BUILDING DROUGHT RESILIENCE IN ISIOLO COUNTY THROUGH SUSTAINABLE LIVELIHOODS

DRIC Project

Isiolo Value Chain Analysis Final Reports

Prepared For: E4Impact Foundation

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About the paper

This value chain analysis assessment was developed based on the process, methodology and technical assistance of E4Impact Foundation within the framework of Building Drought Resilience in Isiolo County Through Sustainable Livelihoods - DRIC Project. E4Impact Foundation is one of the consortium partners working under the leadership of VSF Suisse. The other implementing partners in this European Union funded project are Comitato Collaborazione Medica (CCM), Social Ministry Research Network Centre (SOMIRENEC) and We World Onlus.

This report was prepared by entrepreneurship research consultancy firm, Catalytiks Limited led by Mr. Richard Wahiu and Mr. Patrick Maina who were commissioned by E4Impact Foundation as independent consultants to lead and guide the value chain analysis and the women income generating activities assessment. The report is to inform development of implementation priorities for the DRIC Project.

The views expressed herein do not reflect the official opinion of E4Impact Foundation. Mention of firms, products and product brands does not imply the endorsement of E4Impact Foundation.

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Acronyms

ASAL	Arid and Semi-Arid Lands
ASDSP	Agriculture Sector Development Support Programme
ASDSP II	Agriculture Sector Development Support Programme Phase Two
BDD	Bule Dogo Dambicha
CCM	Comitato Collaborazione Medica
CEC	County Executive Committee Member
CIDP	County Integrated Development Plan
CLMC	County Livestock Marketing Council
COVID-19	Coronavirus Disease
CTA	Technical Centre for Agricultural and Rural Cooperation
DRIC Project	Building Drought Resilience in Isiolo County Through Sustainable Livelihoods Project
EU	European Union
FAO	Food and Agricultural Organisation
FFA	Food Assistance for Assets
FGD	Focus Group Discussion
FNS	Food and Nutrition Security
GHG	Green House Gases
Ha	Hectares
ICIPE	International Centre of Insect Physiology and Ecology
IGAs	Income Generating Activities
IIRR	International Livestock Research Institute
ILRI	International Livestock Research Institute
KALRO	Kenya Agricultural and Livestock Research Organisation
KCSAP	Kenya Climate Smart Agriculture Project
KEBS	Kenya Bureau of Standards
Kenya RAPID	Kenya Resilient Arid Lands Partnership for Integrated Development project
KES	Kenya Shillings
Kgs	Kilograms
KII	Key Informant Interviews
KLIP	Kenya Livestock Insurance Program
KLMC	Kenya Livestock Marketing Council
KNBS	Kenya National Bureau of Statistics
KTBH	Kenya Top Beehive
KWFT	Kenya Women Finance Trust Bank
LMA	Livestock Marketing Association
LMS	USAID Livestock Market Systems
LVIA	Lay Volunteer International Association
Mm	Millimetres
MoALF&I	Ministry of Agriculture, Livestock Fisheries and Irrigation
MT	Metric Tonnes
NDMA	National Drought Management Authority
NGO	Non-Government Organisation
NRT	Northern Rangeland Trust
PLWD	People Living with Disabilities
PREG	Partnership for Resilience and Economic Growth
REGAL AG	USAID Resilience & Economic Growth in the Arid Lands–Accelerated Growth
RPLRP	Regional Pastoral Livelihoods Resilience Project
SACCO	Savings and Credit Cooperative Society
SOMIRENEC	Social Ministry Research Network Centre
USAID	United States Aid for International Development
WARMA	Water Resources Management Authority
WFP	World Food Programme

1 EXECUTIVE SUMMARY

E4Impact Foundation is part of a consortium implementing "**Support to Resilience for Sustainable Livelihoods" project** in Isiolo County **funded by the European Union**. The overall objective of the EU Project is to contribute towards increased **resilience to droughts** and other negative impact of climate change for vulnerable groups and **reduce number of children under 5 years who are stunted** in Isiolo County (WHA – Global Nutrition Target 1 for 2025). The project seeks to enhance Food and Nutrition Security (FNS) for vulnerable Pastoralist and Agro-pastoralist Communities in Isiolo County, generating Sustainable livelihoods, protecting productive assets, and improving climate smart county service delivery.

At the inception stage of implementation activities, E4Impact Foundation designed and commissioned a value chain analysis to inform program priorities. The value chain analysis was needed to inform program activities and improve efficiency and effectiveness of the program. The value chain analysis was also to identify key actors in all the value chains, opportunities and bottlenecks in the VC development and growth, and ultimately identify and develop innovative and sustainable business models in the said value chains. The value chains under focus included fodder, livestock, honey, camel milk, and poultry. The assignment also sought to assess and make recommendations on the Income Generating Activities (IGA) of women in the region under study.

Isiolo County is strategically located and borders several counties including Marsabit, Wajir, Garissa, Meru, Laikipia, and Samburu counties. The county is sub-divided into three sub-counties-Isiolo, Garbatulla, and Merti sub-counties. According to the Kenya National Bureau of Statistics Kenya Population and Housing Census 2019, the county has a population of 245,462 inhabitants and has 58,072 households.

Livestock sector remains the biggest economic activity with approximately 80% of the population directly and indirectly relying on it. The county's major livestock include cattle, goats and sheep, camel and donkeys. According to data from the 2019 Kenya National Bureau of Statistics (KNBS) population census, Isiolo county has a million goats, 854,725 sheep and 248,577 heads of cattle. The county has just about fifty thousand indigenous chickens with about twenty thousand exotic birds reared for eggs and meat. The population of camels was at 148,859 camels and a total of 2,227 beehives.

Climate change effects continue to present challenges to consistent supply and feeding of livestock in Isiolo county. The communities are still largely stuck to nomadic pastoralism and

there is reliance of free grazing with animals trekking long distance in search for water and pasture. This exposes the community livelihood and sustainability of the livestock production is at risk. The DRIC project seeks to promote fodder production, value addition and marketing to safeguard the beef and camel value chains. Fodder production has not achieved commercial value and production, conservation and marketing enterprises are yet to gain strength in many parts of Isiolo county. There are opportunities to leverage national and county government funded initiatives such as KCSAP and Agriculture Sector Development Support Programme Phase Two (ASDSP II) -projects that are focused in building resilience including providing water for irrigation through dams and boreholes. KCSAP is promoting natural pasture improvement through reseeding in Isiolo county. The projects are promoting irrigated fodder production among communities. These projects are cross-cutting and are also supporting technology, management practices and innovation in poultry and apiculture value chains.

There are 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. One the main projects the county government has achieved is to get 800 hectares of fodder established and there are 3000 acres under fodder. Some of the fodder production areas include areas around Isiolo town, where there is favourable climate conditions and high demand from some farmers practicing dairy. Other areas where efforts to promote fodder enterprise have been initiated and some fodder production is taking place include Garbatulla, Rapsu, Kinna, Maili Tano, Guba Dhudha, livestock marketing division, and the region along the Isiolo River. Feedlots and producer groups are mainly leading the production activities that supply the commercial sales of fodder in Isiolo. The common grass species planted in the study area are African fork tail (*Cenchrus Ciliaris*) and Maasai Love grass (*Eragrotis superba*). These are commonly cultivated rangeland species in the drylands because of their high tolerance to drought and harsh climatic conditions. There is however significant trade of fodder that is shipped into the county form Meru, Laikipia and other counties, especially during the dry spells.

There is need to relook at the commercial model of producers and other actors within the value chain. Demand and supply factors are not balance out and fodder producers located far from high demand centres are not well linked to fodder markets. Community conflicts resulting from decreased pasture during drought and land tenure system where pastoralists will do free grazing on fodder farms affect sustained fodder production. Support and awareness creation to manage conflicts is required. Access and use of high-quality seeds are limited due to unavailability, lack of knowledge about how to plant and discouragement from previous poor

harvest due to untimely planting or adverse weather have discouraged producers. Better fodder production education is required in educating the producer groups on need to adopt use of certified seeds to achieve better harvest. Use manual labour practices in land preparation, planting, harvesting, and baling affects the scale. Mechanization and training in modern practices to aid farmers in maximizing production is necessary. Producers' linkage to Kenya Climate Smart Agriculture Project (KCSAP) is a value add that will promote climate resilience and improve yield and commercial value for the producers. Additionally, producers need financing to help them harness production, scaling, water harvesting solutions and mechanisation of production activities.

Livestock production remains the biggest economic activity with approximately 80% of the population directly and indirectly relying on it. The county's major livestock production is cattle, goats and sheep, mostly the black headed breed. Isiolo has a growing population of camels which is growing through the investment by county government and development organisations such as VSF Suisse that have promoted climate resilience response through the adoption of camel production and camel milk aggregation and value addition. To promote value of livestock, breed improvement is considered a critical element in modernising the sub-sector and improve household incomes. The new improved breeds are a better alternative as the weight and value of meat is higher compared to traditional animal breeds.

Isiolo county has opportunity to promote beef production under ranching schemes. These presents opportunity for increased household income through improved livestock fattening. Currently there are five Northern Rangeland Trust (NRT) facilitated conservancies (Nakupratt-Gotu, Leparua, Biliqo-Bulesa, Nasulu, and Oldonyiro Community Conservancy) that serve as fattening grounds and migration areas. NRT Trading has commercialized livestock offtake from conservancies, finishes the livestock for targeted markets. Isiolo is strategically located along trading routes and livestock traditionally move through Isiolo from Wajir, Marsabit, Garissa and parts of Samburu. The main markets include Oldonyiro, Kipsing, Duse, Sericho, Kinna, Eskut, and Isiolo town livestock market. Marketing of livestock in Isiolo includes livestock producers and the buying and selling of animals by livestock traders. Animals move from primary markets to regional markets and eventually to terminal markets (mainly Nairobi) where they are sold for slaughter. Livestock trade is dominated by brokers- and the price point is determined to favour the traders, and formation of producer groups can improve the capacity of pastoralists to improve breeds and improve trade terms.

Isiolo abattoir which is under construction has been positioned to be a processing point for beef to serve the pastoralist counties of Baringo, Laikipia, Samburu and Isiolo. The slaughterhouse has a capacity of processing 270,000 animals per year. It is poised to start

operations in 2021 through a public private partnership arrangement. It is hoped the facility will feed the export markets in the Middle East-United Arab Emirates, Qatar, Oman, Kuwait, and Saudi Arabia as well as local market.

Production practices, nomadic pastoralism, lack of knowledge and skills especially in feeding, diseases and pest control affects the quality of livestock. Low adoption of fodder production and storage exposes producers to risks of drought. Cultural practices and high attachment to animals affects the timing of sale of animals. The county has an underdeveloped private sector including veterinary service providers and animal health and nutrition suppliers. This affects the access to information, products, and services to promote healthy and quality stock. Entrepreneurial capacity building, formation and strengthening of producers' groups and partnerships with county government and other actors supporting farmers to improve production and livestock management is important in addressing the issues. Linkage to markets, and financial products and services is likely to improve the operating capital and scale of producers and actors to improve profitability and sustainability of production as well as postproduction and supportive enterprises in the value chain. Value addition opportunities and especially linkage to processors of beef will greatly improve profitability and stabilize livestock trade and prices.

Camel milk is one of the most strategic value chains in Isiolo (Government of Kenya, 2014), being a major source of food security and income for the county's population and holding a significant cultural value. The product contributes up to 50% of the total household nutrient intake and 30% of the annual caloric intake. With a population of 148,859 camel heads in the county, they yield roughly 22,500 litres of milk per day out of these, approximately 4,500 litres of raw milk are supplied to the main Eastleigh market in Nairobi accounting for 70% of marketed camel milk. It is estimated that 20% of the population in the county is engaged in the camel milk value chain from production to marketing.

Production occurs in four main clusters, based on milk yields: The Mlango-Ngarentare-Burat cluster in Central Isiolo, the Kulamawe cluster in Kinna, and two minor clusters in Modogashe-Eldera in Sericho and Boji-Galfarsa-Malkadaka in Garbatulla. Tawakal and Anolei Women Cooperatives are some of the two community-based processors that have demonstrated success. Other private actors processing milk in Isiolo include Afro Natural processors and Classic Foods, which are based in Isiolo town.

Among some of the challenges that affect the value chain is the quality surveillance compounded by lack of knowledge among producers on milking and milk handling including the continued use of plastic containers in storing milk and carrying milk. Innovative ways of reducing camel milk contamination, spoilage and post-harvest losses are required. There is

lack of policy that regulates camel milk which VSF Suisse and other actors have been pursuing. Well-tailored hygiene and food safety education aimed at improving pastoralists' knowledge on food hygiene and sanitation need to be enhanced. Poor camel health management by offering extension services to producers. Better market linkage through strengthening of existing producer and marketing groups and cooperatives is require. The road network linking production areas to the market are poor and hamper transportation, lead to wastage and increase costs. Existing processors need entrepreneurial capacity building, linkage to finance to fund aggregation, adoption of hygiene practices and acquire cold chain systems for raw as well as processed products.

According to the 2019 population census, Isiolo county was reported to have 407 households practising beekeeping farming with a total of 2,227 beehives. Most of the households (352 households) were reported in Isiolo sub-county. However, since then, stakeholders indicated that various actors including World Food Programme, World Vision, Lay Volunteer International Association (LVIA) and International Centre of Insect Physiology and Ecology (ICIPE) have distributed over 2000 beehives to households in different wards in Isiolo. A baseline study conducted by the county government in 2017, Isiolo county households made KES 3.6 million in the year and by 2022, farmers are projected to be making KES 12 million per year. The county has potential in beekeeping with some key areas such as Oldonyiro, Isiolo central, Merti and Kinna remaining under tapped. In the current County Integrated Development Plan (CIDP) the county government seeks to increase use of modern honey production and processing in Oldonyiro and Central Divisions by providing 500 modern beehives to farmers. The county livestock department in collaboration with World Food Programme (WFP) managed to increase tonnes of honey procured at the Isiolo refinery from 3000 Kg in 2013 to 6000 Kg by 2017. There are several producer groups that are producing honey but there is a gap in the processing capacity and marketing of honey. The county government is working to support cooperatives to increase honey production. Producers and value chains actors lack training and finance for improved post-harvest management. Adulteration of honey is common problem among producers. Post-harvest loses that reduce the quantity and market quality of honey from Isiolo county. Use of traditional beehives, lack of storage facilities and marketing of honey in disaggregated producer units limits the volume and opportunities to promote capacity and quality of production and marketing practices. Therefore, the opportunity exists to use producer cooperatives to enhance practices and entrepreneurship capacity of actors.

