MINISTRY OF AGRICULTURE
AND LIVESTOCK DEVELOPMENT

REPUBLIC OF KENYA

COUNTY GOVERNMENT OF KAJIADO

Department of Livestock, Agriculture, Irrigation & Fisheries

County Directorate of Livestock Production

THE KAJIADO COUNTY LIVESTOCK FEED STRATEGY

2023 – 2033

(Enhancing the Contribution of the Livestock Sector to Food Security, Agribusiness, Employment Creation, Rangeland Rehabilitation Towards Vision 2030 through Production of Quality and Affordable Livestock Feeds)

Department of Agriculture, Livestock, Irrigation and Fisheries, 2023

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SNV

Food and Agriculture Organization of the United Nations

KALRO
Kenya Agricultural & Livestock Research Organization

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Foreword

The state of food and nutrition security in Kajiado County has been weakened by the successive failed rain seasons experienced across arid and semi-arid lands (ASAL) landscape in Kenya in the last three years. Feed production has been affected by climate variability, sporadic global conflicts, global recession, political disturbances, drought, rangelands degradation, human-wildlife conflicts, overstocking, post-harvest losses and invasive plants species. Consequently, the burden of food production has become greater, stressing all agricultural systems as never experienced before.

Kajiado has suffered tremendously from massive social and economic losses. Between October 2020 and March 2023, livestock mortality hit a high of 424,663 head of livestock[1] and over 480,000 human beings[2] faced acute food shortage. As a result, the County Government carried out an enhanced destocking program in addition to panic sales by the livestock farmers. Due to the prolonged drought, the traditional pastoral production system became unsustainable, hence, the County Governor H.E. Joseph Ole Lenku initiated the Kajiado County Transformation Agenda (KCTA) where one of the key pillars is modulated pastoralism.

The county has experienced a protracted livestock feed deficit which has resulted in high livestock mortalities consequently affecting the livelihoods of the livestock keeping communities. It is for this reason that the Livestock Production Department deemed it necessary to reach out to the sector stakeholders and partners with a view to developing a practical strategy to combat the livestock feed crisis. The Kajiado County Animal Feed Strategy was conceptualized as a fundamental tool to address the unrelenting feed deficit.

The County Animal Feed Strategy (CAFS) provides a framework for developing animal feed industry. It is consistent with the United Nations 2030 Agenda for sustainable development; the Constitution of Kenya, 2010; Vision 2030; the Agricultural Sector Transformation; and, Growth Strategy (ASTGS, 2019-2029) as well as Bottom-Up Economic Transformation Agenda (BETA) 2022-2027.

The strategy is expected to form a solid base for all the departmental interventions and open up areas of possible profitable investments. The Department of Agriculture, Livestock, Irrigation and Fisheries will be charged with the responsibility of implementing and operationalizing the strategy through the County Agriculture Sector Steering Committee

1 *SRA report of Feb 2023*

2 *County emergency unit estimates 2023*

(CASSCOM) at a cost of Kshs 2.2 billion.

I commit to wholly support the implementation of this strategy and invite all stakeholders to support the same.

Dr. Jacktone Yala Achola
County Executive Committee Member
Agriculture, Livestock, Irrigation & Fisheries
Kajiado County

Preface

Livestock production is the main source of livelihood and a major contributor to the gross domestic product (GDP) of Kajiado County. Under livestock production systems, feed constitute the highest cost component, therefore, appropriate and innovative strategies need to be adopted to achieve higher returns for the benefit of livestock producers.

Livestock feed production has faced varied challenges over the years. Climate change and its adverse effects have resulted in insufficient livestock feed in terms of quantity, quality and accessibility. Other challenges include weak farmer institutions and linkages across value chains, over-reliance on a limited range of animal feed, insufficient data and information among stakeholders. In addition, limited access to business development services, financial services, appropriate technology packages and a weak feed policy environment have further impacted negatively on the feed situation in the county.

Sustainable animal feed production presents the opportunity to achieve livestock feed security and sustainable livestock production systems. The potential can be realized through adoption of climate smart feed production approaches, application of Technologies Innovations and Management Practices (TIMPs), enhancing adaptive feed research and commercialization of the animal feed enterprises. This strategy outlines the roadmap for the County Department of Agriculture, Livestock and Fisheries in developing a vibrant animal feed industry.

The objectives of the strategy are to:

i. Increase livestock feed production, conservation and utilization;
ii. Institute Quality and Standards in Livestock feed production and handling;
iii. Ensure quality and safety of livestock feed for domestic and export markets;
iv. Promote processing, manufacturing and trade in livestock feed;
v. Promote research and utilization of improved technologies in livestock feed;
vi. Promote Public-Private Partnerships (PPP) within the livestock feed industry;
vii. Develop appropriate institutional and legal frameworks for the feed industry; and,
viii. Safeguard pasture lands through synergies with the County Spatial Plan.

The county government recognizes the need for partnerships with stakeholders along the feed value chain. The feed strategy was developed through a participatory and consultative process and its successful implementation will require substantial resources.

I affirm my commitment to mobilize adequate human and financial resources for its implementation.

Finally, I thank all those who contributed towards the successful development of the strategy.

Francis Metian
County Chief Officer
Agriculture, Livestock, Irrigation and Fisheries
Kajiado County

Acknowledgments

The Kajiado County Animal Feed Strategy is an initiative mooted by the County Department of Agriculture, Livestock and Fisheries, with technical and financial support from other County departments, the Kenya Government State Department for Livestock Development, The Netherlands Development Organization (SNV), Kenya, and The Food and Agriculture Organization of the United Nations (FAO), Kenya.

I humbly extend my gratitude to the above-mentioned organizations, individuals and Government teams whose tireless efforts are recognized and deeply appreciated.

I wish to also appreciate the technical working groups from the county departments, State Department for Livestock Development, SNV Kenya and FAO Kenya. Special thanks to the lead facilitator Dr Stanley Mutua.

May God Bless and reward you for your efforts.

