the devolved funds. Although pastoralism is the main livelihood of the ASALs populations in Kenya (more than 70% of the population is directly or indirectly involved in livestock activities), the recent figures indicated that counties' investment and budgets allocations for the livestock sub-sector (including staff salaries) were ranging between 1% and 3.5% of the total budget, which is very low (these figures are lower compared to previous, before devolution, national/central government budgets allocations for the sub-sector). Likewise, existing market information systems are ineffective in reaching producers leading to information asymmetry that leaves producers vulnerable to exploitation by traders.

As discussed in the previous sections of this report, the co-management model represents an opportunity for the development and implementation of a market information system. LMAs through their livestock markets management have access to information and data on the number of animal species sold per market day, the prices per species, the type of actors involved, the animal health status and disease occurrence, etc. Although the current AVCD–LC project target to develop a livestock market information system (LMIS) which covers the five targeted counties, we think it is possible for each county to develop its own local LMIS (probably less complex compared to the project system), by collating daily/weekly information from the existing LMAs, and then disseminating this information to the different livestock value chain actors through the use of local radios programs and also by developing a small market research and intelligence team that could be reached by calling a hotline number (with a slightly higher fee to pay for the costs incurred to collect the information and to pay the phone operators). The information provided by the market research team/office could include daily/weekly livestock prices (by species, by grade, by livestock market, etc.), number of animals sold (by specie, by livestock market), number of animals supplied (by specie, by livestock market), livestock apparent or detected diseases (by species, by livestock market), presence/attendance of agro-veterinarians and mobile drug sellers, etc. The improvement of mobile network infrastructure and coverage during the last decade provides an enabling environment to implement such market information system.

## Gaps for commercial production

As in the case of the other counties, the absence of a clear and transparent livestock grading system represents an important constraint for animal marketing. Animals delivered to the market are generally too old, which has implications on meat quality, or too skinny to fetch high market prices. The establishment of a clear and transparent grading system will improve the quality of animals marketed and increase income for smallholder producers.

The proximity of Wajir county to the Somali and Ethiopian borders boosts its cross-borders livestock trade (like in Garissa and Mandera) but represents at the same time a threat in terms of animal health and disease outbreaks. This calls the local authorities to improve the surveillance system and animal health service deliveries. An outbreak of FMD or RVF will have disastrous impacts on livestock trade not only in Kenya but for the entire region. The 2001 Saudi Arabia ban to import livestock from the horn of Africa due RVF outbreaks resulted in deep economic crises in Somaliland whose economy is mainly based on the livestock exports representing around 60% of the gross domestic product, 70% of employment opportunities and 85% of exports earnings (Mugunieri et al. 2016).

During the scoping visit to Wajir county, We met with the LMA representing Wajir town livestock market. The county government has yet not 'recognized' the LMAs and the co-

management model is not working. Wajir livestock market infrastructure is in very poor condition. The water point for animals and humans was not functioning. A camel owner was collecting water from houses that were close to the market to water his animal. Animal as well as humans shed were not constructed or usable. The market gate was damaged. There was only one loading and unloading ramp for both small and large ruminants. All these deficient market infrastructures could have been fixed and improved if the co-management model was in place and LMAs were able to share revenue with the county government and access funds.

In Wajir livestock market, sellers and buyers are not able/allowed to directly interact and agree on prices. Brokers are always present between the sellers and buyers. In Wajir, clan tradition is very strong (like in Somali society) and livestock seller and a buyer from two different clans are not allowed to directly interact. Each of the buyer and the seller needs to interact with a broker from his/her clan. Then, both brokers will meet, discuss and agree on a price. Officially the commission perceived by the brokers for each animal type (shoat, cattle, camel) is fixed and accepted by all the participants. However, since both buyer and seller were not present during the negotiation between the two brokers, the real transaction/agreed price is only known by the two brokers. It is generally higher to what the seller is told, and lower to what the buyer is told. When both seller and buyer are from the same clan, only one broker is necessary for the transaction. Again, the negotiation is done between seller-broker and buyer-broker and never involves the three actors together. This situation inflates the price for the buyers, decreases the price for the seller, and provides the broker (who is the less risk taker) with the highest margins. It creates market inefficiency.