The population of poultry in Isiolo is estimated at 71,087 according to the KNBS population census, 2019 data. Culturally and historically the community in Isiolo are non-poultry

consumers which affected production. However, urban growth and demand for poultry products (eggs and meat) has attracted investment in the sector. The growth in demand is attracting investment in exotic layers and exotic broilers for eggs and meat, respectively. Isiolo Sub- County has attracted more new entrants doing chicken on a commercial level and has the highest number of exotic birds. KCSAP is promoting poultry production as a key priority for Isiolo.

There is still slow adoption of modern chicken production in the county and the number of farmers doing poultry production at scaled level is low. There are some producer groups doing poultry production but sometime sharing of roles and responsibility was said to cause some strain to the members and group dynamics. Capital involved in setting up the poultry production units was reported to be a barrier to entry into value chain for most local communities.

Producers have knowledge and skills gaps in production and limited capital are affecting farmers ability to start and grow poultry enterprises. High cost of feeds and lack of reliable feed suppliers in Isiolo. Farmers are forced to order for feeds from Meru which increases the cost of production. While there are upcoming small-scale hatcheries within Isiolo, these are limited in capacity and farmers order chicks from as far as Kajiado county which increases cost of production and profitability. Poor linkage to extension to support community awareness and production and marketing of poultry products. Limited availability of water to maintain the required hygiene and production levels affects production and success of enterprises.

The county government, NGOs and private actors can promote production practices by local community including building skills and capacity of farmers to effectively manage the poultry production units. The DRIC project can promote entrepreneurial capacity of producers and other actors in the value chain, promote the production capacity of the local manufacturers and better linkages for input suppliers. Poultry keepers training on disease control and management, linkage to veterinary and health service providers is necessary addition to make the ventures viable. There is an opportunity to develop hatching enterprises including acquisition and distribution of small-scale hatching machines as with other value chains, linkage to finance is essential to fund the upgrade and scaling of enterprise activities.

2 INTRODUCTION

2.1 Background

Isiolo County is strategically located and borders several counties including Marsabit, Wajir, Garissa, Meru, Laikipia, and Samburu counties. According to the 2019 Kenya Population and Housing Census, the county has a population of **245,462** inhabitants and has 58,072 households. The county is sub-divided into 3 sub-counties of Isiolo with a population of 29,853, Garbatulla (18,661) and Merti (9,558). The county is sub-divided into 10 administrative wards as shown in the table below:

Table 1: Isiolo County Sub- County and wards

Sub-county	Ward
Isiolo	Wabera
	Bulla Pesa
	Burat
	Ngaremara
	Oldonyiro
Merti	Chari
	Cherab
	Kinna
Garbatulla	Garbatulla
	Sericho

Eight percent of the county's population is dependent on livestock according to the County Integrated Development Plan (CIDP) 2018 -2022. The main livelihood activities in the county are livestock keeping (mainly through nomadic pastoralism) and subsistence crop farming especially along Ewaso Nyiro River. Retail trading is practiced mainly in Isiolo Town, Kinna and a few other small trading centres. Pastoralists keep animals - goats, sheep camels, cattle, and poultry for milk, meat, eggs, hides, and skins. Milk is produced by local crossbreeds and exotic cattle, local goats, exotic/dairy goats and camels. Agro-pastoral populations mainly practice crop farming (maize, bean, tomato, green gram, cowpea, onion, and kale) across the county, where rainfall can support crop growth and under irrigation along various rivers.

E4Impact Foundation is part of a consortium implementing “Support to Resilience for Sustainable Livelihoods” project in Isiolo County funded by the European Union. The overall objective of the EU Project is to contribute towards increased resilience to droughts and other negative impact of climate change for vulnerable groups and reduce number of children under 5 years who are stunted in Isiolo County (WHA – Global Nutrition Target 1 for 2025). The project seeks to enhance Food and Nutrition Security (FNS) for vulnerable Pastoralist and Agro-pastoralist Communities in Isiolo County, generating Sustainable livelihoods, protecting productive assets, and improving climate smart county service delivery. At the start of the project, E4Impact sought to undertake a value chain analysis to identify key actors in all the value chains, opportunities and bottlenecks in the value chain development and growth, and ultimately identify and develop innovative and sustainable business models in the said value chains. The value chains under focus included fodder, livestock, honey, camel Milk, and poultry. The assignment also sought to assess and make a recommendation on the Income Generating Activities (IGA) of women in the region under study. The value chain analysis was cross cutting the ten wards of Isiolo county.

The specific objectives of the intervention by the consortium are;

- To enhance food and nutrition security of vulnerable households, especially for women and children in Isiolo County.
- To generate sustainable livelihoods and protect productive assets in Isiolo County.

At the inception stage of implementation activities, E4Impact Foundation designed and commissioned a value chain analysis to inform program priorities. The value chain analysis was needed to inform program activities and improve efficiency and effectiveness of the program. The value chain analysis included the following objectives:

- Plan and implement a value chain assessment in each of the targeted regions including mapping the key actors along the value chain, including farmers, suppliers, and buyers.
- Assess the competitiveness of the value chain(s) and determine how to create competitive advantages for the targeted sectors in the context of local and regional trends, having in
- mind the context of the targeted populations and regions.
- Identify leverage points along the value chain that can have potential in strengthening the
- effectiveness and efficiency of the chains.
- Identify the underlying constraints impinging upon business transactions all along the chain
- and provide interventions on how to mitigate them.
- Identify the potential suitable producers’ groups, and private sector players, the promising value addition opportunities, and markets.
- Assess the cost, profit, marketing, and supply and demand dynamics of the value chain.

- Recommend value chain development plan(s) that benefit the local communities and lead to improvement of living conditions and economic empowerment.
- Analyse the supporting functions that are required to make the value chain work, including both existing and missing support functions (e.g. infrastructure, information, related services)
- Order by priority potential development plans and interventions. In particular, the prioritization should take into account the potential of certain chains to promote economic empowerment of women and the youth
- Make a recommendation of innovative and sustainable business models for the value chains
- Assess the IGAs of women in the wards and make recommendations on improvement of the activities

2.2 Value chain analysis methodology

Mixed methods data collection methods were used to inform the objective set out by E4Impact Foundation. The study was done by use of desk review and primary data collection methods. The desk review was done to develop a clear map of actors. Secondary review was also done given the constraints around travel restrictions both due to the prevailing COVID-19 pandemic and due to poor infrastructure in the project county.

2.2.1 Qualitative survey

Consultant utilised Key Informant Interviews (KIIs) and Group Interviews with actors in the value chains. The KIIs collected data on the current state of the value chains from the intermediaries while KIIs and group interviews were done with producers across the different value chains. A total of 73 KIIs and group interviews with various actors in value chains were conducted. The breakdown of achieved sample was as follows:

Table 2: Qualitative sample distribution-value chains actors

Value Chain	Livestock	Fodder/feeds	Camel Milk	Honey	Poultry	Total
Producers	6	6	5	9	5	31
Aggregators	3		3			6
Traders	4	4	5		1	14
Transporters	2		4			6
Processors	2	1	3	2	1	8
Retailers of finished goods	2	1	3	2	2	10

An additional 32 actors working to support the value chains were interviewed. These included key actors among them government staff including County Executive Committee Members (CECs), Chief Officers, Directors of Departments, consortium partners, financial service providers.

Table 3: Key informants list-value chain enablers

Category of Actor	Number of KIIs achieved
Government	16
Women Enterprise Fund	2
Market Associates	3
Financial service providers	2
Development Partners	3
Women group leaders	6

Picture 1: Women group community engagement during data collection

2.2.2 Secondary review

The analysis has relied on recent and relevant literature that has provided useful information that addresses the objectives of the study. Literature on the development plans including the county integrated development plan, county budgets, value chain analysis, research reports on studies done before on the value chains, and program implementers working in the value chains have benefited this analysis.

2.2.3 Data analysis

Data collected from mixed methods was analysed and triangulated to complete view of the value chain activities in the counties. Qualitative data was be analysed using MAXQDA software to bring out general patterns in different value chains and communities where the project is anchored. The survey data will be analysed using SPSS and descriptive statistics used to provide profiles of IGAs in the county.

2.2.4 Validation workshop

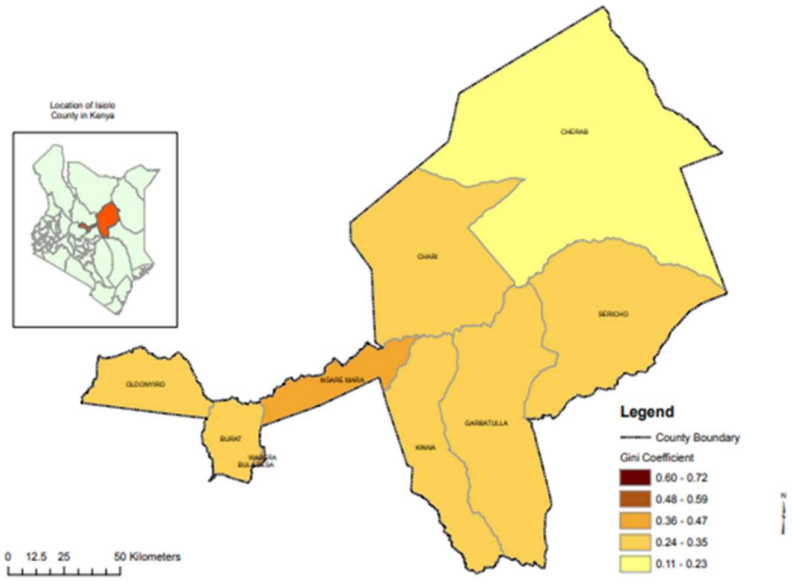
After the reporting, the consultants worked with the consortium partners to disseminate the report to stakeholders at county and national level. A national level meeting of consortium patterns was held virtually while at the county level, two meetings were conducted. The two meetings comprising the technical working group on one hand and community level and value chain actors on the other hand were done to validate the report and offer feedback.

3 OVERVIEW OF THE LIVESTOCK AND AGRICULTURE SECTOR

3.1 Overview of the county

The priority wards were informed by a detailed mapping exercise in Isiolo County. The wards include Oldonyiro, Ngaremara, Chari, Cherab, Kinna, Sericho and Garbatulla. The 6 priority wards to fall under this action due to their high levels of vulnerability but also their potential and ecological characteristics for livestock, pasture, crop and horticulture development. Below is a map of Isiolo showing the sub-counties in the county.

Figure 1: Map of Isiolo County



Source: Kenya National Bureau of Statistics

3.2 Overview of the livestock and agricultural activities in the county

This section reviews the economic engagement of households in livestock and agricultural value chains. According to the National Population Census 2019, Isiolo county had a total of 58,072 households. Forty-two percent of the households (24,271) reported direct involvement in livestock or agricultural activities. Over 90% of the farming households in each sub-county are engaged in livestock production. The table below shows the distribution of farming households across the sub-counties.

Table 4: Household population in the county

Total	Total	Farming	Crop Production	Livestock Production	Aquaculture	Fishing	Irrigation
Isiolo	58,072	24,271	2,780	23,348	80	209	1,322
Garbatulla	18,661	9,264	1,016	8,990	47	75	582
Isiolo	29,853	8,600	1,485	7,989	12	55	649
Merti	9,558	6,407	279	6,369	21	79	91

Source: Kenya National Bureau of Statistics, Population Census Data 2019

4 FODDER VALUE CHAIN ANALYSIS

4.1 National Outlook on fodder

In many parts of the country, favourable periods with abundant fodder alternate with less favourable periods when there is almost nothing to feed to the animals. But keeping animals means providing fodder throughout the year. Livestock plays an important role in many arid and semi-arid areas (ASALs) counties agricultural sector. In Isiolo County, livestock production is constrained by the perennial challenge of fodder scarcity which reduces sustainable livestock development and often leads to conflicts over grazing lands among neighbouring communities.

The scarcity is caused by a combination of factors that include erratic rainfall, shrinking grazing lands due to competition for land for crops and increasing soil erosion attributed to increases in human and livestock populations. In most smallholder farms, fodder cultivation competes for space with the cultivation of crops. As a result, feed scarcity continues to persist as a perennial challenge constraining livestock production, productivity and marketing in drylands. This increases the vulnerability of pastoral livelihoods to climate-induced shocks such as recurrent drought.

Due to agro-ecological limitations, there is no universal fodder and, therefore, selection of a good fodder is paramount. Households in ASALs are increasingly practising fodder production in response to forage scarcity associated with land degradation, climate variability and change. Farmers mainly plant the African foxtail grass (Cenchrus ciliaris) in enclosures meant to keep off grazing animals.

4.2 Isiolo County Fodder Production

Most of the land in (80%) in Isiolo County is communally owned under trusteeship of County Government of Isiolo. Most households in Isiolo do not have title deeds for their lands. Over 80% of the inhabitants rely on livestock for their livelihoods and less than a third (26%) practice agro-pastoralism. Food poverty rates are alarmingly high (77%), which has led to a high dependency of the population on relief food.[1]

The county is constantly exposed to a series of droughts including one 2000, 2005/6 and 2008-2011. The past droughts have led to significant loss of livestock (losses reaching up to 50% of livestock) due to starvation. There are adverse effects of land and environmental degradation. The land is constantly under pressure from overstocking and overgrazing resulting to bare and unproductive tracks of land.[2] The fact that there are extreme hot seasons, strong winds and soil erosion during the rains has greatly affected pasture production.

The common grass species planted in the study area are African fork tail (*Cenchrus Ciliaris*) and Maasai Love grass (*Eragrotis superba*). These are commonly cultivated rangeland species in the drylands because of their high tolerance to drought and harsh climatic conditions.

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 favourable 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 Garbatulla, Rapsu, Kinna, Maili Tano, Guba Dhudha, livestock marketing division, and the region along the Ewaso Nyiro River.

While dissemination of the fodder technologies is mainly being undertaken through community groups, individual armers form 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

1 MoALF. 2017. Climate Risk Profile for Isiolo County.

2 Mohamed Sala, Saada & Jakinda, David & Nzuma, Jonathan & Mureithi, Stephen M. (2019). Understanding the Key Drivers of Land use and Livelihood Dynamics in the Drylands of Kenya: The Case of Fodder Production in Isiolo County.

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 (mainly shrub branches) around plots where they want to establish fodder and letting the grass grow without being grazed. 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.[3]

One the main projects the county government has achieved is to get 800 ha of fodder established and there are 3000 acres under fodder. The table below shows the initiatives the county government has put in pale to support fodder production.