Erick J.O Ahenda,
County Director, Livestock Production,
Kajiado County

List of Tables

Acronyms & Abbreviations

AFC
Agricultural Finance Cooperation

AFS
Animal Feed Strategy

AHITI
Animal Health and Industry Training Institute

AKEFEMA
Association of Kenya Feed Manufacturers

ASALs
Arid and Semi-Arid Lands

ASDS
Agriculture Sector Development Strategy

ASTGS
Agricultural Sector Transformation and Growth Strategy

BETA
Bottom-up Economic Transformation Agenda

BSF
Black Soldier Fly

BSFL
Black Soldier Fly Larvae

CASSCOM
County Agriculture Sector Steering Committee

CBO
Community Based Organizations

CGR
Cumulative Growth Rate

CIDP
County Integrated Development Plan

CIMES
County Integrated Monitoring and Evaluation System

CODEX
CODEX Allimentarius Commission 26th Edition

COMESA
Common Market for Eastern and Southern Africa

CS
Cabinet Secretary

CSA
Climate Smart Agriculture

DE
Digestible Energy

DFID
Department for International Development

DLP
Directorate of Livestock Production

DM
Dry Matter

FAO
Food and Agriculture Organization

FPAK
Fodder and Pasture Association of Kenya

GHG
Greenhouse Gas

GMP
Good Manufacturing Practice

HMPL
High and Medium Potential Lands

ISO
International Organization for Standardization

JICA
Japan International Cooperation Agency

KAFS
Kajiado Animal Feed Strategy

KALRO
Kenya Agricultural and Livestock Research Organization

KEBS
Kenya Bureau of Standards

KEPHIS
Kenya Plant Health Inspectorate Services

KFA
Kenya Farmers Association

kg
Kilogram

km
Kilometre

KNBS
Kenya National Bureau of Statistics

KOICA
Korea International Cooperation Agency

KES/Kshs
Kenya Shillings

M&E
Monitoring and Evaluation

MIS
Management Information System

MJ
Megajoule

MMT
Million Metric Tonnes

MOALF&C
Ministry of Agriculture, Livestock, Fisheries and Cooperatives

MoU
Memorandum of Understanding

MSEs
Micro and Small Enterprises

MT
Metric Tonnes

MT/HA
Metric Tonnes per Hectare

MTP
Medium-Term Plans

NAIPs
National Agriculture Investment Plans

NAKAEB
Narok Kajiado Economic Bloc

NCPB
National Cereals and Produce Board

NEMA
National Environment Management Authority

NGO
Non-Governmental Organizations

NIA
Neighbours Initiative Alliance

NIMES
National Integrated Monitoring and Evaluation System

NRM
Natural Resource Management

PCPB
Pests Control Products Board

PESTEL
Political, Economic, Social, Technological, Environmental and Legal

PO
Producer Organizations

PPP
Public Private Partnership

SACCOs
Savings and Credit Co-operative Organizations

SDGs
Sustainable Development Goals

SFR
Strategic Food Reserves

SIDA
Swedish International Development Co-operation Agency

SMEs
Small and Medium Enterprises

SNV
Foundation of Netherlands Volunteers

SWOT
Strengths, Weaknesses, Opportunities and Threats

TAs
Technical Advisors

TIMPS
Technologies Innovations and Management Practices

TLU
Tropical Livestock Unit

TMR
Total Mixed Rations

TVET
Technical and Vocational Education and Training

TWGs
Technical Working Groups

UMMBs
Urea Multi-Mineral Blocks

UN
United Nations

UN-SDGs
United Nations Sustainable Development Goals

USAID
United States Agency for International Development

USAID-KAVES
Kenya Agriculture Value Chain Enterprises

USAID- KCDMS
Kenya Crops and Dairy Market Systems Development Activity

USAID-FTF
Feed the Future

VCA
Value Chain Actors

WFP
World Food Program

WHH
Welthungerhilfe

WTO
World Trade Organization

Executive Summary

The overall objective of this Animal Feed Strategy is to implement policy statements outlined in Sessional Paper No. 3 of 2020 on National Livestock Policy to provide guidance on feed production, conservation, processing and utilization by outlining specific interventions for sustainable development of the animal feed industry in Kajiado County. The strategy addresses the challenges and proposes interventions in the feed industry with a view to ensuring availability of adequate quality feeds for increased productivity in the livestock sector. The strategy document is structured in four chapters namely, introduction, situation analysis, strategic direction and implementation. The scope of the strategy is to address the main challenges in the areas of feed production; conservation; value addition and utilization; quality and safety; research and development; cost of feed as well as regulation of the feed industry.

Chapter One outlines the background on animal feed, rationale, objectives and scope of the strategy. Chapter Two identifies and explains current status of animal feed, challenges, constraints and future projections in the county. Chapter Three presents the strategic models anchored in six pillars whose implementation will deliver the desired transformation in the animal feed industry. The six pillars are production and productivity; quality; value addition/ processing; marketing; policy environment; and, environmental management. Chapter Four outlines implementation process, co-ordination mechanism, financial and investment plans as well as communication and monitoring and evaluation plans.

The County Government will be instrumental in the implementation of the strategy through development of approaches, allocation of required resources, undertaking the oversight role in development of the necessary feed industry infrastructure, provide technical and extension services to stakeholders in the feed industry, and ensure adequate production, storage and distribution of quality feed on a timely basis. This Animal Feed Strategy will provide livestock producers with a systematic and guided plan to facilitate sustainable and lasting solutions to animal feed challenges in the county. It is envisaged that the interventions outlined in the strategy will enhance feed resources and livestock production, which is a critical step in building the resilience of livestock-dependent communities in Kenya.

The Animal Feed Strategy is structured into six main priority areas, which have been broken into several activities that, upon implementation, will result in the following outputs: improved feed resources; better feed quality and safety; increased feed processing and manufacturing; increased access to markets and trade; research and development; and, public-private partnerships. The county government, in collaboration with the private sector

and development partners, is committed to implementing the strategy through mobilization of resources to fund the proposed interventions.

The county requires Kshs 2.2 billion to implement the strategy. The investment budget for the establishment of the feed value chain is estimated to be Kshs 92 billion to meet the requirement of the nine livestock enterprises. The investments are estimated to generate an annual income of Kshs 24 billion and also projected to generate 8,500 additional jobs annually.

Chapter

ONE

INTRODUCTION

1.1 | Background Information

Kajiado County Government was formed by the County Governments Act of 2012 as prescribed in The Constitution of Kenya, 2010. It is one of the 47 devolved units in Kenya and is situated in the Great Rift Valley in the southern part of Kenya, bordering Nairobi County to the North East, Narok County to the West, Nakuru and Kiambu counties to the North, Taita Taveta County to the South East, Machakos and Makueni counties to the North- East and East, respectively, and the Republic of Tanzania to the South. Kajiado County comprises five sub counties namely; Kajiado North, Kajiado West, Kajiado East, Kajiado South and Kajiado Central, and covers an area of 21,292.7 km^2. According to the Housing and Population Census 2019, Kajiado County total population stood at 1,117,840 with females being 50.1% and males 49.8%.

The county shares an economic bloc with Narok County known as the Narok Kajiado Economic Bloc (NAKAEB). The aim of the economic bloc is to improve the various sectors of the economy to increase exports to other counties, the East African Community (EAC), Inter-

Governmental Authority on Development (IGAD), South Africa Development Cooperation (SADC), and Common Market for East and South African (COMESA) countries and beyond. The county's main economic activities include pastoralism, crop farming, tourism and trade, and are undertaken on small scale. Over 80% of Kajiado land mass is semi-arid lying between agro-ecological zones III to IV, where pastoralism is the main livelihood for the community. The main livestock species reared are, for cattle: (Sahiwal, Zebu, Boran and their crosses); sheep (Dorper, Black Headed Persian, Red Maasai and their crosses); and goats (Galla, small East African and their crosses). Livestock contributes significantly to food security and incomes in most households in the county and also contribute cash income to households in70% of pastoral systems, 48% of agro-pastoral systems and 30% of mixed farming systems, respectively.