During the field work, we visited the export abattoir near Wajir town. As in many other counties in Kenya, the construction of slaughterhouse was previously started by the national government. However, many years after the start of the construction works, the abattoir was not yet completed (at around 90% of achievement) and work has stopped because of funding issues. After the start of devolution, the abattoir property right was transferred to Wajir county which is looking for private foreign investors to take over, finish the required construction work and start running the slaughterhouse. The county government has already started constructing the tarmac road which will connect the slaughterhouse to the city centre. Few months later after our first visit, the road was constructed.

### 9.3 Peri-urban enterprises

There are about 200 ha under fodder cultivation in Wajir county (McPeak 2016). Some fodder is grown at the outskirts of Wajir and is mainly sold to the county and sometime to NGO's at a higher price. Fodder production is a business enterprise if well embraced by individual and group entrepreneurs in the county can mitigate the challenge of feed especially during the recurrent draughts. The produced fodder can also be used to fatten or finish animals which can fetch a higher price in regional or terminal markets. AVCD–LC project should therefore support training of selected individual and group fodder producers on agronomic practices and conservation of fodder. This can especially support the remnant herd increasing milk produced during the dry season. Further, support with shed nets for fodder producers can enhance its production and conservation. The AVCD–LC project could also support and facilitate building of linkages between fodder producers and various service providers, such as financial institutions most of which should be Sharia compliant for them to access the initial investment, input suppliers as well as support training of individual and group fodder producers especially on agronomic practices, bailing and storage. A few sampled fodder producers can also be supported to acquire basic fodder harvesting and bailing equipment.

Wajir county is often affected by seasonal migration of animals to distance grazing areas which are far from livestock markets and from the market centres. Camels and cattle are the main source of milk for the pastoral households. Fodder production can support the milk value chain in the county where remnant herd especially the dairy animals can be fed on preserved/purchased fodder to maintain milk flow all year round. AVCD project could also support training of youth and women groups and individuals to embrace rearing of dairy goat animals especially around the fodder producing pockets. This will ensure continuous milk production all year round even after migration of the bigger herd. Such groups should also be trained on milk processing and value addition so as to increase the shelf life of the locally produced milk. This will also create ready market for the locally produced fodder. The local indigenous goat breeds can be upgraded using male goats (boars) from high milk producing breeds. The project can also link such interested/potential farmers to financial institutions where they can get the start-up/seed capital.

## 9.4 Fodder and seeds

Just like most ASAL counties in Kenya, livestock feed is a major setback in Wajir county especially during drought period. For example, in 2009 about 65% animals were lost due to drought. Sustainable fodder production, conservation and marketing can increase pastoralists' resilience to drought conditions reducing the number of animal deaths/ mortality rate. Fodder production is a viable micro-enterprise in Wajir county. Indeed, fodder production in Wajir county is more feasible due to the county's low altitude (McPeak 2016).

For example, SNV, ILRI and KLMC are supporting Mungano Makaror farming group to produce fodder. This group which also engages in other agricultural activities like fruits and shoat production has been trained on fodder production. AVCD–LC can therefore scale up this replicable intervention across the county and other counties to increase resilience and probably influence commercialization of livestock value chain.

### Fodder production

The types of feed used in livestock feeding in Wajir include: Natural pastures, shrubs, tree leaves and pods). The grass species that grow/ grown are: *Cenchrus ciliaris*, *Cynodon dactylon*, *Pennisetum mezianum* others include *Acacia* species like *Balanite saegyptiaca*, *Grewia* Spp, *Commiphora* spp whose pods are fed on animals (browsers) during drought. However, Sudan grass and *Cenchrus ciliaris* are the types commonly produced under irrigation with very low cultivation of highly nutritive fodder like Lucerne and Calliandra (McPeak 2016).

The commercialization of fodder is very low in the county. However, efforts to promote fodder production and marketing have begun. For example, the county government is supporting 10–15 km<sup>2</sup> of irrigated Rhodes, Sudan and *Cenchrus ciliaris* grasses. A few pastoralists conserve standing fodder around the Manyattas while other bail the natural grass from community land. Some key constraints faced by fodder producers in the county are: lack of skills, access to inputs like seeds, and water, lack of/ poor storage facilities and lack of bailing equipment. In fact, individual fodder producers lack storage facilities but a few group fodder producers have been supported by NGOs to construct fodder stores in urban centres.