Table 5: County government supported initiatives

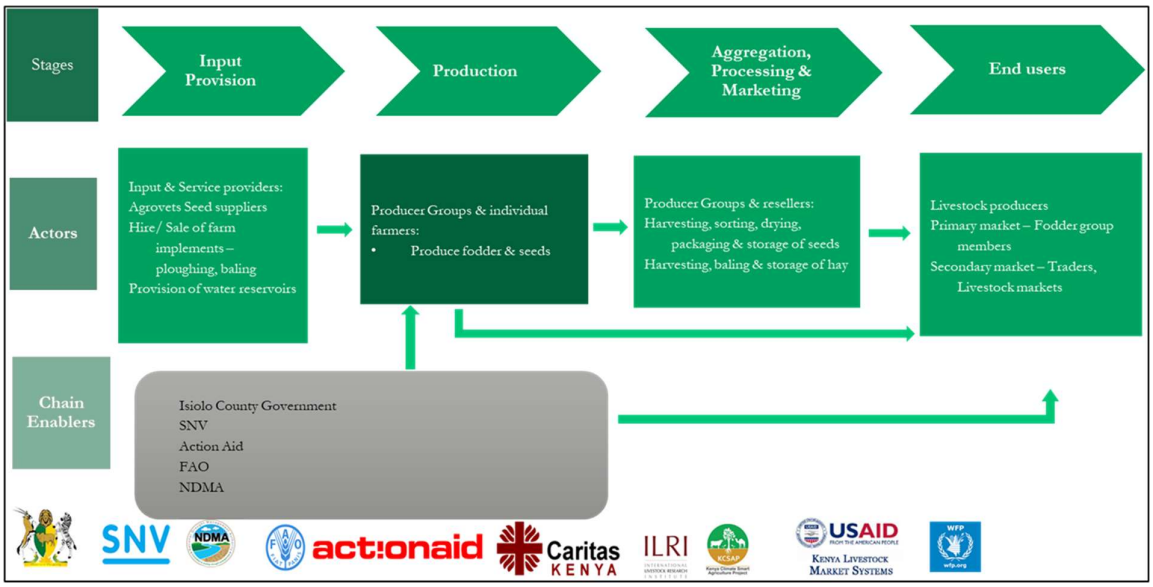
Indicator	Location	Implementing Agencies
• Number of hectares under fodder production/ Conservation • (800 ha. Of fodder established. • 10,000 ha. Of rangeland pasture reserved)	• Burat, • Ngaremara • Chari, • Oldonyiro • Cherab, • Garbatulla, • Sericho • Kinna.	County department of livestock production, Development partners (WFP, ACDI/VOCA, NRT, ILRI, RPLRP, and Kenya climate smart agriculture project.
Situation 2018 (proportion of livestock accessing fodder during the drought seasons)	• 2019 Target = 15% • Target 2020 (midterm) = 25% • End of term (2022) target = 40%	

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

4.3 Snapshot of fodder value chain

Fodder production is carried out on a small-scale with low-output due to high dependence on rainwater, which is largely unreliable in the area. Below is the snapshot of the fodder value chain.

Figure 2- Fodder value chain map



4.4 Actors and enablers with their role in the value chain

Fodder production in Isiolo is highly supported by the external actors who have worked together through the Partnership for Resilience and Economic Growth (PREG) initiative. Inputs and service provision are the dominant activities undertaken by these actors to incentivize pastoralists to adopt commercial fodder production. The emerging entrepreneurs starting and promoting feedlots are developing fodder production units that are up to scale and can be used as demonstration sites to upscale knowledge and fodder production practices. These feedlots are a channel to offtake any community level production that livestock keepers are not suing for their own livestock. There are gaps however in actors who are focused on fodder trade who can promote production by creating demand for fodder, promote quality and during droughts serve as a channel to bring in fodder into the county to bridge any deficits and mitigate drought and shortages. The actors and their respective roles in fodder production in Isiolo are summarized in in the table below.

Table 6: Actors supporting the value chain

Actors	Role
Producers groups: Some of individual producers. • Amnaj • Bule Dogo Dambicha (BDD)	There are close to 20 producer groups and individuals' players in the county. Most of the producer groups comprise of women with few men involved. The higher proportion of women engaging in fodder producing groups is associated with the proximity of the group farms to their homesteads and because fodder growing requires less labour. Fodder groups require members to participate in farm activities thrice a week, and men are always away from homesteads hence their lower participation.
Aggregators/ Resellers/ Retailers: • Producer groups • Local Agrovets	• These comprise of some of the producers' groups and retailers based at the market centres and at Isiolo town. • They buy from producers' group as well as individual farmers during the rainy season where they store and resell during dry periods.
NGOs working to support the value chain	
World Food Program (WFP)	Food incentives for the FFA project
Action Aid Kenya	Initial farm tools (hoes, rakes, spades, harvesting & bailing equipment).
International Livestock Research Institute (ILRI) - AVCD-LC project	Start-up rangeland seed varieties (Cenchrus Ciliaris & Eragrotis superba).
ACDI-VOCA	Bring together common interest groups & individual farmers to train produce hay and market the seeds.
Government agencies supporting the value chain	
Kenya Climate Smart Agriculture project	Lobbying small scale livestock producers to adopt and engage in commercial seed production. Enabling Commercial multipliers and seed merchants to stock and distribute certified seed.
Kenya Veterinary Board	Provision of Extension services in liaison with MoALF&I

University of Nairobi - Dryland Institute	Technical training on seed selection, land preparation, reseeding, and construction of rainwater harvesting structures.
Ministry of Agriculture and Livestock	Extension services - train extension personnel, and mobilising funding to boost the sector.
National Drought Management Authority (NDMA)	Coordination role between the project implementing partners and County Government

The World Food Programme's (WFP) project dubbed food for asset creation (FFA) that was implemented in thirteen ASAL Counties of Kenya through the National Drought Management Authority (NDMA). The project's main objective is to re-establish livelihoods, nutrition and food security for the most vulnerable communities in the drylands. These were to enable them to withstand shocks, become independent of relief foods and attain sustainable diversified livelihoods.

4.5 Challenges and opportunities in the value chain

This value chain analysis has identified several challenges which can be turned around to be opportunities. The table below enlists the same and proposed opportunities.

Table 7: Challenges and opportunities in the value chain

Constraints	Opportunity
Fodder producers located far from high demand centres are not well linked to fodder markets.	There is need to work on a business model that will create a market linkage with some of the producers with excess production of fodder.
Community conflicts which comes because of decreased pasture during drought affect fodder production	Need to provide livestock fodder to community to counter these conflicts. Recommendation to promote mindset change to avoid encroachment of fodder plots County and national government should offer security to reduce inter-community conflicts
Majority of the fodder grass producers do not use fodder seeds for reasons such as unavailability, lack of knowledge about how to plant and previous experience where seeds failed to germinate after planting due to lack of rain.	Better fodder production education is required in educating the producer groups on need to adopt use of certified seeds to achieve better harvest. Intercropping practices should be encouraged

Constraints	Opportunity
Most of the land in the county is communal land and therefore prone to invasion by communities.	Proposal is made to have the county government set aside land and secure it for interested community actors to use the same for fodder production. Priority can be the Kinna areas and the river basin which have high potential for fodder.
Use manual labour practices in land preparation, planting, harvesting, and baling. Manual planting and simply broadcasting seeds leads to poor germination as birds and ants eat up the seeds. Animals grazing on open land eat up the young shoots leading to poor harvest	Need for training in modern practices to aid farmers in maximizing production. Being linked with Kenya Climate Smart Agriculture Project (KCSAP) that is running projects in the county can greatly be beneficial.
Lack of water was cited as an important constraint to fodder production	Producers need to be trained on how to harvest rainwater through water pans, terracing and other modern cost-effective ways that can be used to water fodder during dry periods. Additionally, producers need financing to help them harness water harvesting solutions. KCSAP is providing solutions through boreholes and dams-this can promote irrigated fodder production
Drought is another challenge as when it hits animal feeds become expensive. This increases the production costs leading decline in his profits	Engage community, Isiolo county government, Water Resources Management Authority (WARMA) and county governments of the neighbouring counties to help manage downstream flow.
Upstream use of water from Ewaso Nyiro river affect downstream users who use it to irrigate and feed livestock	
Invasive weeds especially prosopis juliflora locally referred to as '*Mathenge'* weed	Work with grazing committees and livestock department to control the spread of the weed
Quality of fodder produced. Generally, the fodder quality is a lacking within the county	Capacity building to improve the type and variety of fodder grown, timely harvesting, preservation and post-harvest management is needed. The distribution of quality seeds to promote the yield and quality levels is an entrepreneurial opportunity to actors in the value chain.

"We grind grass so that it fetches more money and therefore he sells a bag of grinded BOMA Rhodes at KES 800-1200 depending on the season."
Fodder Aggregator, Trader & Transporter

4.6 Fodder marketing

Farmers who produce fodder 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 Garbatulla 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 available for sale 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. There is an opportunity to increase the volume produced to spur up development of market system for fodder in the county.

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. The 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 KES 10,000 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 peace 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 landlords are forced to keep data on the tally of animals sold by the tenant each day.

4.7 Summary

Pastoralists also have limited access to key institutional and support services such as credit and extension. Credit facilities were solely sought from the informal sources like women groups. Provision of requisite institutional support services such as credit facilities will strengthen household's investment in alternative livelihoods hence reducing poverty levels in the County.

Enhancing post-harvest management and conservation of fodder is necessary to maintain its nutritive value and quality. This calls for investment in hay baling machinery and appropriate storage bans by the county government to support fodder commercialization.

The emerging fodder value chain and markets presents more employment opportunities along the chain particularly for women and youth. Fodder groups and individual pastoralists can be encouraged to undertake business activities such as processing, transporting and trading fodder in the various markets. Establishing effective market linkages between producer groups and potential buyers through contract farming will enable them to take advantage of ready markets opportunities within and outside Isiolo County. There is also need for participatory knowledge sharing platforms to enhance adoption of modern fodder farming practices.

5 BEEF VALUE CHAIN ANALYSIS

This section of the report provides first an overview of the beef value chain at the national level then the rest of the chapter provides an analysis of the value chain in Isiolo county.

5.1 National overview of the sector

Kenya's domestic meat market with a population of 43.7 million is promising and with a strong culture of meat consumption and a growing consumer purchasing power because of economic growth and urbanisation, there are significant opportunities to improve production, processing and marketing of meat. There is therefore a gap in the country's potential to self-sustain and get the sector to contribute to the of economic development.

The country has a large herd, with an estimated 50 million shoat and 13 million indigenous cattle and half a million exotic beef stock. The high number of indigenous stocks directly impacts on the quantity and quality of meat as the quality of breeds and size of the animals affects the carcass weight and the value of meat. The country therefore has had low volume of exported beef with small incremental grow in export of goats in the recent past. Below is a

table of the national herd size for the different livestock that contribute to the value of the beef industry in Kenya.

Table 8: Population of livestock in Kenya

Goats	Sheep	Indigenous cattle	Camels	Exotic cattle - Dairy	Donkeys	Exotic cattle -Beef	
28,011,800	19,307,445	13,005,664	4,640,085	2,209,980	1,176,374	559,174	
Pigs	**Indigenous Chicken**	**Exotic Chicken Layers**	**Exotic Chicken Broilers**	**Beehives**	**Rabbits**	**Fishponds**	**Fish Cages**
442,761	30,320,632	5,580,766	2,914,840	1,157,162	561,351	146,008	33,492

Source: KNBS population Census Data, 2019

The Economic Survey 2020 estimates the value of livestock and livestock products to have increased from KES 146.8 billion in 2018 to KES 147.9 billion in 2019. The country is reported to have slaughtered over 3 million cattle and calves and over 11 million goats and sheep. The incremental value however does not necessarily match to the increase of 10% in the number of animals slaughtered, for example between 2018 and 2019. Analysts consider the potential for beef production and marketing underutilized and there are opportunities to promote value in the sector. This is a demonstration in the desired improvement in the quality and the weight of animals to ensure the quantity in the number of animals slaughtered can deliver proportionate value and income to livestock value chain actors. The table below shows the number of animals slaughtered over a 5-year period (2015-2019).

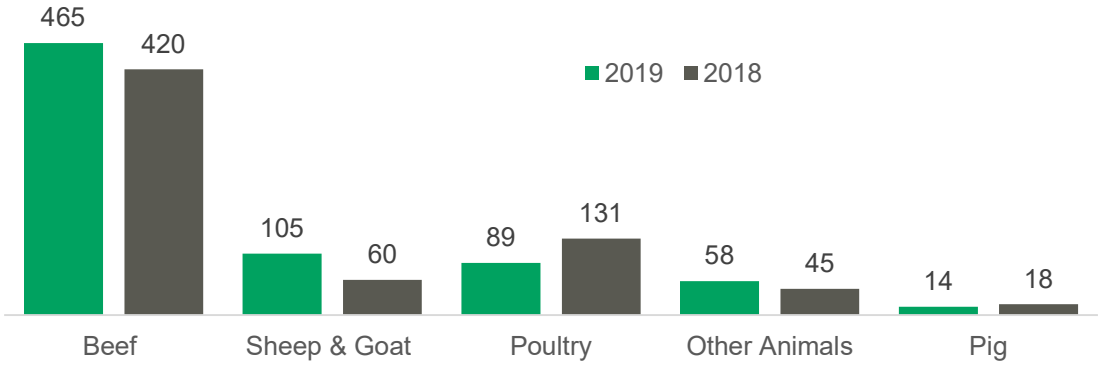
Table 9: Livestock Slaughtered ('000 head)

Animal type	2015	2016	2017	2018	2019
Cattle & Calves	2,275	2,460	2,590	2,782	3,080
Goats & sheep	6,561	8,220	9,207	10,248	11,303
Pigs	283	314	360	388	414

Source: KNBS Economic Survey, 2020

The number of animals slaughtered are feeding the domestic market with an estimated 465metric tonne of beef and about 105 metric tonnes of mutton and goat meet. The figures year on year do show significant change which can be attributed to the increase in the number of animals slaughtered. The chart below presents the increase in the meat volumes between 2018 and 2019.

Figure 3: Domestic meat supply (1000metric tonnes)



Source: KNBS Economic Survey 2020

Processing and preserving of meat and meat products rose by 5.3 per cent in 2019. Production of processed chicken and sausages increased by 6.9 per cent and 7.5 per cent, respectively, in 2019. The quantities of processed and preserved fish declined by 5.8 per cent in the year under review.