1.2 | Physical and Topographic Features

Kajiado County is characterized by vast plains, valleys and occasional volcanic hills. The lowest altitude is about 500 metres above sea level at Lake Magadi while the highest is 2,500 metres above sea level in Ngong Hills. The landscape within the county is divided into Rift Valley, Athi Kapiti plains and Central Broken Ground Lays. The Ngong Hills are the catchment areas for Athi River, which is fed by Mbagathi and Kiserian tributaries.

1.3 | Climatic Conditions

Kajiado County is predominantly semi-arid at an elevation of 1,581.7 metres (5,189.3 feet) above sea level but also has areas of tropical wet, dry and savanna climate. The county has a bi-modal rainfall pattern. The short rains fall between October and December while the long rains fall between March and May. The annual rainfall amount ranges from as low as 300mm in the Amboseli basin to as high as 1,250mm in the Ngong Hills and the slopes of Mt Kilimanjaro.

Temperatures vary both with altitude and season. The annual rainfall trend for Kajiado East, North, Central and West shows a high level of inter-annual variation from the year 1970 to 2013. Rainfall is becoming highly variable and unpredictable especially in recent decades and the year 2000 was recorded as the driest. The highest temperatures of about 340C are recorded around Lake Magadi while the lowest of 100C are experienced at Loitokitok on the eastern slopes of Mt Kilimanjaro. The coolest period is between July and August, while the hottest months are from November to April. Therefore, the county has the potential to sustain production of a variety of fodder and pasture species, making it suitable for all the selected value chains to be promoted, in turn, achieving the main goal, that is, feed security.

1.4 | Status of the animal feed

1.4.1. STATUS OF THE ANIMAL FEED INDUSTRY IN KENYA

Livestock feed and feeding systems in the country are constrained by a host of factors, including recurrent droughts, grassland degradation, overgrazing, land tenure and land use changes, resource use conflicts, encroachment of invasive plant species, soil infertility and inadequate inputs and planting material. Seasonal feed shortages and inefficient feed use by pastoralists and agro-pastoralist communities are the major challenges affecting livestock productivity.

In addition, poor feed conservation practices, lack of knowledge on appropriate feed and feeding practices, and inadequate data on estimates of the proportion/number of animals kept within specific production systems constrain the efficient use of available feed resources and also contribute to the inefficiency and non-competitiveness of the feed industry. The rapid population growth, urbanization and rising incomes have increased demand for livestock products and will continue to do so. This will, inevitably, lead to a rise in the demand for feed ingredients and, subsequently, the need for increased production capacity for feed cereals and oil-seed crops estimated to be 55 million MT currently and is projected to rise to 320 million MT by 2030.

1.4.2. STATUS OF THE ANIMAL FEED INDUSTRY IN KAJIADO COUNTY

The livestock feed industry in Kajiado has been growing at a moderate rate, attracting several new entrants yearly due to the high demand for feed. However, natural pastures are the main source of feed for ruminants in the county. Availability of sufficient and quality feed that are accessible and affordable by livestock producers are key determinants for sustainable livestock production. Drought, which is usually associated with water and feed scarcity, is a frequent phenomenon in the county. Under the circumstances, lives and livelihoods of livestock-producing communities suffer most.

The increasing frequency and severity of droughts is mainly attributed to the effects of climate change and variability. In an effort to drive sustainable feed value chain development, it has become necessary to develop a feed strategy for Kajiado County to guide investments in the feed industry. This is also in line with the Bottom-up Economic Transformation Agenda - BETA (2022-2027) and Kajiado County Transformation Agenda (KCTA, 2022-2027) on feed and nutrition security for the country.

1.5 Projected status of the animal feed industry in Kajiado County

1.5.1 POLICY INITIATIVES

Kajiado County has adopted a robust legal and institutional framework, which sets the institutional framework and orientations for the management of the feed industry. Nationally, the Agriculture Sector Transformation and Growth Strategy (ASTGS) focuses on transforming small-scale subsistence production into a sustainable, equitable and remunerative agricultural sector. The strategy has prioritized five policy and investment goals for national and county development as embedded in Kenya Vision 2030 and national agricultural policy, namely:

i. Food and nutrition security;
ii. Eradication of extreme poverty;
iii. Increasing productivity and competitiveness;
iv. Wealth and job creation; and,
v. Strengthening of institutions

The livestock sub-sector is one of the drivers in actualizing priority areas on food and nutrition security and has a vital role in manufacturing and agro-processing as well as attainment of universal health care (through public health). Although the country has placed emphasis on livestock feed through various policies, such as National Livestock Policy and the National Agriculture Policy and also laws such as the Livestock Act of 2020 and Animal Feeds Regulations of 2020 and standards, there has not been significant growth in the industry.

To drive sustainable feed value chain development and attract investment in line with the CIDP (2022-2027) and the Governor's manifesto especially on modulated pastoralism (KCTA 2022-2027), it has become necessary to develop a county animal feed strategy. This animal feed strategy takes cognizance of and is aligned to the County Climate Change Action Plan (2022-2027), the Kajiado County Spatial Plan (2019-2029), and the Department of Agriculture, Livestock and Fisheries Strategic Plan (2020-2025).

1.6 Rationale

The animal feed strategy will provide the policy guidance required for sustainable growth of the feed industry. The planned interventions will be employed to ensure increased resource allocation for livestock feed production while assuring quality, reduced cost of production and post-harvest losses; hence increased profitability and accelerated development of the livestock sector.

1.7 Justification

The animal feed strategy will address challenges of feed deficit and gaps identified by the animal feed inventory as well as feed balance assessment study of 2019 that demonstrated a county negative feed balance of 34.5% on dry matter basis. The feed deficit translates to a shortage of 476,114 metric tonnes of DM. The assessment also reported annual post-harvest feed losses of 54%.

Feed value chains will be developed to produce quality feed that meets livestock feed requirements in terms of energy and protein. Other interventions will include sustainable land use to adapt to the negative impacts of climate change and climate variability. The strategy will be used to lobby for favourable fiscal policies for a competitive animal feed industry in the county.

1.8 Expected Benefits

The strategy aims to increase production and productivity along the animal feed supply chain resulting in improved incomes, creation of new job opportunities annually, sustainable livelihoods, and food and nutrition security. It is expected to increase availability of quality feed from sustainable feed production systems.

It will contribute significantly to sustainable low carbon and climate resilient livestock production. The quality, health and safety standards detailed in the strategy are projected to result in improved access of livestock and livestock products to local, regional and international markets.