## Fodder marketing

Marketing of fodder is poorly developed in the county. Mainly, pastoralists buy fodder for their remnant animals while the bigger herd graze in distant grazing land. About KES5,000–25,187.5 is spent to purchase fodder for the remnant animals during drought. The average price for a bale of fodder during the dry season is KES700 and KES250-300 during the wet season for a 25-kg bale, while a 12–13-kg manual bale sells at KES500 during the dry season. On the other hand, the average price for a bale of beans stovers is KES1,000. The high price greatly limits the ability of pastoralists to purchase fodder for their entire large herd during the dry seasons. However, the county government provides support fodder during drought which they buy from fodder producers within the county.

Access to fodder seeds is also a big challenge and the seed sells at an average price of KES1,000 per kg. Those producing fodder in the county were given initial seed by NGOs. Efforts to train fodder producers on seed harvesting were done by some NGOs. AVCD–LC could partner with the existing NGOs to scale up fodder seed production and train many pastoralists on fodder production, conservation and baling. The photo below shows some of the fodder value chain activities in Wajir county.



Source: AVCD LC survey (2016) and Naitos Golden Inspiration Report (2015c)

Fodder producers could be supported to strategically produce and store fodder which they could sell in times of drought. This would fetch them higher returns. The AVCD–LC project could, therefore, support and facilitate building of linkages between fodder producers and various service providers, such as financial institutions most of which should be Sharia compliant for them to access the initial investment, input suppliers as well as support training of individual and group fodder producers especially on agronomic practices, baling and storage. A few sampled fodder producers can also be supported to acquire basic fodder harvesting and baling equipment. AVCD LC should promote and support fodder production through sensitization campaigns/training to especially the people of more limited wealth. Establishment of linkages between fodder producers and demand side should be supported. Pastoralists should also be trained on intensification of livestock production, this will create fodder marketing opportunities. Research on more cost-effective storage solution should also be supported.

## 9.5 Best-bet interventions

Table 35 summarizes a selection of best-bet interventions that could be implemented in Wajir county through AVCD–LC project activities and in collaboration with different partners. The scoring of these interventions is reported in Table 36. Scores were allocated in a range from



1 (low) to 5 (high) for the 'positive' attributes. For the 'negative' attributes related to risk assessment a negative sign was added to the score. An overall score was then computed as the total sum of these individual scores. We opted to provide equal weight to each attribute.

A total of five possible interventions were identified: i. Fodder production; ii. Goat milk production; iii. Development and implementation of a livestock grading system; iv. Development and implementation of a livestock market information system (LIMS); and v. supporting the co-management model and upgrading the LMAs. The development and implementation of livestock grading scheme received the highest score. This intervention mainly depends on the AVCD–LC project staff skills and on low investments. It is also backstopped and with interest from the county as well as the national/central livestock departments in Kenya. The implementation of a livestock market information system, and the goat milk production interventions could also be considered for implementation by the project.

Factors for prioritizing value chain interventions in AVCD

**Table 35. Mapping the attributes of the interventions in Wajir county**

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ Skill, investor (farm, market agent, group, regulator)	Knowledge and management (financial, requirement, land) including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
1. Fodder production	Muungano Makaror farming group which engages in fodder and fruit production	-Enhanced community resilience during drought	-livestock producers -fodder seed and fodder producers -county government	-Agronomic practices for producing fodder -fodder harvesting and conservation skills	-Fodder seeds -fodder harvesting and bailing equipment	-fodder producers -county government -Sponsors	-migration of animals to distance grazing areas in search of pasture and water -death of animals during draught	-Sponsors -willingness of fodder producers to invest in fodder and fodder seed production -Financial institutions who give credit facilities to livestock producers	-Both gender	6 months to one year	fodder producers' willingness to adopt and upscale the intervention  -county government support in offering extension service  -Sponsors
2. Goat milk production	Dairy goats rearing in Marsabit and Isiolo counties	-Higher incomes to producers -Continuous milk supply all year round	-livestock producers -fodder seed and fodder producers -county government -Animal breeders	-Good animal husbandry to be able to rear the dairy goats -Improved semen from high yielding goat breeds	-Livestock producers -animal breeders -county government -fodder producers	-Livestock producers -animal breeders -county government -fodder producers	-high milk prices in the county -low supply of milk during the dry spells	producers -Sponsors -willingness of livestock producers to invest in rearing of dairy	-Both gender	-6 months to one year	-milk producers -private investment