5.2 Overview of the livestock sector in Isiolo

Livestock production remains the biggest economic activity with approximately 80% of the population directly and indirectly relying on it. The county's major livestock production is cattle, goats and sheep, mostly the black headed breed. Isiolo has a growing population of camels which is growing through the investment by county government and development organisations such as VSF Suisse that have promoted climate resilience response through the adoption of camel production and camel milk aggregation and value addition.

"The priority of the county is livestock production, we are livestock dependent county, almost 80% of people in Isiolo county rely on livestock for their livelihoods."
Isiolo County Livestock Department

Poultry production is also coming up fast especially in urban areas (CIDP, 2018). Poultry production is coming up fast especially in urban areas (CIDP, 2018). This is because poultry production requires just a small space. Poultry production is becoming a source of white meat for the urban population as well as providing eggs that make pancakes.

"Livestock and livestock products are the economic pillars of the county. Youth can engage in honey production, fodder, and production of livestock, they have energy to do blue colour jobs. You know we can't all get employed, the youth must think of creating employment for themselves. There also opportunities for gum & resin products Chari and Garbatulla and Oldonyiro ward that can be tapped."
County trade office

According to data from the 2019 KNBS population census, Isiolo county has a million goats, just over 854,725 sheep and 248,577 heads of cattle. The county has just about fifty thousand indigenous chicken with about twenty thousand exotic birds reared for eggs and meat. The population of camels was estimated at 148,859 camels. The table below shows the livestock population in Isiolo county.

Table 10: Number of livestock reared in Isiolo county

Exotic cattle: Dairy	Exotic cattle: Beef	Indigenous cattle	Sheep	Goats	Camels
12,900	10,121	248,577	854,725	1,030,005	148,859
Donkeys	**Pigs**	**Indigenous chicken**	**Exotic Chicken: Layers**	**Exotic Chicken: Broilers**	**Beehives**
33,692	158	52,192	11,439	7,456	2,227

Source: KNBS Population Census Data, 2019

5.3 Livestock production areas and animal breeding

Isiolo livestock production is influenced by three ecological zones:

- The **semi-arid zone** covers part of Wabera Ward, Bulla Pesa Ward, and parts of Burat Ward (Isiolo North), and parts of Kinna Ward (Isiolo South). This region practices some agro-pastoralism and there is fodder production.
- The **arid zone** including Oldonyiro, Ngare Mara, some parts of Burat Wards in Isiolo North, the entire Garbatulla Ward, and parts of Kinna Ward in Isiolo South.
- The **severe arid zone** that covers Chari, Cherab, parts of Oldonyiro Ward in Isiolo North, and Sericho Ward in Isiolo South. These are hot areas and relief in livestock feeding is found along Ewaso Nyiro River.

The ecological zones have influence on vegetation and pasture which partly accounts for the varying numbers of livestock. Garbatulla Sub-county (Kinna, Garbatulla and Sericho) has more animals compared to the rest of the sub-counties. The population of goats, cattle, sheep and camels mainly show there is untapped potential for beef production.

Table 11: Isiolo livestock population

Livestock	Isiolo County	Garbatulla Sub-county	Isiolo Sub-county	Merti Sub-county
Indigenous cattle	248,577	121,522	46,839	80,216
Goats	1,030,005	607,921	175,883	246,201
Exotic cattle -Beef	10,121	5,811	1,384	2,926
Sheep	854,725	491,857	111,613	251,255
Camels	148,859	82,312	21,728	44,819
Donkeys	33,692	17,531	6,739	9,422
Exotic cattle -Dairy	12,900	8,338	2,076	2,486

Source: KNBS Population Census 2019

"We have developed DRR plans for 7 wards. Livestock production is a key area, …it is community strength. Crop production integrated with livestock production could in are Agro-pastoral areas can really help the community in building resilience and improving food security for both human and livestock". ***NDMA Isiolo County Office***

Many of the livestock are largely local or indigenous breeds with an exotic beef stock of just about ten thousand heads of cattle. The goats are mainly the Galla and the Small East African goat breeds with a live weight of approximately 50 kg. There are exotic and crosses of local and exotic breeds in Isiolo with Saanen, Toggenberg, and the Swiss alpine as some of the breeds kept by the population. The Boran and Zebu are the key breeds for cattle while the Black Head Persian breed is the dominant sheep breed. These have limited the carcase weight and the market value of beef stock from the county, which affects the profitability of the livestock enterprise both at the household level and at the county level.

"Our breed for cattle (Boran) and goats are among the best for meat, have you heard the fame of Boran cattle? ***Livestock producer Chari***

There have been several initiatives to introduce Galla goats to enhance the size of the goats. The Boran breed and Sahiwal breed have been identified and there are initiatives to undertake selective breeding to improve the carcass quality and size of cattle by adopting these breeds. In the CIDP and the current annual development plan, the county government seeks to invest in the sector to modernize livestock keeping through appropriate animal husbandry, expansion of extension services, disease control, product processing and timely marketing. These initiatives therefore should strengthen the sector and present an opportunity to enhance beef production.

To promote value of livestock, breed improvement is considered a critical element in modernising the sub-sector and improve household incomes. The new improved breeds are a better alternative as the weight and value of meat is higher compared to traditional animal breeds.

"We work to ensure to improve on what community has through upgrading and local breed improvement to enable livestock producers get value for their livestock." ***Isiolo Sub-County livestock veterinary officer***

"In line with big four agenda the department is investing in technology and innovation to improve indigenous breed of cattle, the county is in process of acquiring AI plant." ***Garbatulla Sub-County Livestock Production Officer***

Breeding services are reported to be hampered by the unavailability of Artificial Insemination services in Isiolo. Farmers are forced to source for services from Meru which affects the serving of animals and reduces the timing of calving and farmers chances of increasing improved breeds.

"Lack of AI technologies in Isiolo. Farmers seek for AI services from Meru county, inviting service providers is costly and causes delays in getting the services"

Ranching beef production: Isiolo county has opportunity to promote beef production under ranching schemes. These presents opportunity for increased household income through improved livestock fattening. Currently there are five NRT facilitated conservancies (Nakupratt-Gotu, Leparua, Biliqo-Bulesa, Nasulu, and Oldonyiro Community Conservancy) that serve as fattening grounds and migration areas. NRT Trading has commercialized livestock offtake from conservancies, finishes the livestock for targeted markets. Animals bought from Isiolo are fattened and finished in Lewa Conservancy, OlPajeta and parts of Laikipia, Meru and Nyeri. Livestock markets create linkages to the external buyers buying and finishing animals within and out of Isiolo county.

Ranches and community conservancies provide an opportunity for sound rangeland management and conservation work. The county government in its CIDP seeks to establish conservancies, pasture reserves and feed lots and reseeding and control of invasive species to support livestock production in integrated livestock-conservation activities. Community members however appreciate this is capital intensive and requires coordination from government and other actors.

".. Our cattle are really liked by ranchers in Laikipia, the NRT occasionally come here to buy Borana cattle. The white people have resource and security to get the best out our own breeds. They buy from producers and go to fatten. Given the

resources producers here can reap big from the cattle breed we have here." ***Producer Cherab***

"Modern grazing method such as ranching can offer solution to steady of fodder and prevent risks of animals dying from starvation faced during drought, but these methods are capital intensive, skills and knowledge required for locals to practice, this is lacking." ***Producer Chari***

5.4 Livestock feeding and health management

Feeding and watering are critical success factors to the beef production in Isiolo. Eight percent of land is communally owned and therefore, communal grazing is prevalent. Livestock keepers in Isiolo county largely practice nomadism pastoralism. With increase in population, both human and livestock, degradation of rangeland, changing weather conditions, availability of pasture and water has become a challenge. This has exposed the producers to the risk of adverse weather and prolonged drought which frequently erodes their asset base and the value of livestock. Communities however have come to full realisation that the practice is not sustainable and are exploring ways to mitigate effects of adverse weather.

"It is not easy work to practice free range grazing, it comes with a lot of risks, it is the cheapest way of livestock production as grass and water is free but lately it has turned to be costly as pastoralist lose hundreds of livestock in recurring drought every two years". ***Producer Garbatulla***

Isiolo County had a good production season over the past year (2019-2020). The County Government of Isiolo is spearheading the improved pasture and safeguarding availability of fodder for the livestock. Feeding has been favoured by good rainfall in last year but threat from locust and possibility of droughts in the future remain a risk to the beef production. The slow but consistent adoption of fodder production is promising to address feeding challenges for quality beef. More and more pastoralists are appreciating that the livestock trade requires certain quality of livestock and therefore are using fodder production to address risk of pasture degradation due to weather and feed and minerals to promote quality finishing of animals.

"We have experienced improved production trend in the last one year, we have received good rains from October 2019 through May current year but years before production has been at its lowest, with failed rains things were difficult". ***Producer Cherab***

Private individuals are starting feedlots and buying and finishing animals. There are periodic fodder purchase and distribution by government both at national and county level to address adverse weather effects.

"Animal feeding & fodder production has gained little success, very few people doing fodder, the uptake of is low, we introduced assets creation projects to train farmers on fodder production but with little success, the uptake and adoption of fodder production was very poor, the project was implemented in Kinna, Burat, Oldonyiro and Garbatulla. I may say disease management for livestock is high, but animal nutrition is doing badly, human nutrition aspects is wanting for animals is much worse, dairy production and beef value addition in the county is poor. Success for the feedlot are not impressive, the idea needs to be hammered properly to farmers". ***Isiolo County Livestock Department***

There are however challenges in consistent supply of fodder and processed animal feeds throughout the year. In the dry seasons, hay prices go up and availability is poor and within increased demand during the time, the cost of production goes up.

The county government has several initiatives outlined to promote beef production in the county. The government has focussed on feedlot as a risk mitigation approach and viable solution to promote offtake of livestock and finishing the livestock to promote beef industry. Therefore, the county government is establishing eight feed lots – Cherab, Chari, Sericho, Kinna, Garbatulla, Oldonyiro, Ngare Mara, Burat. Two hundred and forty million shillings is proposed to be spent to construct paddocks, feeding and watering troughs and crushes Bore hole drilling and piping and to construct offices and stores in the feedlots (CIDP 2018-2022)

"The county is focused on improving livestock production through putting hay sheds in strategic locations, vaccination of livestock to stop spread of livestock and ensure livestock are healthy. The county government is also focused on development of ranches to boost environment conservation". ***Kinna Sub- County Livestock Production Officer***

There has been support to the production of beef by other government projects notably the Agricultural Sector Development Support Programme. Other projects have supported the establishment of feedlots and fodder production.

"Three value chains have selected as county priorities supported by ASDSP project, the value chain of focus are camel milk, tomato and beef. A lot has been done to improve camel milk value chain, Anolei group was supported by EU to improve camel milk production, they been provided equipment and cooler machines. REGAL-AG project supported poultry production and feedlots in Garbatulla as well as facilitated training of government officers". ***NDMA County Office***

Animal health management remains a weak link in the value chain. The government extension services are limited, and interventions will come during outbreaks. The government main support has been through mass vaccination. The private practitioners and input suppliers play

a critical role to create awareness in health management practice and offering products and service to producers.

> *" For us we have extension staff who direct farmers on use of products, from the feedback we get I believe they stick to guidelines well, some farmers are knowledgeable on use of these products and they come and go to give to animals themselves, some services like administering injections are done by our staff or other private veterinary officers whom most of them get products from us".* ***Input supplier, Isiolo***

This however has not been with challenges mainly relating to expansive geography, limited knowledge in animal health management among herders, pastoralism practices especially the movement of animals to far flung areas during droughts which also is a period where animals and pests attack increase. The business operates from a weak capital base, have limited entrepreneurial capacity and sales orders are low and debtors' default or delay payments exposing businesses to dangers of collapse.

> *"… there are some like geographical area of Isiolo is too big with less population, this way our customers are scarcely distributed which require that you cover long distance reaching out to few customers, but we have retailers whom we work with and they buy products from us at wholesale price and distribute them to areas we are unable to reach, another challenge is that we are majorly serving pastoralist and I know you are aware of their behaviour of moving from place tom place in search of pasture, if you are offering extension services to this kind of people you realize today you will get them here tomorrow elsewhere miles away".* ***Input supplier, Isiolo***

5.5 Livestock marketing

Isiolo is strategically located along trading routes and livestock traditionally move through Isiolo from Wajir, Marsabit, Garissa and parts of Samburu. The main markets include Oldonyiro, Kipsing, Duse, Sericho, Kinna, Eskut, and Isiolo town livestock market. Marketing of livestock in Isiolo includes livestock producers and the buying and selling of animals by livestock traders. Animals move from primary markets to regional markets and eventually to terminal markets (mainly Nairobi) where they are sold for slaughter. During trading in livestock, before reaching the terminal markets an animal may change hands several times. Animals are therefore sold both to local butcheries and to traders who sell them off out of the county. Thus, in the value chain some of the meat animals' end up being consumed within the county while others go outside the county.

The livestock trade therefore has several actors within the trade who can be identified as traders who:

- source animals from the pastoralist in the grazing lands or the primary markets in Isiolo and sells in regional markets in the county.
- procure animals in markets in the county and sells in markets in the neighbouring counties.
- buy animals in regional markets in the county and sells in the same markets; and
- procure animals in markets in the county and sells in Nairobi.

Traders frequently trading in the markets mainly come from Meru, Laikipia, Nyeri, and Nairobi. The terminal markets for animals from Isiolo in Nairobi include Dagoretti for cattle, Kiamaiko and Babadogo for sheep and goats.

"Mostly we sell to Nyeri, Nairobi, Meru, Tharaka, Embu and many more places within and outside our counties, there are those who sell young goats to Nairobi for export". ***Livestock Trader***

While Isiolo has played an important role in feeding the export market for goats and sheep for the Middle East market, trade is dominated by brokers- and the price point is determined to favour the traders. This makes the livestock producer vulnerable and exposed to the risk of exploitation. Key informants have pointed out that formation of producer groups can improve the capacity of pastoralists to improve breeds and improve trade terms. Through these groups livestock value chain actors can receive financial literacy and entrepreneurial capacity building to promote trade in the county.

Livestock Marketing Association (LMA) are playing a critical role in management of livestock markets, managing trading activities and maintaining peace and stability in the livestock markets. Together County Livestock Marketing Council (CLMC) and national level Kenya Livestock Marketing Council (KLMC), LMAs, coordinate trade activities and management of markets. The LMAs have previously received support from USAID through REGAL AG and LMS Activities. The projects have supported the infrastructure development and trade regularization within markets and capacity building of the LMA leadership.