Chapter
TWO

SITUATION ANALYSIS

2.1 Overview

Kajiado County has a long history of livestock feed deficit occasioned by prolonged droughts, overstocking and post-harvest losses. The magnitude and severity of droughts have increased in the recent past due to the effects of climate change and variability arising from global warming, with the ASALs being the most affected. Effects of the cyclic droughts include negative socio-economic and environmental consequences. Prompt and appropriate responses are, therefore, needed to address these emerging trends to protect lives, livelihoods and ecosystems that are important for livestock production.

2.2 Feed Demand and Supply

The feed industry faces serious challenges resulting in chronic feed deficits. The actual feed available as dry matter (DM), crude protein (CP) and metabolizable energy (ME), respectively, for all the livestock species in the county, is lower than the feed required. Table 1, below, indicates a negative feed balance of -34.5%, translating to 476,114 MT of DM).

Table 1: Feed balance as dry matter, crude protein and metabolizable energy

Dry Matter		Crude Protein		Metabolizable Energy	
Potential feed availability as DM (tonnes)	1,967,824	Potential feed availability as CP (kg)	243,720,170	Potential feed availability as ME (MJ)	14,683,710,922
Actual feed availability and use as DM (tonnes)	905,438	Actual feed availability and use as CP (kg)	107,082,372	Actual feed availability and use as ME (MJ)	6,773,971,838
Livestock DM requirement as DM (tonnes)	1,381,552	Livestock CP requirement (kg)	155,517,447	Livestock ME requirement (MJ)	17,023,350,939
Feed balance as DM based on potential feed availability (%)	42	Feed balance as CP based on potential feed availability (%)	57	Feed balance as ME based on potential feed availability (%)	-14
Feed balance as DM based on actual feed availability and use (%)	-34.5	Feed balance as CP based on potential feed availability (%)	-31.1	Feed balance as ME based on actual feed availability and use (%)	-60.2

Source: National feed inventory and feed balance assessment 2021

The feed deficit leads to low livestock production and productivity resulting in inadequate livestock products (meat, milk and eggs) and hence compromised human food and nutrition security.

2.2.1. HUMAN POPULATION SIZE AND COMPOSITION

The county human population for the year 2019 stood at 1,117,840, with male gender constituting 49.8% and the female gender 50.2% of the total population (Table 2).

Table 2: Human population by sub-county

Sub-County	Male	Female	Intersex	Total
Isinya	105,607	104,860	6	210,473
Kajiado Central	81,514	80,343	5	161,862
Kajiado North	150,675	155,908	13	306,596
Kajiado West	91,607	91,237	5	182,849
Loitokitok	94,613	97,225	8	191,846
Mashuuru	33,082	31,131	1	64,214
Total	557,098	560,704	38	1,117,840

Source: KNBS Census, 2019

2.2.2 PER CAPITA REQUIREMENTS AND PRODUCTION

The Kajiado human population in 2019 was 1,117,840 and was projected to increase to 1,378,592 by 2022. It is projected to rise to 1,801,765 and 2,354,834 by 2027 and 2032, respectively. Table 3 presents the per capita demand and supply of animal products for 2022 and projections for 2027 and 2032.

Table 3: Per capita demand and supply of animal products

				Year	Human population			
				2022	1,378,592			
				2027	1,801,765			
				2032	2,354,834			
Per capita consumption of animal food products								
	Milk	Meats					Eggs	Fish
Per capita consumption (WHO)	200	Beef	Mutton	Chevon	Chicken	Pigs	135	20
		9	2.4	2	1.2	0.8		
Demand for animal products								
Required 2022	275,718,400	22,333,190					186,109,920	27,571,840
Required 2027	360,353,000[1]	29,909,295					243,238,275	36,035,300
Required 2032	470,966,800[1]	39,090,248					317,902,590	47,096,686
Supply of animal products								
Produced 2022	54,028,590	20,815,361					300,841,920	20,000,000[2]
Produced 2027	360,353,000[1]	181,077,362					405,397,125	26,139,206[2]
Produced 2032	470,966,800[1]	401,660,836					529,837,650	34,162,889[2]

Source: Strategic planning team (2022)

1 Dairy milk required is equivalent to milk produced. This is because Kajiado is not an exporter of milk to other counties. Meat is the core export product.
2 Fish is a new enterprise in Kajiado and even though its uptake is growing, its adoption is still low because of cultural issues. Projections indicate that it will take more than 10 years to attain the per capita consumption in Kajiado.

2.2.3 LIVESTOCK POPULATION AND DISTRIBUTION

The livestock population for 2021 was 133,226 and 652,856 for dairy and beef cattle, respectively; 1,177,771 for goat; 1,244,854 (sheep); 47,839 for (pigs); 850,817 (broilers), 141,182 (layers), and 297,372 for indigenous chickens .Data on fish was captured in metric tonnes totalling 20,000 MT annually (Table 4).

Table 4: Livestock population per sub-county

Sub-County	Cattle		Sheep	Goats	Pigs	Poultry			Fish
	Dairy	Meat	Hair	Meat	Meat	Broilers	Layers	Indigenous	Fish
Central	6,337	155,934	308,777	241,239	1,270	14,958	16,660	15,632	2,000
East	42,200	162,000	390,200	315,000	40,900	610,100	21,500	89,900	6,000
West	1,000	230,000	360,000	450,000	260	90,500	18,500	25,000	1,000
North	67,500	5,700	6,400	12,000	4,600	130,000	72,000	56,500	4,000
South	16,189	99,222	179,477	159,532	809	5,259	12,522	110,340	7,000
Total	133,226	652,856	1,244,854	1,177,771	47,839	850,817	141,182	297,372	20,000

Source; Validated Livestock Statistics for Kajiado County, 2021

2.3 Generation of animal products and feed resources baseline data

2.3.1 ANIMAL PRODUCTS DATA

Accurate data on livestock production and productivity are essential for governments to develop, monitor and evaluate the impact of their policies and investments on the ground, as well as to monitor growth trends in the livestock sector. According to validated data from KNBS, 2021, the county summaries for livestock products were as shown in Table 5.

Table 5: County summaries for livestock products for year 2021

S. No	Sub-County	Milk (kg)	Beef (kg)	Chevon (kg)	Mutton (kg)	Pork (kg)	Poultry meat (kg)
1	Central	8,670,659	1,949,175	434,230	694,748	57,785	40,204
2	East	41,390,470	4,512,500	1,820,000	1,386,000	5,280	200,750
3	West	15,878,808	3,667,500	1,404,000	738,000	9,000	7,650
4	North	30,103,863	1,421,250	21,600	14,400	209,300	389,220
5	South	2,190,000	1,695,000	117,000	80,300	12,000	16,425
	Total	**98,233,800**	**13,245,425**	**3,796,830**	**2,913,448**	**293,365**	**654,249**

Source: Validated Livestock Statistics for Kajiado County, 2021

2.3.2 FEED RESOURCES BASELINE DATA

Animal feed is an edible material consumed by an animal to provide energy, proteins and minerals. There are two basic types of animal feed: fodder and pasture. “Fodder” refers, particularly, to feed or forage given to the animals (including plants cut and carried to them), rather than that which they forage for themselves. The common feed resources in Kajiado County include pasture, hay, straw, silage, concentrates (pellets, marsh) and legumes. Feed grains are the most important source of energy in animal feed. The common pasture and fodder resources in the county for three consecutive years are shown in Table 6.