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit/impact (productivity, price)	Target actor/ Skill, investor (farm, market agent, group, regulator)	Knowledge and management including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
3. Development of livestock grading scheme	- Currently absence of grading scheme - Somaliland grading scheme	- Transparent pricing system based on animal quality - Better prices to producers - Better quality animals	- All value chain actors but mainly producers, traders and brokers	- Knowledge in animal grading for ILRI team - Basic skills for recipients	- ILRI team - Workshop organization and field activities - Resource AVCD-LC project funds + county funds	- Ministry of Livestock - Counties' livestock departments	- Demand for high quality animals - Higher prices for better animal quality	- Value chain actors - National and county livestock departments	- All genders involved in livestock production and marketing, but mainly men	- 1-2 years	- Highly sustainable - Value chain actors - LMAs
4. Livestock market information system	- Existing KACE and LINKS	- information access on (prices, diseases, etc.)	- livestock value chain actors (producers, traders, input suppliers etc.)	- Skills on bundled information collection and reporting	- AVCD county Government - Trained personnel - Server	- Mobile phone service providers - county Government - KLMC and CLMC - Media stations	- Lacking advisory services and market information	- Actors in livestock value chain	- Both gender	- 12-18 months	- county government - KLMC and CLMCs - AVCD/ NGOs - Value chain actors

Name of the value chain intervention	Source of innovation and evidence of existing examples	Main type of benefit outcome/ impact (productivity, price)	Target actor/ Skill, investor (farm, market agent, group, regulator)	Knowledge and management including collective management	Resource requirements and source (financial, land)	Partner needed to implement (local NGO, country department)	Evidence of demand (FGDs, market prices)	Dependence on which other actors (regulators, market agents, competitors) benefit)	Gender and equity implications (who captures most benefit)	Time to achieve impact	Sustainability post project would depend on? (new projects, government investment, private investment)
5. supporting the co-management model and upgrading the LMAs	-The LMAs in Laikipia are doing quite well	-Better livestock market infrastructure -Higher animal transactions per market day -Better information collected on livestock prices, marketed numbers, diseases, etc.	-county livestock department -LMAs	- Management skills, good financial practices, negotiation skills -Higher animal transactions per market day	-Funds for training the LMAs officials and members on management and best practices and skills -Funds to organize meetings with the county livestock officials and attorney	-county government -KLMC/CLMC -LMAs	-No co-management or revenue sharing model implemented yet - Revenue collection by the county government could be improved -Poor market infrastructure	county government -KLMC/CLMC	-All genders involved in livestock marketing	-1 year to 18 months	-county government -KLMC/CLMC -LMAs

Source: AVCD LC survey (2016)

**Table 36. Scoring the interventions in Wajir county\*\***

Name of the value chain intervention***	Strength of evidence of demonstrated or potential success	Is the benefit of the type and scale to meet project objectives?	Are the potential targets many and do they match project objectives?	Are the targets likely to be able to manage the resources, including innovation?	What is level of risk of inadequate resources, including during shocks?	Risk of lack of partner capacity, reliability, etc.	Strength of evidence of demand	What is level of risk due to dependence on others?	Does the distribution of benefit suit the project aims?	Does this time period suit the project aims?	Sustainability score	Total score
1	4	4	5	3	-2	-2	3	-3	4	5	3	24
2	4	4	4	3	-2	-1	4	-2	2	5	4	25
3	4	5	4	3	-1	-2	5	-2	4	5	4	29
4	4	4	5	4	-1	-3	4	-3	4	4	4	26
5	4	4	5	3	-2	-3	3	-2	5	4	3	24

\*Each column, except the first one, scores the attributes of the matching column above in the previous table (1=low, 5=high). For the questions related to 'risk assessment' a negative score was provided

\*\*The same as the previous table

Source:AVCD LC survey (2016)

## 10. Conclusions and recommendations

Positioning livestock sub-sector as a key driver for delivering 10% economic growth in Kenya as per the 'Vision 2030' is critical. Livestock is an important sub-sector of the Kenyan economy with animal estimates of over 17 million cattle, 17.1 million sheep, 27.4 million goats and 3 million camels (KNBS 2009). Northern Kenya accounts for a significant (80–90%) meat supply nationally. Unfortunately, the livestock sub-sector in this area is confronted with many challenges including: insecurity, frequent droughts, poor infrastructure, disease outbreak and immense market failure which pose serious risks to the livelihood of pastoralists and their animals.