"Information and training of Livestock Market Association (LMA) has registered significant success especially LMAs in Oldonyiro have been successfully in managing livestock market revenue where the revenue collected is used for development of community projects. LMAs capacity to manage livestock markets has improved through training supported by REGAL-AG, LMA is structured by the county government". ***County Economic Planning Office***

There are generally gaps in market information on available markets, product pricing and value. The dominant role of the broker, asymmetrical relationship between herders and traders and poor linkages to the terminal market animal prices have entrenched a trade practice that bases the price of animals on visual assessment. There has been adoption of best practice

digital weighing scales that are used to determine the price based on the live weight of animals. There are weaknesses in existing producer groups and cooperatives where they exist.

"…introduction of livestock weighing scale for weighing animals and price determined by weigh rather than estimation which often disadvantage the producers." ***Sub-County livestock veterinary officer***

"Most of the cooperatives are not performing well though some aren't bad I can say they are trying. Most comprise of agriculture, livestock and table banking Sacco's those doing relatively better is like in livestock for those who engage in livestock marketing they are doing relatively better though there is also need for improvement". ***County Cooperative Department***

"There has been key success registered in better management of livestock market revenue collection, formation and strengthening of local livestock market association has been really successfully. Construction of modern markets in Isiolo, Oldonyiro, and Kipsing has really accelerated growth in trade opened the centres to different actors who access the market weekly. REGAL-AG project by USAID has been supportive in achieving the success". ***County economic planning office***

5.6 Beef processing

The upcoming abattoir presents opportunities and growth of the beef value chain. Though the construction has taken time, there is hope the facility will open soon. Isiolo abattoir has been positioned to be a processing point for beef to serve the pastoralist counties of Baringo, Laikipia, Samburu and Isiolo. The slaughterhouse has a capacity of processing 270,000 animals per year. This is to help harness the vast potential of livestock business in the region. The abattoir is expected to create inter linkages to other sectors of the economy and create more industries including hides and skins, commercial feed production, pet food manufacturing among others. the facility has capacity of slaughtering 23,040 animals per month—19,200 small stocks and 3,840 large stocks. It is projected to process 1000tonnes per year. It hopes to target export markets in the Middle East-UAE, Qatar, Oman, Kuwait, and Saudi Arabia as well as local market. The government seeks to commission the processing of meat next year (2021) to fill in a gap that exists. There are mechanisms in place to institute a Public-Private Partnership framework proposed to operate the facility.

"The abattoir is 80% complete, creation of disease-free zone within the abattoir is currently being worked, equipment's are also being installed. There is also intention to have private public partnership this is being discussed by county government leadership, the move will ensure partnership between the private sector and the county government. There are some staff employed at the abattoir to monitor the progress of the project." ***Garbatulla Sub-County livestock production officer***

"Development of abattoir is our concern as it will support strengthening of livelihood that we support. Follow up abattoir completion is made through such forum, follow up on private public partnership is also made through the forum." ***County trade and industry department***

Currently there are several cottage industries that are processing (drying) camel meat to make locally favoured delicacy called *nyiri nyiri*. Some women groups are processing nyiri nyiri. The value addition of camel meat is mainly undertaken by women, who usually buy meat from other women running butcheries.

The gap in a large processor and the high number of live animals that sold off and transported out of the county is an opportunity that the county government and the actors should address to increase the value of livestock and incomes of pastoralist households in the county.

5.7 Actors and their role in the value chain

The beef value chain has several actors playing critical roles from production, aggregation, and marketing. Government and non-government organisations offer facilitative role in the value chains development. The table below summaries some of the key actors and the respective role played by each.

Table 12: Actors in the livestock value chain in Isiolo county

Actor	Role
County & national government	National and county government are supporting various initiatives to promote livestock production and marketing. These include. • Government is key in support of livestock production and marketing among pastoral communities in the county. These include programs such as Agriculture Sector Development Support Programme (ASDPS), Kenya Livestock Insurance Program (KLIP), vaccination campaigns, breeding and husbandry practices programs. • Policy formulation and implementation-the sector requires review of the policy to address legal and regulatory gaps • Research and Development -together with Kenya Animal Genetic Resources Centre, Kenya Agricultural and Livestock Research Organisation and other institutions including universities are leading research to promote breeds, rangeland management and fodder. • Breed improvement-county and national government are supporting the subsidised artificial insemination project • Standards Regulatory activities-several actors including Director of Veterinary Services, Kenya Bureau of Standards, Public Health Department, Meat Inspectors among others work to assure meat quality and adherence of public health. These also oversight the management & hygiene of slaughterhouses.

Actor	Role
	• Animal health service-county government is key to the success of veterinary services. • Infrastructure investment-from setting aside land require to boost activities to construction and operationalisation of the infrastructure needed to promote production and trade. • Production and provision of drought mitigation feeds-government has provided relief in form of hay, high nutrition blocks and other inputs to farmers during distress drought period. • Climate mitigation response-government is at the forefront in campaigning for climate smart agriculture and is promoting the production and storage of hay as a drought mitigation measure among pastoralists. • Security-national police service and interior department support the sector by fighting cattle rustling and maintenance of peace in communities. • Road infrastructure-county government and departments such Kenya National Highway Authority, Kenya Urban Roads Authority, Kenya Rural Roads Authority and improving, upgrading, and expanding the road network. • County government collects cess that is used to improve services for growth of the sector.
Livestock keepers	These are the 23,348 households that produce livestock as enumerated by the national census in 2019. These are key in breeding, feeding, health and nutrition management, fattening and sale of livestock to the traders. The producers are critical in transition of the sector to an improved state from what it currently is.
Grazing committees	Work out modalities of peacefully sharing out pasture and water in the region. These are also crucial in reseeding and natural resources management.
Producer associations/ Marketing cooperatives	Associations of farmers and some of traders are propelling the growth of production and trade in livestock.
Input suppliers	Input suppliers for feeds, minerals and animal health products. These are mostly private sector actors and limited to key urban areas. These will be stationed in a town but routinely visit livestock markets, watering points and pastureland to serve livestock keepers.
Livestock Traders	Traders play the linking role between livestock keepers, meat processors and consumers. They are also a critical group in the fair

Actor	Role
	price determination and any shift from traditional pricing of using the 'eyes' to weight-based price setting.
Butcheries	Retailers of meat are useful channel through which meat is sold. Butchery owners also buy animals directly from the livestock keepers or buy through the livestock traders.
Slaughterhouse actors	The butchers, slaughterhouse personnel are key especially to the quality management of meat. The cleanliness and hygiene of slaughterhouse and transportation equipment affects the quality of meat sold either in butcheries or in commissioned slaughtering point of the meat destined for markets outside the county or country.
Transporters	Transporters of livestock
Livestock Marketing Association (LMA)	LMAs are involved in daily livestock sales yard management. These are vital organisations in streamlining trade and provides structures that reinforce orderly trade. Some also reduce livestock theft by advocating for sale of legitimately sourced livestock.
Kenya Livestock Marketing Council (KLMC)	Kenya Livestock Marketing Council, a non-profit organisation, represents the traders' interests about marketing livestock products
NGOs	• Non-governmental organisations are supporting a range of activities. • We have different partners supporting the county government: The partners including World Food Program- supports food distribution, cash transfer for poor households, VSF-support vaccination of livestock, ILRI-disease surveillance." County Economic Planning Department • VSF Suisse-promoting the livestock value chain development and specifically camel milk value chain, livestock diseases and pest control and community resilience activities. • USAID Livestock Market Systems (LMS) -Promoting livestock production, marketing and value addition. Grant program that supports resilience and economic growth of the county. • USAID funded Kenya Resilient Arid Lands Partnership for Integrated Development (RAPID)-mainly promoting livestock and community access to water, value addition and diversified livelihoods in Isiolo county. • FAO - supporting Kenyan Arid and Semi-Arid lands (ASALs) improvement of livelihoods through development of value chains and natural resources management, crop and livestock production.

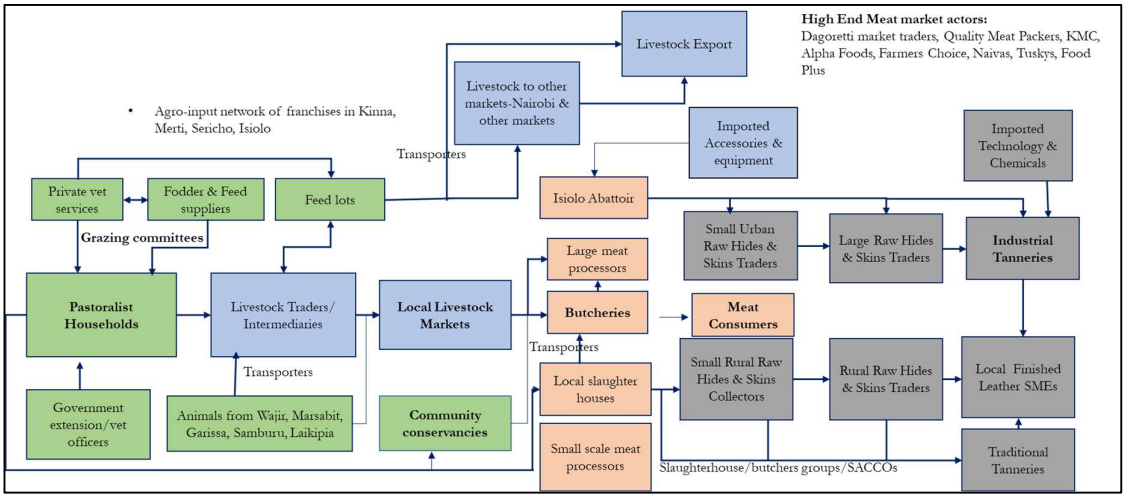
Actor	Role
	• International Institute of Rural Reconstruction (IIRR) together with Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) supporting the livestock value chain to build climate resilience and enterprise development, including support to LMA. • International Livestock Research Institute (ILRI)-has over the years supported research and projects that promote production and marketing of livestock and livestock products. • Africa Development Bank: Drought Resilience and Sustainable Livelihoods Program (DRLSP). • World Bank funded Kenya Climate Smart Agriculture Project (KCSAP): KCSAP focuses on increasing productivity, building resilience, with reducing GHG emissions. • IGAD's Regional Pastoral Livelihoods Resilience Project (RPLRP) that is developing regional solutions to challenges faced by pastoralists.

"We have different partners/agencies supporting county government who include but not limited to, WFP- implement sustainable food system program in four wards, FAO-support livestock vaccination and disease management, VSF-also support of livestock vaccination, CRS-wash solar powered water pump, environment friend energy and caritas- green energy project and restocking." ***County Livestock Department***

5.8 Beef value chain map

The diagram below depicts the value chain map, with actors at different stages of the beef production and trade.

Figure 4: Beef value chain map



5.9 Value chain challenges and opportunities

Production practices: continued nomadic pastoralism exposes livestock keepers to loses when drought strikes. The effects of climate change have manifested in unpredictable seasons. The communities remain highly susceptible to more frequent drought periods, increases in mean temperatures, and decrease in average rainfall in both the January - June and July to December seasons.

"We are used to this kind of grazing; it been practiced by our forefathers for hundreds of years. ***Producer Kinna***

"Drought has been a major challenge in growth and development of livestock economy, when the drought strikes livestock have no value, livelihoods of hundreds is in jeopardy. Livestock diseases is also another challenge in growth of livestock economy, diseases lead to reduction in production and loss of livestock".
County Livestock Department

Feeding and nutrition was pointed out by producers and key informants as an area that is presenting a challenge for pastoralists. The lack of quality and sometimes adequate pasture and fodder supply of limits the growth and quality of beef stock. Poor supply of feeds (hay and manufactured feeds) affects the costs of production high and reduces profitability of beef actors. Additionally, there is limited supply of high nutrition feeds to do finishing and where the feeds are available the cost was said to be high.

"Animal health have greatly improved, regular vaccination of livestock done supported by development partners, but animal nutrition is still wanting, producers do not understand much on animal nutrition, they think that animals need only grass". ***Garbatulla sub-county livestock production officer***

Opportunity: To address the challenge, DRIC project should consider collaboration with projects to address climate challenges –including the national and county government projects such as the Kenya Climate Smart Agriculture Program (KCSAP) co-funded by Government of Kenya and the World Bank. The project is intervening through adaptation practices including fodder production and supplementary feeding, improvement of herds to more quality beef breeds, pests and diseases control and management, and timely sale of livestock during extreme drought conditions.

Cultural beliefs: the number of animals is small for each of the producing households. Animals will usually be sold as need arises mainly to cater for cash need such as school fees, to pay hospital bills among others. community will usually consider the size of stock as symbol of wealth and therefore even when threatened by drought, producers may not willingly or timely sell of their animals.

"Pastoralist do not keep livestock for commercial purpose but rather for prestige this makes them disinterested in financial services or even getting information about financial services". ***Kinna Sub-County Livestock Office***

Extension support and animal health services: County government staff like in many other counties are overstretched which undermines their capacity to effectively support their roles. The staff are inadequate and lack of facilitation and mobility to reach the expansive communities. Garbatulla and Merti Sub-counties are critically underserved.

"The county government should strength disease surveillance, support vet department in mobility to offer timely extension services, train producers in pasture production and conservation". ***Isiolo Sub-County Livestock Office***

"We are teaming up with the government to give us drugs, transport and to train farmers in different wards. Some NGOs like ILRI are also assisting us to raise awareness about best animal health practices. We also got help from USAID through REGAL-AG and that is how I started and grew this agrovet". ***Input supplier, Kinna***

Underdeveloped private veterinary and input supply chain: 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. One of the providers-Sidai Africa which has operated in the county since 2013 has a main distribution point in Isiolo town and a network of franchise of eight contracted outlets (Oldonyiro, Buresa, Merti, Biriqo, Kinna, Galba Tulla, Sericho and Garfasa). This has provided supply of inputs. However, there is still a gap in supply of inputs and there claims by producers that some of small individual outlets with no systems to monitor quality of stock have substandard products. Feeds and minerals supply chain is characterised by delays and high cost of transport which makes cost of production high.

"We are majorly serving pastoralists and I know you are aware of their behaviour of moving from place to place in search of pasture, if you are offering extension services to this kind of people you realize today you will get them here tomorrow elsewhere miles away". ***Input supplier***

Entrepreneurial capacity building, formation and strengthening of producers' groups and partnerships with county government and other actors supporting farmers to improve production and livestock management is important in addressing the issues.