Table 6: Common pasture and fodder resources

TYPE OF PASTURE/FODDER	Size (Ha)/Year		
	2018	2019	2020
Napier grass	1,250	1,429	1,450
Sweet potato vines	350	268	350
FODDER TREES			
Calliandra	30	30	35
Sesbania	20	20	22
Leucaena	50	55	50
PASTURES			
Rhodes grass	850	950	990
Kikuyu grass	10	10	10
Natural pastures	1,632,000	1,680,000	1,920,000
Other (specify)			
Browse material	240,000	480,000	720,000
LEGUMES			
Lucerne	200	150	145

Source: 2020 Validated Livestock figures, Kajiado County

2.4 Production systems distribution

The three distinct livestock production systems in Kajiado are:

i. Intensive livestock production system: This system is characterized by a cut-and-carry feeding system and total mixed ration formulations, which are provided either in feedlots or stall-fed in zero-grazing units in the higher zones (Zone IV) of the county. The main areas where milk is produced under the intensive system are Ngong, Ongata Rongai, Kiserian and Oloolua. Small-scale agro-pastoral milk production is undertaken in the southern parts of the county namely, Kimana, Oloitokitok, Ilasit and Rombo.

ii. Semi-intensive livestock production system: The system combines grazing on natural pastures with supplementation in feedlots or dairy units. The system is practiced in all the ecological zones.

iii. Extensive livestock production system: The system is characterized by grazing on

natural pasture and it is predominant in the county's agro-pastoral and pastoral ecological zones. The production system is practiced mainly in Kajiado Central and parts of Kajiado East, West and South.

Beef finishing in feedlots is another system gaining importance. It is mainly practiced by investors and it is also being promoted for the indigenous communities with a focus on women and youth. The County Government is advocating feedlot system as a way of commercializing the livestock sector for meat production.

2.5 Livestock enterprises

The livestock enterprises include, dairy and beef cattle, goats, sheep, camels, poultry, pigs, rabbits, apiculture, and emerging livestock such as fish, crocodiles and guinea fowls. The main livestock enterprises contributing significantly to Kajiado County economic growth are dairy and beef cattle, goats, sheep and other emerging enterprises such as fish, pigs and poultry (local, layers and broilers).

2.5.1 RUMINANTS

Ruminant animals are mammals with a four-chambered stomach that has microbial flora to digest tough cellulose found in plants that constitute the largest part of their diets. Ruminants include cattle, goats and sheep.

a) Dairy Enterprise

The dairy population as at 2022 was 133,226 and it is expected to grow to 182,827.5 in 2027 and 215,053 in 2032. The main production systems are intensive (zero grazing) and semi-intensive (semi-zero grazing). The consumption requirement in 2022 was 275,718,400.0 litres, projected to rise to 360,353,000.0 litres in 2027 and 470,966,800.0 litres in 2032.

The intention is to satisfy the county's annual demand for milk. The common feed resources required for feeding dairy animals include, hay, maize, sorghum, cowpeas, Lucerne, sweet potato vines and sunflower cake. The total dry matter feed requirement for dairy production is currently 554,353 MT and is expected to increase to 855,838 MT and 1,118,546 MT in 2027 and 2032, respectively (Table 7).

Table 7: Summary of current and projected dairy cattle feed resources requirements

Feed resources (MT)	2022	2027	2032
Energy sources			
Maize	58,353	135,132	294,354
Protein – Plant sources			
Sunflower	64,188	117,115	176,613
Lucerne	11,671	27,026	35,323
Cowpeas	29,176	18,018	11,774
Sweet potato vines	11,671	18,018	11,774
Pasture and Fodder			
Grass hay	291,765	360,353	235,483
Sorghum silage	87,529	180,176	353,225
Total	**554,353**	**855,838**	**1,118,546**

Source: Strategic planning team (2022).

Water requirement was estimated to be 2,431,375.5 litres for 2022 and is projected to be 3,336,601.85 litres for 2027 and 3,924,723.33 litres for 2032. Mineral salt requirement for 2022 was projected to be 29,176.49 and is estimated to be 45,044.13 kg for 2027 and 58,807.5 kg for 2032.

b) Beef Enterprise

The beef population was 652,856 in 2022 and is projected to be 2,252,205.76 in 2027 and 2,354,834 in 2032. The current meat requirement stands at 11,855,891 kg and is projected to be 16,215,881 kg in 2027 and 21,193,508 kg in 2032. Meat produced in 2022 was 12,238,125 kg and is projected to increase to 81,079,407 kg in 2027 and 105,967,544 kg in 2032. The local beef consumption is 20% while 80% is exported to other counties.

The current production systems in the county are intensive, semi-intensive, and extensive, and the county is progressing towards ranching and feedlotting. The main beef feed resources identified for energy are pastures, hay, maize, and sorghum. The protein sources are sunflower cake, cowpeas, Lucerne and sweet potato vines. Minerals are provided as mineral salts and premixes. The total feed requirement was 65,553 MT in 2022 and is estimated to be 1,099,910 MT and 2,071,206 MT for 2027 and 2032, respectively. In addition, total acreage

required for pasture/browse production was 2,659,735.34 acres for 2022 and is projected to be 8,513,337.78 acres and 7,912,243.25 acres for the projected strategy period. Table 8 shows the summary of the feed resources and requirements.

Table 8: Summary of current and projected beef cattle feed resources requirements

Feed resources (MT)	2022	2027	2032
Energy sources			
Maize	6,910	172,632	687,612
Protein sources			
Sunflower	7,077	128,241	386,782
Lucerne	1,525	32,882	79,075
Cow peas	3,741	50,967	51,571
Sweet potato vines	1,382	24,662	30,943
Pasture/ fodder crops			
Hay	34,552	460,351	550,089
Silage- sorghum	10,366	230,175	285,134
TOTAL (MT)	**65,553**	**1,099,910**	**2,071,206**
Pastoral acreages – grazing biomass (Acres)	2,632,315.39	8,040,374.57	6,923,212.84
Ranching Acres	27,419.95	472,963.21	989,030.41
TOTAL (Acreage)	**2,659,735.34**	**8,513,337.78**	**7,912,243.25**

Source: Strategic planning team (2022).

c) Meat Goat Enterprise

Kajiado County has the fifth largest population of sheep and goats among the 21 ASAL counties in Kenya. There has been a 39.9% increase in sheep and goat population over the years. The population of meat goat in 2022 was 1,177,771 (KNBS, 2022), while it is projected to increase to 6,673,204 in 2027 and 8,721,607 in 2032.