In the case of livestock feeds, the challenge is that fodder production in northern Kenya is predominantly rain fed and many farmers do not conserve feeds. On the other hand, minimal public-sector investment by the respective county governments as well as inefficient and poorly coordinated support services are common in the ASAL counties. Many initiatives and interventions are being undertaken to reduce some of these inefficiencies experienced along the livestock and fodder value chains.

While these challenges are real, the sub-sector has enormous untapped potential presented especially by the livestock revolution towards consumption of more animal-source foods fuelled by increasing income, population growth and urbanization which is expected to continue for at least the next three decades. Increased productivity and enhanced animal trade to meet the uprising in demand should, therefore, remain a priority of any development intervention.

The results of this study reveal that in the five AVCD LC counties, the core activities in the livestock value chain comprise livestock production, marketing, slaughter and/or processing, and meat and meat products marketing. The main actors are: pastoral producers, livestock traders (of different types including bush, primary and secondary market traders), brokers, butchers and meat sellers, animal trekkers and truckers hired to transport animals. Livestock production is the bedrock driving the value chain, performed by pastoralists.

The main species reared include: cattle, camel, sheep and goats, with relative variation in importance of these species across different counties/communities. The current trend shows a reduction in the numbers of cattle perhaps due to their higher vulnerability during drought and increases in numbers of camels and small ruminants which are more resilient in the face of the negative impacts of climate change. On average, the number of animals owned per household are: 8.74 camels, 14.6 cattle and 55.74 shoats in all study counties with variations in the means for each county.

Producers are often not commercially-oriented but rather view their livestock as assets and only sell them when there is need for money or due to distress, occasioned by catastrophes such as drought and other vagaries of weather. Most (98%) of the animals and meat produced is low quality. The value capture by producers tends to be low (in some cases <35% of retail value) due to the poor quality of animals sold, the lack of a grading system, presence of many intermediaries in the marketing chains and exploitation by brokers due to a total lack and/or limited market information, including on prices.

Drought presents a serious threat, with some groups losing up to 50% of their herds during severe drought incidences. Throughout the project area, there is obvious range land destruction due to overgrazing, a lack of grazing management, massive inbreeding of animals and frequent insecurity and rustling resulting into sedentarization. Over 80% of pastoralists are illiterate and they also encounter a dysfunctional supply of veterinary drugs. In addition, producers lack knowledge on planned grazing and husbandry best practices.



Livestock diseases, such as foot-and-mouth disease (FMD), CBPP, CCPP, black quarter, Rift Valley fever, pose serious risks. At the same time, animal health services and inputs are widely lacking at the grassroots level with most producers treating their own animals based on their long experience/ indigenous knowledge. Though they sometimes consult with other farmers and agro-veterinarian dealers. In some cases, pastoralist buy counterfeit drugs which they perceive to be more effective than the equivalent bought from the agro-veterinarians simply because the concentration administered is higher than recommended. This is a health risk due to drug residue effects in animal products as well as resistance developed when drugs like tetracycline are administered to treat the animals. Producers also lack access to disease surveillance information.

Demand for red meat is highest in Nairobi and Mombasa and, hence, they are the high-end terminal markets for animals coming from the study sites. Willingness to pay premiums for quality, reliability and cleanliness is higher among higher-income consumers in these cities. The export market for red meat and live animals is not well exploited; however, a noted recent trend in areas where cross-border trade is highest like Marsabit county is that, Ethiopia feedlots have created high demand for young bulls (259–280 kg) and shoats (15–30 kg), while more mature sheep and goats are directed to Kenyan markets.

Possible areas for AVCD–LC investments and strategies that could be used to ensure that the proposed interventions bear the desired fruits are list below.