Access to finance: Producers and private agrovets and service providers are reported to lack adequate capital to produce quality and scalable enterprise at production and to offer input

supply and services to actors. Working capital constraints limit the capacity of the businesses to effectively support farmers in the county. Partnership with private sector extension support-agrovets and practitioners to promote selective breeding, production practices, supply of inputs (drugs, minerals and high nutritious feeds) and other best practices is important in enhancing beef production and quality in the county.

"Challenges are many, if I start listing them I may take long, for example Muslim culture on loan issue have make it difficult for this cooperative to acquire loans to accelerate their growth, if I may just list few others include; inadequate funds for growth, poor record keeping, poor marketing skills makes it difficult for products to penetrate other markets, Inadequate training in leadership and governance of cooperatives and saccos. For example, there are women who makes and sell dried meat called nyiri nyiri, if there were means in which the meat could me parked and branded it could penetrate more other markets". ***County livestock department***

"Producers or livestock keepers can have access to financial services of their choices, accessibility could be hindered by gap in information reaching producers, especially pastoralists". ***Financial service provider***

"We have got challenges in raising enough capital to supply even beyond Nyeri and Meru Counties where we supply" ***Livestock trader***

Linkage to market: producers are poor linked to market and the producers have limited information about the trade especially market prices. The trade is dominated by brokers and therefore farmers are not fully benefiting from the optimal market prices. The cooperatives and producer groups are reported to be weak and in several places across the county, they are non-existent.

"Brokers exploit the producers, producers rely on brokers services for livestock prices and negotiation of prices between buyers and producers."
Livestock Producer

Value addition: There are limited value addition facilities in Isiolo county that are currently processing beef. This has led to a situation where animals are sold to intermediary traders who in turn ferry the animals to terminal market in Nairobi. There is presently an opportunity to work with county government to operationalise the upcoming abattoir and support the capacity of producers to improve the quality of beef, embrace feedlots and feeding that promotes growth and quality of livestock, and link directly to the abattoir or any other value-addition facility that would offer better price than what traders currently offer the producers.

"There is no good slaughterhouse in Isiolo, this comprises the hygiene condition of meat. The slaughterhouse is not halal certified"
Private meat processor, Isiolo county

The project has an opportunity to capacity building existing medium sized beef value addition, producer groups and feedlots to strengthen the supply of quality livestock that will promote beef value addition and incomes for the farmers.

Water availability is a major issue affecting the effective and profitability production. During the dry sells, animals trek for long distance in search for water. The quality of the water is said to be poor and together with exposure to rangelands during to the treks exposes animals to diseases and pests.

"Inadequate water supply for animals. Enough water is needed for animals to drink and to keep the environment clean. Purchase/hire water van often to meet water demand which is expensive" ***Producer Isiolo Sub-county***

6 CAMEL MILK VALUE CHAIN ANALYSIS

This section of the report provides first an overview of the camel milk value chain at the national level then the rest of the chapter provides an analysis of the value chain in Isiolo county.

6.1 National overview of the Camel Milk Value Chain

In Kenya there are four main breeds of camels which are associated with the ethnic groups where they are traditionally kept. These are; the Somali breed predominantly found in the former North-Eastern Province; the Oromo-Gabbra - Rendille breed found among the sub-tribes of Marsabit county, and the Turkana breed largely found in the arid parts of the Rift Valley and the Pakistani breed which originated from Pakistan.

Camels which originated from among the Somalis are referred as Somali breeds and are generally much larger than other breeds in the country with adult females weighing between 500 – 600 kg and males 600 – 800 kg. The Somali breed has the highest milk yield estimated at 5 – 8 litres per day during the wet season and 2-4 litres during the dry season.[4]

[4] https://www.afraca.org/download/general_rf_publications/Camel-Milk-Value-Chain-The-Case-of-Isiolo-District-A-Study-Report-by-Muli-Musinga-et-al.pdf

Camel herding has great potential in many dry parts of Kenya that are affected by climate change, as camels are much more resistant to drought than cows and keep producing milk in dry periods. There are 167,666 household in the country rearing camels and holding 4,640,085 camels[5]

6.2 Overview of the Camel Milk Value Chain in Isiolo

In 2019 KPHC, 6,771 households in Isiolo County reared camels with a total population of 148,859 camels.

Table 13: Camel population in Isiolo sub-counties

ISIOLO Sub-counties	Camel Population
Garbatulla	82,312
Isiolo	21,728
Merti	44,819
Isiolo Total	**148,859**

Source: 2019 KPHC – Vol. IV

A baseline study conducted by the county government in 2017 indicates that the county produces over **6.8 million litres** of camel milk annually. The camel Milk producers in the county made an estimated **KES. 2.8 billion** from sale of camel milk. By end of 2020, expectation is that the county should make **KES. 3.9B** from sales of **9.2 million litres** based on projections across the 3 years.

Table 14: Income and volume of camel production projections -2018-2022

Isiolo County 2018-2022	% Increase Amount of earnings in KES from camel milk processing and trade				
	2018	2019	2020	2021	2022
Income from sale of camel milk – KES 2.8 billion (Baseline 2017)	(10%) – 3.08 billion	(15%) – 3.22 billion	(20%) – 3.36 billion	(30%) – 3.64 billion	(40%) – 3.92 billion
Increased adoption of camel milk production by best practices – Baseline 2017 (6.8 M litres)	(10%) – 7.5 million litres	(20%) – 8.2 million litres	(25%) – 8.5 million litres	(30%) – 8.8 million litres	(35%) – 9.2 million litres

Source: Isiolo County CIDP 2018-2022

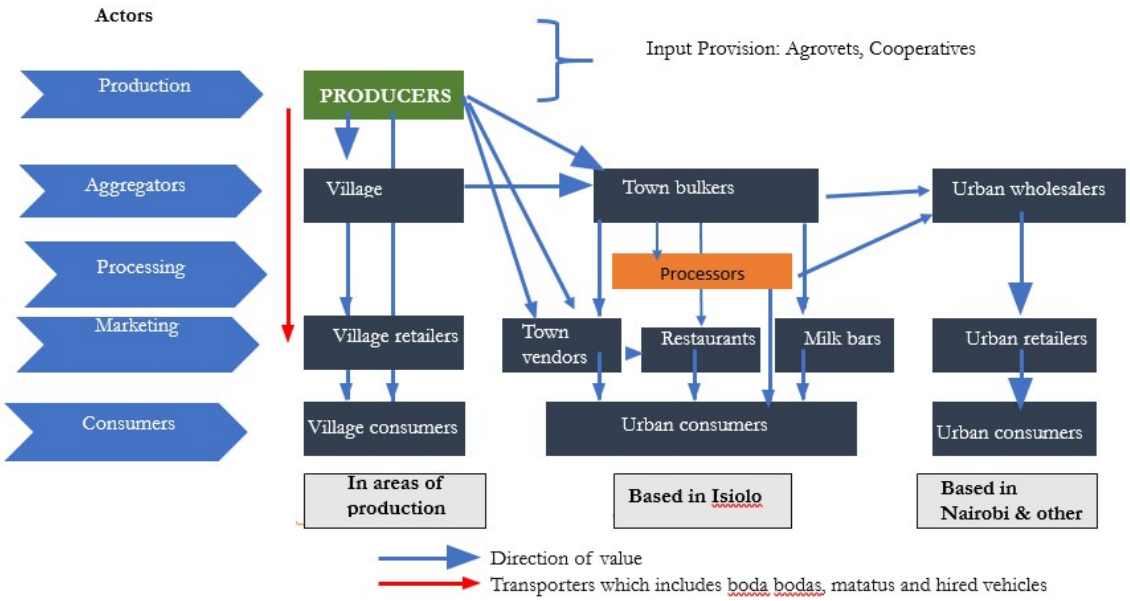
[5] KPHC 2019 – Volume IV

Camel milk is one of the most strategic value chains in Isiolo (GoK, 2014), being a major source of food security and income for the County's population and holding a significant cultural value. The product contributes up to 50% of the total household nutrient intake and 30% of the annual caloric intake. With a population of 148,859 camel heads in the county, they yield roughly 22,500 litres of milk per day out of these, approximately 4,500 litres of raw milk are supplied to the main Eastleigh market in Nairobi accounting for 70% of marketed camel milk. It is estimated that 20% of the population in the county is engaged in the camel milk value chain from production to marketing.

Production occurs in four main clusters, based on milk yields: The Mlango-Ngarentare-Burat cluster in Central Isiolo, the Kulamawe cluster in Kinna, and two minor clusters in Modogashe-Eldera in Sericho and Boji-Galfarsa-Malkadaka in Garbatulla. Only two of these clusters, the Central Division and Kulamawe are significantly developed and operating at meaningful levels of commercialization. The two clusters mainly contribute the bulk of camel milk traded in Isiolo town from largely Somali breeds. Of the total volume of camel milk that enters Isiolo Town from Isiolo Central and Kulamawe production clusters, camel milk traders and businesses within Isiolo Town handle an average of 3,422 litres daily in the dry season and 4,532 litres in the wet season.

Snapshot of camel value chain in Isiolo

Figure 5: Camel milk value chain map



6.3 Camel Milk Value addition processing

There have been several initiatives towards camel milk processing in the county and information obtained from the value chain actors including the Isiolo Directorate of Livestock and Directorate of Co-operative Development affirm that there are several licensed formal mini processors, mainly groups and co-operatives in the county. However, only a few are currently active and engage in some form of value addition. These are:

Table 15: Aggregators Milk Potential

Aggregators	Current Volume Capacity in litres per day
Anolei Women Camel Milk Processors	3,100
Tawakal Women Self Help Group	900–1000
Afro Natural Camel Milk Processors	100

*"It ranges from 900 – 1000 Litres of milk per day. But these days due to Covid it has reduced to 200 or 300" – **Tawakal Women Self Help Group***

*"We do make yoghurt, sweets and ice cream. Since we have all the machines for that" - **Tawakal Women Self Help Group***

6.4 Camel Milk marketing

There are three distinct value adding activities that camel milk goes through once it reaches Isiolo town for it to reach the Nairobi urban market. These include grading and bulking, cold storage and transportation to Nairobi. Grading, bulking and cold storage activities are undertaken by Isiolo-based camel milk traders (over 90% women) estimated to range from around 25 during the dry season to about 60 during the wet season of peak camel milk production.

The biggest demand for camel milk in Kenya is in its fresh form, largely for preparing tea or for young children. It is therefore important that milk can reach consumers while it is still fresh. Since milk to the Nairobi urban market is transported by buses that depart Isiolo town by 6.30 am, milk from farmers have to stay in Isiolo overnight so that it can be loaded into the buses in time for the early morning departure. This requires cold storage and, in response, an elaborate business for cold storage has emerged in the town.

A census carried out during the study of the number of businesses involved in cold storage of camel milk showed that there are seven cooling hubs in Isiolo town with a cold storage capacity of 8,020 litres of camel milk per day. These could be termed as bulking and cold storage

centres. Five of the cooling hubs are owned by an association of 52 women (Anolei women group) all of whom are camel milk traders. The other two hubs are owned by a businessman in Isiolo town (Abdi Rahman Abdile) who is also a camel owner with 100 camels and buys milk from other farmers to take to the Nairobi urban market. The cooling hubs can therefore be said to be part and parcel of the camel milk trading activity and as mentioned, can be termed as bulking centres. Cold storage can however also be a business on its own right. For instance, Anolei women group only owns about a half of the 58 freezers in their cooling hubs with the rest leased from different businesspeople at a rate of KES 2,000 per month.

Any trader who is not a member of the women group is charged KES 50 per 20 litre jerrican of camel milk stored overnight (i.e. KES 2.50/litre).6

"We joined group back in 2014 where we take our milk to women at Anolei who sell on our behalf and pay us for milk we have delivered depending on how they have sold". ***Anolei Camel Milk Producers***

"We sell our produce in Isiolo and Nairobi the unit selling price in Isiolo is different from Nairobi, in Isiolo we sell at KES 100 per litre and in Nairobi it is KES 150 – 200 per litre". ***Tawakal Women Self Help Group***

"Before the Covid we were handling up to 1000 litres a day and now we are doing 100 – 120 litres. We have produced throughout the year because there is a way, we do calve to ensure we have milk throughout the year again with camel you can milk them up to 9months". ***Afro Natural Processors***

[6] The Camel Milk Industry in Kenya- A study commissioned by SNV to explore the potential of Camel Milk from Isiolo District to access sustainable formal markets

6.5 Actors and their role in the value chain

The table below summaries some of the key actors and the respective role played by each.

Table 16: Actors in the camel milk value chain in Isiolo county

Actor	Role
Producers - 6,771 households	• The types of actors in the value chain at the on-farm production stage are the producers at small scale, and farmers' at large scale. The role of women in the camel milk production is low. • Producers deliver milk to the aggregator in the morning when it is still raw. The camel owners receive approximately KES 60 to 80 per litre of milk.

Aggregators:	• It entails aggregator at two levels.
	  ○ Village collectors
	  ○ Town aggregators
	• Some of the village collectors who also act as producers have formed groups and cooperatives to market their milk. Some of co-operatives are well organized such as Anolei & Tawakal Cooperatives.
	• Town aggregators rely on their supplies from village collectors who plan for delivers on a daily basis.
	• The aggregation business is largely women driven and takes place at the nearest market centre with ease of access to the market.
	• Aggregators who do not have refrigeration services boil the milk to keep it fresh for longer period. It is during the boiling process that these aggregators smoke the plastic containers used to store milk.

Transporters	• These were made up mainly of the young motorbike transporters whose role is to collect milk from producers and taking it to village or other market centres aggregators. • Transporters doing delivery from market centres to Isiolo town get paid by the cooperatives or the producers. Some are paid daily or get to deduct money from sale of milk delivered in town.

Actor	Role
	• Other transporters involved are matatus, small private vehicle operators, trucks and passenger buses which ply along the Moyale, Marsabit, Isiolo and Nairobi routes.
Input Suppliers	• At the inputs stage, the types of actors in the value chain are the service providers at medium scale, and suppliers at small scale.
Processors	• There are several players where some are groups or SACCOs operating them such as Anolei Women Camel Milk Cooperative, Tawakal Women Self Help Group and individual owned such as Afro Natural Camel Milk processors. • Most are these players process camel milk and yoghurt with no other form of value addition done.