The main production system practiced currently in rearing meat goats is pastoralism and in the projected years, systems such as feedlots and ranching will be promoted to meet the projected increase in demand. The current goat meat produced in the county is 3,796,830

kg against a local demand of 2,757,184 kg. For the year 2027, the demand and supply is projected to increase to 3,603,530 kg and 18,017,650 kg, respectively, while for the year 2032 the demand and supply is projected to increase to 4,709,668 kg and 23,548,340 kg, respectively.

The current feed requirement for meat goats is projected to increase from 4,084 MT in 2022 to 344,653 MT in 2027 and 1,055,294- MT in 2032. In addition, total acreage required for pasture/browse production was 692,529 acres in 2022 and is projected to be 3,603,530 acres and 4,186,372 acres in 2027 and 2032, respectively, as shown in Table 9.

Table 9: Summary of current and projected meat goat feed resources requirements

Feed resources (MT)	2022	2027	2032
Energy sources			
Maize	430	62,111	294,463
Silage	645	82,814	353,356
Protein – Plant sources			
Sunflower	473	53,829	176,678
Cowpeas	215	8,281	11,779
Lucerne	86	12,422	35,336
Sweet potato vines	86	8,281	11,779
Pasture/fodder			
Hay	2,149	116,915	171,903
TOTAL	**4,084**	**344,653**	**1,055,294**
Pastoral – grazing biomass (acres)	692,529	3,603,530	4,186,372

Source: Strategic planning team (2022).

d) Sheep enterprise

The Kajiado sheep population for2022 was1,152,407 while the projected sheep population for 2027 and 2032 is 9,609,413 and 10,465,930, respectively. The major sheep production systems in Kajiado County are pastoral and free range, but it is projected that ranching and feedlotting will soon be adopted for the projected years 2027 and 2032. Mutton production in 2022 was 2,913,443 kg and is projected to be 21,621,180 kg in 2027 and 28,258,011 kg in 2032. The mutton required in the county is 3,308,620.80 kg, 4,324,236 kg and 5,651,602.28

kg for the years 2022, 2027 and 2032, respectively. The main feed resources for sheep are natural pastures with mineral supplementation. However, it is projected that farmers will adopt hay, silage, fodders such as Desmodium, sunflower, Lucerne, fodder sorghum and sweet potato vines.

The total feed requirement was 3,991 MT for 2022, and is projected to be 666,413 MT and 1,189,743 MT for 2027 and 2032, respectively. In addition, total acreage required for pasture/browse production was 684,530, for 2022 and is projected to be 5,189,083 acres and 5,023,646 acres for 2027 and 2032, respectively, as shown in Table 10.

Table 10: Summary of current and projected sheep feed resources requirements

Feed resources (MT)	2022	2027	2032
Energy sources			
Maize	421	105,223	313,090
Protein – Plant sources			
Sunflower	463	91,193	187,854
Lucerne	84	21,045	37,571
Cow Peas	205	14,030	12,524
Sweet potato vines	84	14,030	12,524
Pasture/Fodder			
Grass hay	2,103	280,595	250,472
Sorghum silage	631	140,297	375,708
TOTAL	**3,991**	**666,413**	**1,189,743**
Pastoral acreages – grazing biomass	684,530	5,189,083	5,023,646

Source: Strategic planning team (2022)

2.5.2 NON-RUMINANTS

Non-ruminant or monogastric animals are animals with a single stomach compartment within the digestive system. Examples are pigs, poultry, horses, dogs, cats and humans.

a) Pig enterprise

The pig population in 2022 was 1,378,592 (KNBS, 2022) and is projected to grow to 1,801,765 in 2027 and 2,354,834 in 2032. The main production system is semi-intensive, but the county

is progressing towards an intensive system. The pork requirement in 2022 was 1,102,873.6 kg and is projected to be 1,441,412 kg in 2027 and 1,883,867 kg in 2032. Pork produced in 2022 was 293,365 kg and is projected to increase to 14,414,675 kg in 2027 and 18,838,674 kg in 2032.

The main pig feed resources identified are maize, sorghum and cassava for energy, sunflower seed cake, soybean, groundnuts and cottonseed cake for protein and mineral salts and premixes for minerals. The total feed requirements were 398,278 MT for 2022 and are projected to be 494,584 MT for 2027 and 646,401 MT for 2032 (Table 11).

Table 11: Summary of current and projected pig feed resources requirements

Feed resources (MT)	2022	2027	2032
Energy sources			
Maize	179,224	222,563	290,881
Sorghum	39,828	49,458	64,640
Cassava	19,914	24,729	32,320
Protein – Plant sources			
Sunflower	79,655	98,917	129,280
Soybean	19,914	24,729	32,320
Ground nuts	7,966	9,892	12,928
Cotton seed	39,828	49,458	64,640
Mineral salts	7,966	9,892	12,928
Premix	3,983	4,946	6,464
TOTAL (MT)	**398,278**	**494,584**	**646,401**

Source: Strategic planning team (2022).

b) Poultry industry

The main categories of poultry within the county are:

i. Local (indigenous) chickens
ii. Layers
iii. Broilers

i. Indigenous chickens

The population of the indigenous chicken (297,372) has been on an increasing trend (KNBS, 2019). The increase is attributed to a rise in demand for poultry products as a result of increasing human population. The indigenous chickens are kept under the extensive production system where they scavenge for feed during the day and are sheltered at night. In some instances, minimal supplementation is provided.

The requirement for indigenous chicken meat was 1,654,310 kg in 2022. It is projected to be 2,162,118 kg in 2027 and 2,825,801 kg in 2032. In 2022 the meat produced from the indigenous chicken was 297,372 kg (KNBS, 2019).This production is projected to increase to 2,702,648 kg and 3,532,251 kg in 2027 and 2032, respectively. The projected figures are based on the county's requirements and a 20% surplus (Strategic planning team, 2022) for export to other counties.

The common feed resources required for indigenous chickens include, maize, sorghum, sunflower cake, groundnuts, mineral salts and premixes. It is expected that 50% of the indigenous chicken feed requirements will be provided by complete feed rations while the other 50% will be obtained through scavenging. The total feed requirement was 1,302 MT for 2022 and is projected to be 11,839 MT and 15,471 MT for 2027 and 2032, respectively (Table 12).

Table 12: Summary of current and projected indigenous chicken feeds resources requirements

Feed resources	Current 2022 (MT)	Projected 2027 (MT)	Projected 2032 (MT)
Energy sources			
Maize	586	5,327	6,962
Sorghum	130	1,184	1,547
Cassava	65	592	774
Protein – Plant sources			
Sunflower	261	2,368	3,094
Soybean	65	592	774
Groundnuts	26	237	309
Cotton seed	130	1,184	1,547
Mineral			
Mineral salts	26	237	309
Premix	13	118	155
TOTAL	**1,302**	**11,839**	**15,471**

Source: Strategic planning team (2022)

ii. Layers enterprise

The population of layers in the county in 2022 was 1,373,707 and is projected to increase to 1,851,128 in 2027 and 2,419,350 in 2032. The main production system is intensive, commercially done in large and small scale. Egg production was 300,841,920 in 2022 and is projected to increase to 405,397,125 and 529,837,650 in 2027 and 2032, respectively. The requirement for table eggs was 186,109,920 in 2022 and is projected to increase to 243,238,275 and 317,902, 950 in 2027 and 2032, respectively. With production exceeding local demand, the county intends to export at least 40% of the eggs to other counties.