- Investment in production and marketing strategies that aid pastoral producers to participate and benefit from the high-quality meat trade. A good approach to pilot this is to target niche areas where fodder production is feasible and /or is being promoted by other development partners. The project could support groups of producers to engage in finishing of young animals, especially small ruminants, which are then sold directly to high-end abattoirs. Selling through the NRT which have supply contracts with some high-end butcheries and who are a partner in this project could be explored in the case of cattle. However, this might require investments and commitments in guaranteeing supply by the producer groups.
- Support for the development of more vibrant livestock markets in the project counties to cut down on number of intermediaries in the marketing chains. One good way of doing this would be by supporting the institutionalization of the co-management model of livestock markets through the enactment of livestock sale yard bills in the five project counties coupled with nurturing the establishment of vibrant LMAs that are charged with the day-to-day management of livestock markets. AVCD–LC could, therefore, support the restructuring of the KLMC and CLMCs to become vibrant organizations able to handle emerging challenges on governance, transparency and accountability to become more responsive to the needs of LMAs, including systems for carrying out regular audits and the signing of memoranda of understanding between the KLMC and the county governments where possible. This includes support for efforts to finalize the legislation process of the sale yard bills where possible in Isiolo and Marsabit counties.
- Design of a sustainable and effective market information system which would boost the bargaining power of livestock producers. Although brokers play a critical role in livestock trade (interpretation and conflict resolution), sometimes they are perceived as actors exploiting producers. This category of people could be very useful in collecting and disseminating market information. An opportunity here exists for the project to leverage the knowledge and system developed by the IBLI and KACE.

- Promotion of risk mitigation measures such as livestock insurance, feed production and conservation, and better range management practices including reseeded of degraded lands. For livestock insurance, there is an opportunity for the project to work with IBLI to intensify the uptake of the insurance product. The promotion of better range management practices could feature development of institutional arrangements that could enable livestock producers work with conservancies in grazing management and livestock marketing. The mitigation of livestock diseases including supporting development of vaccination plans against common notifiable disease and surveillance. This could leverage efforts by: county governments; development actors, such as the Food and Agriculture Organization of the United Nations, that often devote resources to the prevention of livestock diseases in these areas; and private sector actors such as Sidai that is striving to ensure delivery of quality animal health services to producers. In particular, involvement of the private sector actors in vaccination campaigns could enhance their profitability and viability which has been a major hindrance to their establishment in the project area.
- A major constraint to improving the prices that producers fetch for animals sold is lack of a clear, consistent animal grading scheme, as well as a transparent price discovery mechanism. AVCD LC could support efforts towards establishing agreed grading schemes in selected markets with strong collaboration with county governments, other PREG partners, LMAs and traders. This will help build producer awareness about the additional value for better finished animal and provide transparent standards of animal pricing.
- Natural pastures, shrubs, tree leaves and pods are the main feed resource for livestock in the study sites. AVCD–LC and county governments could support groups and individuals currently producing fodder and any other potential fodder producing entrepreneurs to scale up the fodder production model in all the counties. This could be tied to dairy animal producers for a ready market of fodder and animal lodge entrepreneurs. Support with simple fodder harvesting machines could be given to few sampled individuals and groups who could also be trained on good fodder agronomics practices and then tasked to train the other fodder producers. Support with the suitable fodder varieties and subsequent seed bulking is critical for the fodder value chain. Similarly, AVCD LC should promote and support fodder production through sensitization campaigns/training to especially the people of more limited wealth. Establishment of linkages between fodder producers and demand side should be supported. Pastoralists should also be trained on intensification of livestock production, this will create fodder marketing opportunities. Research on more cost-effective storage solutions should be supported.
- Enhancing the capacities and business skills of young people and women is critical. The project could support training of young people and women to acquire business development skills. This would help them to participate in both livestock and non-livestock related businesses. The project could link young people and women entrepreneurs to financing opportunities, as well as integrating nutrition awareness and promotion to enhance allocation of income generated to household nutritional need. They could also be supported to participate in processing/ value addition of hide and skins.
- Most (98%) of the animals and meat produced is of low quality and milk production per animal is also low. On average, the quantity of milk produced during the dry and wet season is (<3) litres per animal partly because of breed quality kept by the pastoralists and poor herd management practices which is worsened by degraded pasture lands. There is, therefore, a need to support livestock breed improvement and herd management by the pastoralists. This intervention could be tied with fodder production and improved rangeland management to ensure feed supply especially to the remnant stock when the bigger herd is taken to distant grazing land.