"There are different actors who are involved in taking our products to the market the first one is the Boda Boda riders and taxi drivers they carry the plastic jerry cans to the bus stop for us. The second actors are the bus drivers and the conductors who are the one who take our products to Nairobi. The last people are the agents we have on the ground who receive the milk from the bus and distribute them to our customers." ***Tawakal Women Self Help Group***

6.6 Challenges and opportunities in camel milk value chain

Value chain constraints related to production, milk handling and transportation hamper overall camel milk value addition in the Isiolo county. Among the constraints include.

Constraints	Opportunity
Quality surveillance – The lack of knowledge among producers on quality to be maintained – Use plastic containers in storing milk	• Strategies to improve pastoralists' income and livelihoods from camel milk should therefore focus on innovative ways of reducing camel milk contamination, spoilage and post-harvest losses. • Well-tailored hygiene and food safety education aimed at improving pastoralists' knowledge on food hygiene and sanitation need to be enhanced.
Milk Handling - unhygienic milking. The udders of lactating camels are rarely washed before milking. The Milkers also do not wash their hands which affects the milk quality as they get it going bad before selling.	

Constraints	Opportunity
"Unable to Maintaining the hygiene standards by the people who are milking it". Camel Producers, Isiolo	
Poor camel health management	• Producers require extension services to regular provide camel health education.
Lack of market for milk - This affects the amount of milk they produce with most of it either left to be suckled by the calf while a certain portion is consumed at home.	• Market linkage through formation of cooperative is required to help in reaching out to a bigger market.
High transportation cost during dry season -Milk production levels reduce by almost fifty percent during dry season. *"Transportation mode of our product – we are using 20litres jerrican to transport milk to the market which sometimes is not hygienically proper, and it consume more time and expense while the supply is more". Tawakal Women Self Help Group* As the herders move further hinterland in search of pasture, transportation cost also increases thereby raising the farm-gate price per litre of milk. *"During the dry season it becomes more expensive to transport the milk to town since animals always migrate very far away from town sometimes it can be more than 30 – 40 kms from town." Afro Natural Camel Milk Processors*	• Pooled transportation cost needs to be implemented and producers encouraged to join or form cooperatives.
Lack of refrigeration services for most of them to keep the milk fresh - Longer time taken for milk to be cooled at cooling facilities. Initial High costs of setting up coolers *"Lack of cold system during transportation of milk from the farm to the market which reduces the shelve life of the milk. Quality is compromised due to heat knowing that milk is very sensitive to change in temperatures especially during the dry and*	• Need to provide access to finance for aggregators to source for refrigeration/ coolers

Constraints	Opportunity
hot season because we tend to move very far from the town we can move from 70,100 or even 120 kms away so by the time milk gets to Isiolo or the intended market you may find that the quality has been compromised." – Afro Natural Camel Milk Processors	
Lack of maintenance of good hygiene practices as both the producers and aggregators use plastic containers	• Provision of hygienic containers that will not contaminate milk after it has already been delivered
High transportation cost drives the price of milk high -Lack of access to structured off-takers *"the first one is high cost of transporting milk to the markets, bodaboda charges us KES 300 to transport 20 litres and KES 150 for 10 litres. We don't have our own motorbikes, as you can see, we have taken camels to grazing field they will be milked there so transporting that milk with that distance makes it so expensive. The price is low, the market is not reliable." – Anolei Camel Milk Producers*	• Market linkages and pooled transportation cost needs to be done with cooperatives
Traditional practices of preserving by smoking milk	• Need to sensitize producers on better ways to preserve milk

"We have challenges in storing the milk for a longer time since camel milk get spoilt and we don't have fridge to store it". ***Camel Milk Trader, Merti***

"There is contamination of milk because some of the boys who work for me are uneducated, they tend to follow their own way when milking instead of doing the way I have trained them, which contributes to bacteria getting in to the milk more often. Also, the containers we are using to transport it is not of good quality because we are using the plastic containers to transport it to town". ***Afro Natural Milk Processor***

6.7 Summary

The value chain analysis has established that:

- Camel milk is one commodity that has a **great potential for expansion** through co-operative societies.
- Camel milk trade is a business mostly done by women in Isiolo county and it is a thriving business. However, camel dairy cooperatives still face many challenges to grow their businesses in rural areas.
- Some of the key challenges that hamper business growth are the **high production costs for milk** and **lack of suitable equipment for storage**, value addition and **transportation t**o markets.
- Strong cooperative can help consolidate this potential and grow the camel milk economy in Isiolo.
- In an effort to address these challenges, marketing groups, in collaboration with relevant players can train milk producers and traders on hygienic camel milk handling practices and promote the use of aluminium cans (instead of plastic containers), and value addition through yoghurt and cheese to the processors to help the community maximise on returns.
- Policy is required to help make it easy to trade in the sub-sector and others to address the identified barriers. In addition, effective strategy is required to ensure that the **local businesses benefit** from this huge potential will need to be put in place by Isiolo County Government.

7 HONEY VALUE CHAIN ANALYSIS

7.1 Overview national honey value chain

Kenya is the third important producer of honey in Africa after Ethiopia and Tanzania. However only 20% of the country's honey production potential (estimated at 100,000 metric tonnes) has been tapped. 80% of the honey comes from the traditional log hive. However, a reasonable amount of hive products is obtained from Kenya Top Bar and Langstroth hives. [7]

Picture 2: Modern Top-Bar Beehives in Isiolo

The apiculture policy has broadly promoted a modern bee keeping industry to provide additional income for rural households. The current policy on Apiculture is broadly to develop a modern bee-keeping industry in the country to provide additional income to rural households. The policy paper on apiculture is still on the draft proposal stage.

Kenya is the **third important producer** of honey in Africa after **Ethiopia** and **Tanzania**. There are **201,406** households practising apiculture in the country with an estimated annual production of **20,000 metric tonnes** (20% of the country's honey production potential (estimated at **100,000 metric tonnes**) has been tapped. **16,000 tonnes** (80% of honey produced) come from the **traditional log hive**.

[7] https://kippra.or.ke/index.php/resource-centre/blogs/26-bee-bulking-and-farmer-capacity-building-in-bee-keeping-an-opportunity-for-increasing-youth-employment-and-food-security-in-rural-areas

A reasonable amount of hive products is obtained from Kenya Top Bar and Langstroth hives. According to honey packers, processors and players in the Kenya Honey industry, most of the honey sold in supermarkets across the country is sourced from outside the country. Locally sourced honey account for between 15-20% of all honey marketed in the country. The country's honey production is not sufficient to sustainably meet the local demand and keep the processor machines running throughout the year.

For instance, Honey Care (a processor based in Nairobi) requires between 25-30 tons per month to meet demand from their customers. Honey sourced from local producers only manage to meet 10-15% of their need per month. While Honey Care Africa and other processors would prefer to source all their honey from local producers, lack of sufficient quantities and quality issues drive them to source from Tanzania.

The total amount a person requires to set up bee farming is approximately KES 10,000 (from purchasing of beehive to that of harvesting materials) together with the equipment used for harvesting honey. Setting up a beehive requires KES 5,000 for example the Langstroth type of beehive, but a person may decide to use locally available materials to construct one from home.

7.2 Beekeeping in Isiolo county

7.2.1 Overview of the county

Isiolo only has 407 households practising beekeeping farming well where 352 household are in Isiolo subcounty. The county has a total of 2,227 beehives distributed across the 407 household. The table below shows the distribution of beekeepers across the three sub-counties.

Table 17: Number of honey producers in Isiolo County

Sub-County	No. of households	No. of beehives
Garbatulla	53	218
Isiolo	352	1,501
Merti	2	508
Total Isiolo County	407	2,227

Source: KNBS Population Census Data, 2019

However, during the DRIC value chain analysis validation workshops held in June 2021, it was reported that various actors have been supporting communities to increase honey production. It was noted that the bee keeping activities are generally being under-reported. For instance, while the Kenya National Bureau of Statistics 2019 Census reported 407 households to be

producing honey, there are initiatives that in recent years that have increased the number of beehives. These include the additional estimated 1000 beehives provided by WFP, 500 by World Vision and Lay Volunteers International Association (LVIA) which has given out 300 hives.

The community actors noted that the value chain faces challenges with theft of honey and beehives. Bee housing technologies could be adopted to avert the losses being experiences from theft, invasion by honey burgers. Community policing and support of the value chain is needed to safeguard the gains being made. The quality of honey from Isiolo was said to be quality and marketable. The actors in the value chain reported there is unmet demand and the lack of capacity to process and brand products is a limiting factor. The processing unit in Isiolo town is said to be underutilized and DRIC Project can find ways of linking actors to undertake processing in the facility.

In a baseline study conducted by the county government in 2017, Isiolo county households made KES 3.6 million in the year and by 2022, farmers are projected to be making KES 12 million per year. The county has potential in beekeeping; however, this has not been achieved because of challenges like drought, inadequate investment among others. Potential areas for bee keeping include Oldonyiro, Isiolo central, Merti and Kinna.

In the 2013 to 2017 County Development plans, the county government had plans to enhance honey production in the county by increased use of modern honey production and processing in Oldonyiro and Central Divisions by provision of 500 beehives to farmers. The county livestock department in collaboration with WFP managed to increase tonnes of honey procured at the Isiolo refinery from 3000 kg in 2013 to 6000 Kg by 2017.

The county has favourable climate for bee keeping which gives rise to 3 seasons for production of honey. In each season, farmers who use modern beehives have the capability to produce an average of 15kgs or unrefined honey from each beehive. Using data from KNBS 2019 of number of beehives in the county, if all the producers were to use modern beehives, the county would manage to produce 33 tonnes of unrefined honey per season and close to 100tonnes a year.

"In one season, we harvest 4 buckets each weighing 20Litres. We usually have two seasons but during the times that there is enough rainfall, we have got three seasons of harvesting". ***Hussein Wako Group Leader, Garbatulla***

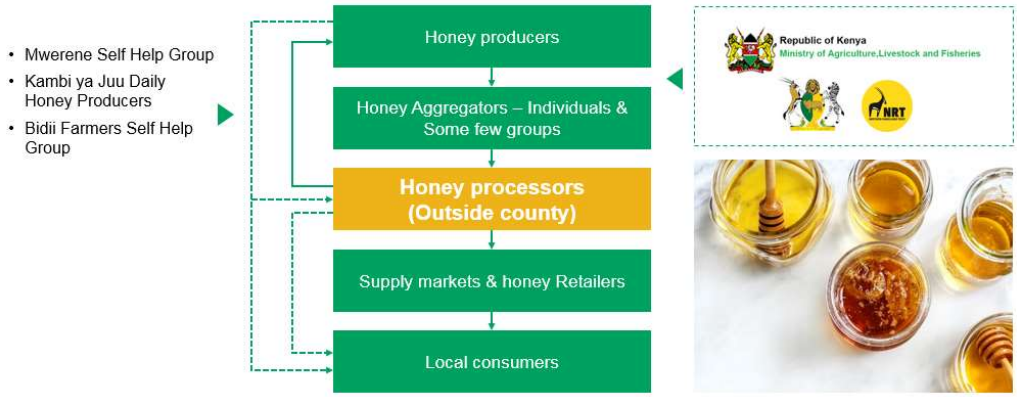
"The honey is produced in three seasons annually. An average of 15kgs in high seasons and 5Kgs in low seasons". ***Latu Self-Help Group***

"We harvest the honey twice per year. When there is enough rain, we harvest three times in a year. Sometimes we harvest nothing, and we have never explained why this happens. The harvest is usually in 3-6 months". ***Hussein Wako Group Leader, Garbatulla***

Honey Production in the county

The diagram below is a representation of the honey value chain and some of the actors playing critical roles in the production, value addition and marketing of honey in the county.

Figure 6: Honey value chain map



7.3 Actors and enablers in the value chain

Beekeeping in the county is still not well developed in the county thus there are not many actors and enablers mapped. Below is a list of those that were identified to be active in the county.

Table 18: Honey value chain actors

Actor	Role
Honey Producers	With only 407 household practising apiculture, beekeeping is still at a nascent stage in the county. Carry out apiculture as a secondary income. Some of the key Producers are: • Mwerene self-help group • Honey producers in – kina • Kambi ya Juu daily honey producers • Anagrar Self-Help Group (8 women and 7 men) • Bidii farmers self-help group • Latu Self Help Group • Hussein Sheraka Diba –Kinna

Actor	Role
	• Hussein Wako, Honey Producer- Garbatulla
Aggregators	There are limited aggregators in the county and most producers sell directly to consumers. • Existing aggregators are perceived to exploit the producers and offer poor prices to farmers. • Mwerene self-help group • Kambi ya Juu daily honey producers • Bidii farmers self-help group
Transporters	Due to the low volumes of honey produced, transportation is done by use of locally available means i.e. through motorbikes, taxis and matatus that are used daily for movement across the production areas.
Processors	There is only one locally based processor - Isiolo refinery. Most of the honey in the county is sold to middlemen and local people for domestic use. This processor also acts as an aggregator.
NGOs & Bilateral Aid Agencies	There are interventions currently being run by several organisations in the county focusing mainly on producers. The organisations are training and equipping farmers with modern bee keeping knowledge and beehives. Some of organisations are. • Northern Rangeland Trust • World Vision • Government of Sweden through SIDA • World Food Programme (WFP) • Lay Volunteers International Association (LVIA) • international Livestock Research Institute
County Government	Aiding communities by providing training and modern beehives
National government	Working in collaboration with the county government and Kenya Climate Smart Project and is carrying out the training and doing demonstration to farmers.

7.4 Challenges and opportunities in the honey value chain

The table below outlines the challenges and opportunities within the honey value chain.