Common feed resources for layers are maize, sorghum, cassava, sunflower cake, soybean cake, groundnuts, cottonseed cake, minerals and premixes. Demand for layer feed was projected to increase from 90,357 MT in 2022 to 121,759 MT in 2027 and 159,134 MT in 2032 as shown in Table 13 below:

Table 13: Summary of current and projected layers feeds resources requirements

Feed resources (MT)	2022	2027	2032
Energy sources			
Maize	40,660	54,791	71,610
Sorghum	9,036	12,176	15,913
Cassava	4,518	6,088	7,957
Protein sources			
Sunflower	18,071	24,352	31,827
Soybean meal	4,518	6,088	7,957
Ground nut	1,807	2,435	3,183
Cotton seed	9,036	12,176	15,913
Minerals and vitamins sources			
Minerals	1,807	2,435	3,183
Premix	904	1,218	1,591
Total	**90,357**	**121,759**	**159,134**

iii. Broilers enterprise

Kajiado County is the leading producer of broilers in Kenya at 19% of the total production. It accounts for 66% of the poultry sub-sector income (KNBS, 2021). The broiler population in 2022 was 850,817 and is projected to increase to 28,828,240 in 2027 and 37,677,344 in 2032. The main production system is intensive (commercial production). Broiler meat production was 1,276,226 MT in 2022 and is projected to increase to 43,242,360 MT and 56,516,016 MT in 2027 and 2032, respectively.

The requirement for broiler meat was 1,654,310 kg in 2022 and is projected to increase to 2,162,118 kg and 2,825,801 kg in 2027 and 2032, respectively. Common feed resources required for broiler feeds are maize, sorghum, cassava, sunflower seed cake, soybean, groundnuts, cottonseed cake, minerals, and premixes. Demand for broiler feed will increase from 28,925 MT in 2022 to 153,657 MT in 2027 and 216,765 MT in 2032 as summarized in Table 14.

Table 14: Summary of current and projected broilers feeds resources requirements

Feed resources (MT)	2022	2027	2032
Energy sources			
Maize	1,685	57,080	74,601
Sorghum	374	12,684	16,578
Cassava	749	25,369	33,156
Protein sources			
Sunflower	25,369	33,156	59,273
Soy bean meal	187	6,342	8,289
Ground nut	75	2,537	3,316
Cotton seed	374	12,684	16,578
Minerals and vitamins sources			
Minerals	75	2,537	3,316
Premix	37	1,268	1,658
Total	**28,925**	**153,657**	**216,765**

Source: Strategic planning team (2022)

c) Fish enterprise

At the national level, research has shown that fish is consumed by about 80% of the population. At the household level, fish contributes to food and nutritional security and generates income. Fish cultured in the county in 2022 was estimated at 20,000 MT and it is projected to increase to 26,139,205.80 MT and 34,162,889.17 MT in 2027 and 2032, respectively. The fish farming industry is composed of the fry, fingerlings, whole fish and the brooders.

Most farmers culture Nile Tilapia (Oreochromis niloticus) and Catfish (Clarias gariepinus) across the county under water pan rearing in earthen ponds, liner ponds and water tanks. Fry and fingerlings are mostly reared intensively in hatcheries located in medium and high potential areas of the county.

Common feed resources for fish production are maize, sorghum, cassava, sunflower cake, soybean meal, groundnuts, cottonseed cake, minerals and premixes, with Black Solider Fly Larvae meeting the protein requirements. The total current feed requirement is estimated at 41,874 MT. The total feed requirements are projected to increase by 20% to 54,729 MT by 2027 when the fish production is expected to grow to 34,162,889.17 kg. The feed requirement is further projected to increase to 82,171 MT by the 2032 representing 31% increase from the current requirement (Table 15).

Table 15: Summary of current and projected raw materials for fish production

Feed resources (MT)	2022	2027	2032
Energy sources			
Maize	14,656	19,155	28,760
Sorghum	2,094	2,736	4,109
Cassava	2,094	2,736	4,109
Protein – Plant sources			
Sunflower	4,187	5,473	8,217
Soybean meal	10,469	13,682	20,543
Ground nut	837	1,095	1,643
Cotton	837	1,095	1,643
Protein source – Animal sources			
Black Soldier Fly	5,444	7,115	10,682
Minerals and vitamins sources			
Minerals	837	1,095	1,643
Premix	419	547	822
Total	**41,874**	**54,729**	**82,171**

Source: Strategic planning team (2022)

2.6 Water demand for various livestock species

Water is life, particularly, in livestock where it is a key factor in digestion of feed, absorption of nutrients and also in passage or excretion of toxic products such as urea. Lack of water has drastic effects on body physiology. Water needs for livestock are determined by type of livestock and its body size, metabolic activity, ambient temperatures, level of production and status of housing. Average water needs for livestock are indicated in Table 16.

Table 16: Average water needs of farm livestock

Livestock type	Average Water needs	Remarks
Dairy cattle	50 litres	• Amount is dependent on age, weight, level of production, temperatures and housing. • Amount ranges from 10 litres for calves to close to 150 litres for cows producing over 50 litres of milk daily.
Beef cattle	30 litres	• Amount is dependent on age, weight, milk production and temperatures. • Bulls weighing over 700 kg in hot weather require 60 litres of water daily.
Pigs	15 litres	• Requirement ranges from 7 litres for growers to 32 litres for lactating sows.
Sheep/goats	4 litres	• Amount ranges from 1 litre for a lamb to 6 litres for big rams.
Chickens	0.4 litres	

Source: JICA Study Team (Ref. Main Report Part A, Section 6.10 and Sectoral Report (G), Sub-section 3.3.1 (3)) and Ministry of Water Master Plan (Unit: MCM/year)

2.7 Climate Change

Kajiado livestock sub-sector is highly vulnerable to extreme weather events, climatic shocks and climate variability. Climate change is creating further stress on livestock feed and water supply and causing environmental degradation. Based on the climate change scenarios and effects in Kajiado, the animal feed industry will be affected and it is also likely to contribute to increased greenhouse gases (GHG) emissions leading to global warming. Extreme weather events, especially, the frequent and severe droughts, could affect feed production.

The incidences of heavy rains and flooding are likely to result in loss of feed during production or damage to those conserved or stored, with possible implications on feed safety. With regard to contribution to an increase in GHGs, the agriculture, forest and other land use (AFOLU) sectors are the major source of carbon dioxide gas (CO2) emissions.