## References

- ADESO. 2014. *The walking classrooms of Marsabit county: In pursuit of literacy*. Accessible at <http://adesoafrica.org/what-we-do/blogs/the-walking-classrooms-of-marsabit-county-in-pursuit-of-literacy> (Accessed on 27 January 2018)
- Alexovich, A., Bowatte, V., Mercier-Dalphon, A. and Sran, A. 2012. *Rethinking the shoat market. Northern Rangelands Trust and Kenya Markets Trust*. Available at <https://static1.squarespace.com/static/5653e896e4b0a689b3fafd97/t/56f0d40c7da24f87fc9f94cf/1458623529394/A+Livestock+Study+in+NRT+Conservancies.pdf> (Accessed on 2 February 2017)
- Behnke, R. and Muthami, D. 2011. *The contribution of livestock to the Kenyan economy*. IGAD LPI Working Paper. Intergovernmental authority for development in Eastern Africa. IGAD LPI Communications Office.
- Bett, B. Jost, C., Allport, A. and Mariner, J. 2009. *Using Participatory Epidemiological Techniques to Estimate the Relative Incidence and Impact on Livelihoods of Livestock Diseases Amongst Nomadic Pastoralists in Turkana South District, Kenya*. *Prev. Vet. Med.* 90:194–203.
- Bosire, C.K., Lannerstad, M., de Leeuw, J., Kror, M.S., Ogutu, O.O., Ochungo, P.A. and Hoekstra, A.J. 2017. *Urban consumption of meat and milk and its green and blue water footprints-patterns in the 1980s and 2000s for Nairobi, Kenya*. *Science of The Total Environment* 579:786–796
- Chabari F. and Njoroge G. 2014. *Enhancing drought resilience in northern Kenya by strengthening livestock and livestock product markets in Turkana and Marsabit counties*. GIZ. (Unpublished)
- Commission on Revenue Allocation (CRA). 2011. *Data from Kenya county fact sheet. Turkana county*. (Unpublished)
- County government of Garissa. 2013. *County integrated development plan 2013–2017*. Available at <http://www.devolutionhub.or.ke/resource/garissa-county-integrated-development-plan-2013-2017> (Accessed on 2 February 2017)
- County government of Marsabit. 2013. *County integrated development plan 2013–2017*. Available at <https://www.scribd.com/document/352977753/Marsabit-CIDP-2013-2017>. (Accessed on 2 February 2017)
- County government of Turkana. 2013. *County integrated development plan 2013–2017*. Accessed on 2 February 2017 at <http://www.turkana.go.ke/wp-content/uploads/2016/10/Turkana-CIDP-Final-1.pdf>
- County government of Turkana. 2015. *Turkana county development plan 2015*. Second annual development plan 2015/2016. (Unpublished)
- Farmer, E. and Mbwika, J. 2012. *End market analysis of Kenyan livestock and meat: A desk study*. A micro report No. 184. USAID
- Gamba, P., Kariuki, D. and Gathigi, B. 2005. *Urban domestic consumption patterns for meat: Trends and policy implications*. Tegemeo Working Paper 17. 2005. Egerton University. Tegemo Institute of Agricultural Policy and Development, Nairobi.
- International Development(I-Dev). 2014. *Kenya livestock and meat market analysis for cattle, goat and sheep*. Kenya Market Trust, p56.
- Kenya Institute for Public Policy Research and Analysis (KIPPRA). 2016. *Kenya economic report 2016: Fiscal decentralization in support of devolution*. Nairobi, Kenya: KIPPRA. Available at <http://opac.karu.ac.ke/cgi-bin/koha/opac-detail.pl?biblionumber=5395>. (Accessed on 2 February 2017)