Table 19: Honey value chain challenges and opportunities

Challenges	Opportunities
Lack of training - insufficient training and finance for improved post-harvest management *"Our greatest challenge is training. Nobody has ever trained us in bee keeping and we feel that if we get some education in the same, our harvest will increase" - Honey Producer-Garbatulla* *"We also do not have any financial management training, but we save our money in the bank account for the group" - Honey Producers Mwerene Self-Help Group*	Need to partner with County & Ministry of Agriculture, Livestock & Fisheries personnel to coordinate training for the beekeepers to improve on quality and quantity.
Adulteration of honey is common among producers. *"We also add some sugar and water to increase the amount of honey… We spray the honey with perfume so that it can smell nice. "- Hussein Wako Leader of a Group of Three Men – Garbatulla*	
Post-harvest loses that reduce the quantity and market quality *We do not have a honey sucker that reduces honey loss or being left in the combs – Kambi Juu Dairy Farmers* *"We sometimes can wait for 2-3 months and find that no honey has been made and we do not know the reason." - Anagrar Self Help Group, Kinna*	Producers need to be trained and linked up with producers and marketers of beehives honey harvesting equipment to help minimize of losses.
Lack of storage *We do not have storage facilities or a place. We just store our honey in the buckets which we are not sure they are good. We store the honey in the house of one of us - Kambi Juu Dairy Farmers*	

Challenges	Opportunities
Use traditional beehives *"If one has got local beehives, they are easily accessed by honey burger. If one has got modern been hive, it is not easily accessed by the honey burgers" - Anagrar Self-Help Group, Kinna*	
Lack of market to sell in bulk and poor prices by aggregators and middlemen *"We do not have ready market for our honey where we can sell in bulk. We sell to our neighbours at low price" - Anagrar Self Help Group, Kinna*	Linking up with the local processor will help in making the processing business sustainable as well as providing reliable income for producers.
Invasion by honey burger	Improved invasion management and devise way to keep off the animals

7.5 Honey value addition in the county

The county has one micro private honey refinery in Isiolo town which is currently operating below capacity because of low honey production. Most of the honey produced in the county is consumed locally with minimal value addition taking place. It was noted that producers unknowingly carry out some form of adulteration to the honey either as a way they perceive enhances quality by adding a different aroma or unscrupulously to add quantity of honey.

"We clean our beehives with traditional hub so that bees can get in quickly. We mix the hub, honey and he goat ram that attracts the bees into the empty hives"
Kambi Juu Self Help Group

Honey resellers and aggregators such as Mwerene Self Help Group carry out sorting and refining using manual means in low scale which then is availed to the local market.

7.6 Marketing

Most of the honey produced in the county is largely consumed with the locality or sold at Isiolo town. The local honey market is unstructured such that the prices in the market are slightly above average prices in similar urban centres. Consumers buy the honey at a higher price for

quality that is not certified due to the unstructured nature of the market. Unrefined honey from aggregators sells at average of KES 400 per kilogram which is way above what established processors buy at. The price also varied by season where during the festivities, the prices shoots up to a high of KES 600 per kilogram. Breaking the bulk i.e. selling in lower quantities of honey such as 250gm fetch higher price where it is sold at KES 200. Thus, for the resellers, selling in low quantities fetches as high as KES 800 for a kilogram of refined honey.

It was observed that honey traders especially within the communities collude to influence the price at which they purchased honey from beekeepers by easily sharing marketing information. Competition for honey among the traders was noted not to be intense, as supply may be sufficient for them suggesting that they maybe exploiting producers.

"We sell in glasses at KES 200 per glass…. We tell our neighbours through the word of the mouth who come for it". ***Anagrar Self Help Group, Kinna***

"We sell in kilograms. In crude state, we sell at 400/kg, in semi-crude state we sell at 500 while the refined one we sell at 600/kg… The honey is used as dowry for young girls getting married where a dowry of 30kgs honey must be given. So, during these seasons, the price goes up to 600 per kg". ***Mwerene self-help group***

"¼ kg of refined honey is sold at KES 200 and 1 Kg of honey sold at KES 800, 1Kg of crude honey is sold at KES 300". ***Latu Self Help Group***

7.7 Summary

From the study, we recommend that beekeepers to sell their unrefined honey through groups or cooperatives to enhance honey market competitiveness and for them to get more value for their produce.

Training of beekeepers is required to equip them with modern knowledge of apiculture thereby maximising production and quality. Also need for vertical integration between beekeepers and processors to help in reducing the levels of intermediaries and making their honey competitive.

Development of a honey market information system that provides up to date price information at the marketplace to both beekeepers and traders would greatly help stabilise the prices and remove the price asymmetry.

Training of honey aggregator groups is required to enhance specialization. For those that may be able to do processing, they need to skills to market the refined honey beyond the county as well as marketing of other beekeeping products such as beeswax, propolis and bee venom.

8 POULTRY VALUE CHAIN ANALYSIS

8.1 Poultry sector overview

Isiolo has not been a poultry production county for the years before. However, the value chain has received significant attention and actors including county government and development support agencies interest to support the sector is growing. The population of poultry in Isiolo is estimated at 71,087 according to the KNBS population census, 2019 data. Culturally and historically the community in Isiolo are non-poultry consumers which affected production. However, urban growth and demand for poultry products (eggs and meat) has attracted investment in the sector. The growth in demand is attracting investment in exotic layers and exotic broilers for eggs and meat, respectively. Isiolo Sub- County has attracted more new entrants doing chicken on a commercial level and has the highest number of exotic birds. The table below shows the population of poultry in the county.

Table 20: Number of chickens in different sub-counties in Isiolo

Type of birds	Isiolo	Garbatulla	Isiolo	Merti
Indigenous Chicken	52,192	22,180	22,567	7,445
Exotic Chicken Layers	11,439	429	10,662	348
Exotic Chicken Broilers	7,456	207	7,127	122

Source: KNBS Population Census 2019

Recent investment in the sector has seen growth in number of farmers and birds. USAID Resilience and Economic Growth in the Arid Lands–Accelerated Growth (REGAL-AG) project invested in starting up several poultry production units, feed manufacturing and chicken processing. Department of livestock has emphasized importance of poultry as income generating activity and bosting food and nutrition security.

Through the KCSAP, the county government has prioritized poultry among the economic activities that the project is promoting. The KCSAP is providing chicks to farmers and the county government is offering technical capacity building to promote the value chain. The county is keen to work with the DRIC project to further the gains being made in promoting poultry production especially in the urban and peri-urban wards.

"I started with local breeds but later changed to broilers and now I am doing local breeds, broilers, and layers. ***Producer, Kulamawe***

"…due to demand of broilers in this area. They do well and mature fast hence they can fetch a farmer quite much within a short time. Local breeds take long to mature and thus consume a lot of food. Their market is a bit low here. There is also demand for eggs here which made me adopt the third idea of rearing layers. Despite high competition from other producers in Meru and Nanyuki, we still sell a tray of eggs at between KES. 320-340. ***Producer Kiwanjani***

"Customers are knowledgeable and are aware of the nutritional value of chicken products. We have marketed our product enough even through social media and website and so we are known" Poultry Supplier

There is still slow adoption of modern chicken production in the county and the number of farmers doing poultry production at scaled level is low. There are some producer groups doing poultry production but sometime sharing of roles and responsibility was said to cause some strain to the members and group dynamics. Capital involved in setting up the poultry production units was reported to be a barrier to entry into value chain for most local communities.

"The modern farming techniques have not been embraced because of the high capital that is involved" ***Chicks supplier***

8.2 Challenges and opportunities in the value chain

Poultry production and marketing when efficiently managed is a fast return business. Majorly, poultry producers in Isiolo have opportunity to produce and market eggs and chicken meat. There is predictable market for eggs and chicken meat among the individual customers and retailers of poultry products in Isiolo. There is a medium scale poultry processing factory-Kulamawe Poultry located in Isiolo town. The producers who have reached scale are producing about 1,500 birds at a time while large ones have reached a capacity of 6,000 birds.

The producers and suppliers indicated there is a ready and sufficient markets within Isiolo. There are however times when there is an oversupply of poultry products -both eggs and chicken meat. This is mainly from products supplied to Isiolo from the other counties including Meru, Nyeri, and Kiambu. The marketing and market linkage remains a challenge as producers indicated they have middlemen who would exploit them.

"We have many intermediaries who have invaded the market and sometime exploit farmers hiking the prices of eggs or put their prices too low". ***Poultry producer***

The market is unpredictable at times. Mostly last year, we encountered a big challenge with the market because of the eggs that used to come from Uganda. At other times we cannot satisfy the market demands". ***Poultry products supplier***

Producers and other actors in Isiolo indicated that producers have knowledge and skills gaps in production. This is affecting farmers ability to start and grow poultry enterprises. From construction of proper chicken houses, breeding, feeding, diseases and pest management, hygiene and sanitation are among some areas with gaps that affect farmers. These alongside the limited capital reduce the number of farmers adapting poultry production.

"Poultry farming is currently flooded which makes it hard for us to sell our eggs at the required price. We are sometimes forced to lower our price to avoid wastage". ***Poultry producer***

"We used to supply to Marsabit, but we can no longer do that. We do not allow one person to carry in bulk so that everyone can carry". ***Poultry producer***

"We get some middlemen who buy from other producers and display their eggs in the boot of their cars in town at KES 300. That affects our sales". ***Poultry producer***

Some of the other challenges faced by producers include the high cost of feeds and lack of reliable feed suppliers in Isiolo. Farmers are forced to order for feeds from Meru which increases the cost of production. While there are upcoming small-scale hatcheries within Isiolo, these are limited in capacity and farmers order chicks from as far as Kajiado county which increases cost of production and profitability.

County government staff are few and there is poor linkage to extension to support community awareness and production and marketing of poultry products. Existing farmers lament challenges of accessing capital among the existing financial providers. This has been aggravated by the COVID-19 pandemic and effect of measures that were put in place to control the spread.

"Currently I do not have any chicken for slaughter since I have not been able to raise enough capital after selling the last batch. My hotel in town closed because of COVID 19". ***Poultry Processor***

Isiolo is generally water deficient and the drought affects availability of water to maintain the required hygiene and production levels.

"I am raising my chicken in a small piece of land. Waste management is a big challenge since my space is small, I do not have adequate water source". ***Poultry Producer***

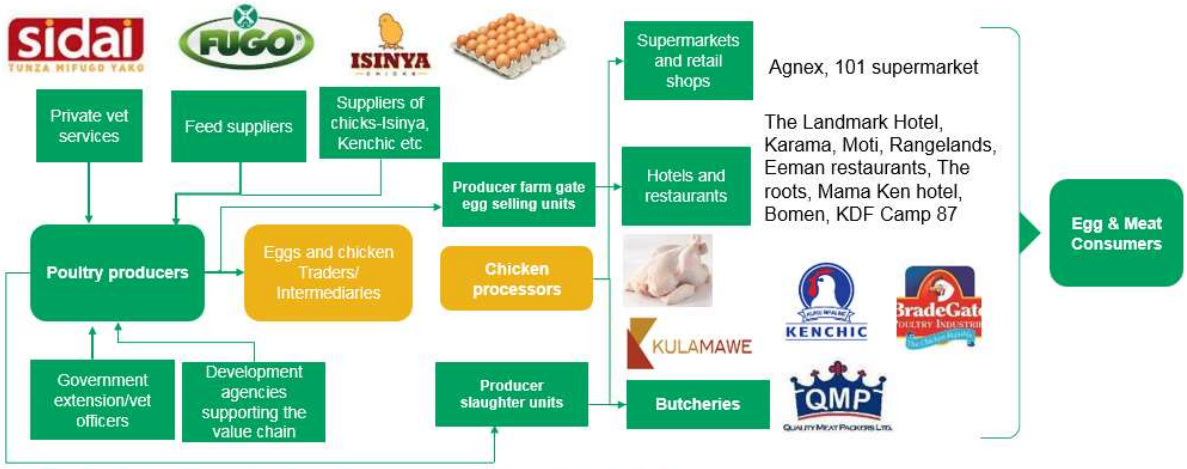
There are several opportunities that the project can support to enhance the capacity and sustainability of the value chain actors. These include:

- County government, NGOs and private actors support to expand production by local community including building skills and capacity of farmers to effectively manage the poultry production units.
- Promote entrepreneurial capacity of producers and other actors in the value chain
- Promote the production capacity of the local manufacturers and better linkages for input suppliers in Isiolo.
- Poultry keepers training on disease control and management, linkage to veterinary and health service providers.
- Opportunity to develop hatching enterprises including acquisition and distribution of small-scale hatching machines
- Linkage of actors to credit providers –linkage to Sharia complaint products

8.3 Poultry value chain map

The poultry value chain has multiple actors, and these can be outlined as follows:

Figure 7: Poultry value chain map



8.4 Poultry value chain actors and enablers

There many actors supporting the sector directly and indirectly. The table below highlights some major actors actively engaged with the sector.

Table 21: Poultry value chain actors and enablers in Isiolo

Actor	Role
County & national government	• National and county government are supporting various initiatives to promote poultry production and marketing. These include. • County government of Isiolo supports diversification of livelihoods and poultry production is increasingly receiving the attention of the department of livestock and other departments. • Standards Regulatory activities-several actors including Director of Veterinary Services, Kenya Bureau of Standards, Public Health Department, Meat Inspectors among others work to assure meat quality and adherence of public health. • Infrastructure investment-from setting aside land require to boost activities to construction and operationalisation of the infrastructure needed to promote production and trade. • Production and provision of drought mitigation -government is sinking and servicing boreholes to address the acute issue of water in communities. • Climate mitigation response-government is at the forefront in campaigning for climate smart agriculture and is promoting the production and storage of hay as a drought mitigation measure among pastoralists. • Road infrastructure-county government and departments such Kenya National Highway Authority, Kenya Urban Roads Authority, Kenya Rural Roads Authority and improving, upgrading, and expanding the road network. • Community development programs and specifically addressing gender and development disparities including supporting inclusive livelihood programs in the county. • Enterprise development fund is support community level enterprises.
Poultry producers	• These are the 6,585 households that rear chicken as per the national census in 2019. These are key in breeding, feeding, health and nutrition management, sale of chicken and eggs to the traders and processors. This forms a critical part of the value chain.
Poultry producer groups	• There are a few emerging producer groups which require strengthening. These are largely involving women, and most are currently producing and marketing individually but receive extension support as a group. Farmer groups are also developing skills and some have started hatcheries that are supporting in breeding services.
Input suppliers	• Input suppliers for feeds, minerals and health products and services. These are mostly private sector actors and limited to key urban areas. Some of them including feed suppliers and chicks' suppliers are in Meru, Kajiado and Nairobi.
Producer associations/	• Associations of farmers and some of traders are propelling the growth of production and trade in livestock.

Actor	Role
Marketing cooperatives	
Poultry and egg traders	• Intermediaries or brokers play the linking role between poultry keepers, poultry processors, egg distributors/retailers and consumers. They play a critical role in fair price determination and drive the demand of eggs and poultry products.
Local supermarkets, and dukas	• The retail outlets are specifically important in distribution of eggs.
Butcheries, eateries, institutions, and hotels	• These are linkage for meat sales and drive the business of broilers in Isiolo.
NGOs	• There are several non-state actors who are supporting the sector. These offer support services including capacity building, mobilising communities into producer groups, some are offering grants to enterprises and entrepreneurial capacity building.

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