- Kenya National Bureau of Statistics (KNBS) 2009. *Kenya population and housing census*. Nairobi, Kenya: Kenya National Bureau of Statistics.
- Little, P. D, Debsu, D. N. and Tiki, W. 2014. How Pastoralists Perceive and Respond to Market Opportunities: The Case of the Horn of Africa. *Food policy* 49:389–397.
- Lugusa, K.O., Wasonga, O.V., Elhadi, Y.A. and Crane, T.A. 2016. Value chain analysis of grass seeds in the drylands of Baringo County, Kenya: A producers' perspective. *Pastoralism: Research, Policy and Practice* 6:6. doi:10.1186/s13570-016-0053-1
- MacOpiyo, L., Jama, A., Ali, A. and Gobena, M. 2008. *Assessment of livestock market information systems in the highland regions of Ethiopia*. Research Brief LINKS. Global Livestock Collaborative Research Support Program. Accessed on 2 February 2017 at <http://crsps.net/wp-content/downloads/Global%20Livestock/Inventoried%207.16/2-2008-2-187.pdf>
- Matete, G. and Shumba, C. 2015. *Market-driven value chain for the livestock sector Turkana county*. Report submitted to Oxfam. Available at [https://kenya.oxfam.org/policy\\_paper/market-driven-value-chain-livestock-sector-turkana-county](https://kenya.oxfam.org/policy_paper/market-driven-value-chain-livestock-sector-turkana-county) (Accessed on 2 February 2017)
- McPeak, J. 2016. *Fodder value chain analysis for Marsabit and Wajir counties*. Report of a consultancy for Livestock Systems and Environment Program. AVCD Livestock Component project. (Unpublished)
- Mude, A. 2016. *IBLI team's contribution to the AVCD–LC program—Leveraging digital technology to crowdsource market data for sustainable market information systems*. Presented at the AVCD–LC Review Meeting, 13 May 2016. ILRI, Nairobi Kenya. (Unpublished)
- Mugunieri, G. L., Mtimet, N., Enock, K., Costagli, R. and Gulaid, I. 2016. *Saudi Arabia end-market requirements and the implications for Somaliland livestock exports*. ILRI Research Report 40. Nairobi, Kenya: International Livestock Research Institute (ILRI). <http://hdl.handle.net/10568/76316>
- Mukhebi, E.W. 1999. *Agricultural marketing in a liberalized economy: The case of livestock*. A workshop organized by the Hanns-Seidel-Stiftung Foundation in collaboration with the Kenya Agricultural Commodity Exchange. Limuru, Kenya. (Unpublished)
- Mwanyumba, P.M., Wahome R.G., MacOpiyo, L., Kanyari, P. 2015. Pastoralist livelihoods, resources and strategies in Garissa county, Kenya. *Livestock Research for Rural Development* 27:10, article no. 202. <http://www.lrrd.org/lrrd27/10/mwan27202.html>
- Naitos Golden Inspiration. 2015a. *Livestock value chain study for Garissa county*. REGAL-IR, p78. (Unpublished)
- Naitos Golden Inspiration. 2015b. *Livestock value chain study for Turkana county*. REGAL-IR, p80. (Unpublished)
- Naitos Golden Inspiration. 2015c. *Livestock value chain study for Wajir county*. REGAL-IR, p76. (Unpublished)
- Nyariki, D.M., Makau, B.F., Ekaya, W.N. and Gathuma, J.M. 2005. *Guidelines for emergency livestock off-take handbook*. Arid Lands Resource Management Project (ALRMP), Office of the President; Agricultural Research Foundation (AGREF), Nairobi.
- Republic of Kenya. 2008. *National livestock policy*. Session Paper No. 2 of 2008
- Waithanji E., Mtimet, N. and Muindi, P. 2015. *Delivery of the contagious bovine pleuropneumonia vaccine in northeastern Kenya*. ILRI Discussion Paper 31. Nairobi, Kenya: International Livestock Research Institute (ILRI). <http://hdl.handle.net/10568/67322>

- Watson, D.J. and Binsbergen, J. van. 2008. *Livestock market access and opportunities in Turkana, Kenya*. ILRI Research Report. no. 3. 106p. Nairobi, Kenya: ILRI. <http://hdl.handle.net/10568/238>
- Weber, M. T., Donovan, C., Staatz, J.M. and Dembele, N.N. 2005. *Guidelines for building sustainable market information systems in Africa with strong public-private partnerships*. Food Security III Cooperative Agreement between USAID, Global Bureau, Economic Growth and Agriculture Development Center, Office of Agriculture and Food Security and Department of Agriculture Economics. Michigan State University. <http://ageconsearch.umn.edu/record/11433>