The animal feed industry is likely to contribute to an increase in nitrous oxide (N2O) gas emission as a result of inorganic fertilizer use. The release of carbon dioxide will increase from land use change in the conversion of natural grasslands to non-perennial forage and production of crops for supplementary feed and during generation of farm energy using fossil fuels.

Noting that climate change effects have not been considered in the animal feed industry, innovative measures are needed to help feed industry actors cope with the changes in emerging and projected climatic patterns and the implications of the industry's generation of GHGs that contribute to global warming.

Increasing productivity and resilience of the industry will necessitate application of technologies such as forage species adaptable to low precipitation, and increased temperature and fodder with short growth cycles. Minimizing loss and damage of conserved feed will necessitate climate proofing of conservation infrastructure. Similarly, reduction of GHG emissions from land use and land use change will entail innovative practices and technologies such as sustainable land management.

2.8 Challenges and opportunities in the livestock feed industry

The livestock feed industry is constantly faced with challenges such as inadequate supply of feed resources to meet the country's livestock feed requirements; high cost of processing and manufacturing; poor quality of feed; insufficient marketing and trade facilitation; declining

productivity of land used for feed production and inadequate generation and adoption of animal feed production technologies. The rapid population growth, urbanization and rising incomes will lead to increased consumption of proteins of animal origin. This will create opportunities for investment along the livestock value chain including feed industry.

Pastoralism is the main source of livelihood to rural households in the county, save for the highland areas of Ngong Hills and a section of Kilimanjaro where horticulture thrives. The arid and semi-arid zones constitute approximately 92% of Kajiado County thus exposing the county to climatic risks and hence the need for adaptation mechanisms.

Based on the climatic profile, the county faces severe droughts, whose frequency has increased to once every two years. Despite livestock and livestock products being considered commodities of high value expected to fetch attractive prices in the markets, this has not resulted in better proceeds for pastoralists.

The scenario is too much work and little profits for pastoralists; most profits go to livestock traders. As a result, this leads to low incentives to invest in the enterprises, bearing negatively on the growth of this sub-sector. It is, therefore, necessary to assess the situation with a view to clearly identifying the factors that affect the sub-sector and suggest possible strategies to overcome them.

2.9 SWOT analysis

Livestock feed contribute immensely towards the transformation of the livestock sector. The achievement of the livestock industry objectives depends on the exploitation of existing strengths and available opportunities as well as analysis of the current and emerging weaknesses and threats in the feed sub-sector. Some of the key strengths are derived from the sector's contribution to the national GDP in terms of livelihoods and income from livestock and livestock products.

The available opportunities include the increased demand for livestock products due to urbanization leading to increased feed demand. Weaknesses relate to the seasonal feed deficits while threats emanate from competition from cheap imports as well as trans-boundary pests and diseases as shown in the SWOT analysis in Table 17 below:

Table17: SWOT analysis of the feed industry

STRENGTHS

1. Availability of land for feed production.
2. Existence of a sizeable livestock population.
3. Improved breeds – Sahiwal and Boran.
4. Availability of organized community structures.
5. Presence of a young and educated generation.
6. Existing partnerships with research institutions.
7. Existence of formal and organized producer organizations and entrepreneurs, Sahiwal breeder's society, Dorper breeders' society.
8. Existing public and private service and input providers such as feed and veterinary input providers and extension services providers.
9. Availability of diverse local sources of feed and farm by-products such as *Acacia tortilis* pods.
10. Wide range of policies, strategies and technical manuals.

WEAKNESSES

1. Low technical capacity of farmers.
2. Invasive plant species.
3. Low adoption of water harvesting techniques.
4. Land degradation.
5. Overstocking.
6. Low levels of mechanization.
7. Poor implementation of policies.
8. Unorganized marketing channels.
9. Inadequate feed production data and information materials and skills among farmers and service providers.
10. Inadequate training and research on feed formulation.
11. High cost and unreliable quality feed resources.
12. Poor networking and weak co-ordination of stakeholders across and along the feed value chain.
13. Lack of a developed financial model for the feed industry.
14. Inadequate regulation of information dissemination.
15. Inadequate funding of the feed industry.
16. Lack of centralized feed business centres for processing and value addition.

17. Supply of uninspected feed into the market.
18. Inadequate registration and traceability system along the feed value chain.
19. High post-harvest and post-processing losses.
20. Inadequate legal framework and enforcement.
21. Lack of feed inspectors for quality control.
22. Unsecured institutional land for pasture and fodder production.
23. Inadequate research capacity to generate feed resources that adapt to the effects of climate change (decline in precipitation and soil fertility, carbon stocks and emerging pests and diseases).

OPPORTUNITIES

1. Willingness to adapt.
2. Availability of improved breeds.
3. Availability of development partners.
4. Availability of labour.
5. Population growth.
6. Market availability.
7. Political goodwill.
8. Political stability.
9. Formation of favourable policies.
10. Existence of research institutions.
11. Value addition.
12. Increased demand for animal feed.
13. Increasing prices in other meat products such as chicken, beef and fish.
14. Diversification of feed products.
15. Availability of land for production of livestock feed.
16. Availability of national, regional and global markets.
17. Availability of stakeholders for partnerships in development.
18. Increasing demand for alternative feed sources-insect protein sources such as harvesting of locusts, which are a feed threat.
19. Drive to offset high cost of imported feed ingredients.

THREATS

1. Urbanization and industrialization.
2. Change of land use.
3. Presence of unscrupulous middle men.

4. Emerging zoonotic diseases.
5. Invasive species.
6. Climate change risks – drought, seasonal rivers.
7. Human-wildlife conflict.
8. Cross-border conflicts.
9. Economic instability.
10. Poor infrastructure.
11. Stiff competition for ingredients between food for humans and livestock feed – especially maize grains
12. Political instability that negatively impact on the feed industry.
13. Covid-19 pandemic restrictions on cross-border trade.
14. Unreliability of funding of the feed industry.
15. Emerging diseases, pests and invader fodder species.
16. Competition from cheap feed and feed by-products imported from neighbouring countries
17. Effects of climate change on availability and access to livestock feeds.
18. Over-exploitation of natural resources leading to environmental degradation.

Source: Strategic planning team (2022)

2:10 PESTEL Analysis

2.10.1 POLITICAL ANALYSIS

i. The national policy Vision 2030, recognizes the agricultural sector as a key economic pillar to development.
ii. Increased focus on food security policy in the county.
iii. Devolution bringing about smooth implementation of the strategy, through allocation of more resources to the counties.
iv. Global and regional influence to having a feed strategy action plan.
v. Inadequate national budgetary provision.
vi. Weak co-ordination between national and county governments hindering co-operation and implementation of strategy.

2.10.2 ECONOMIC ANALYSIS

i. High cost of maintaining equipment and machinery.
ii. High cost of business premises.
iii. Low volumes in the feed business meaning low returns to investment.
iv. Value addition tools and equipment are expensive and unavailable locally.
v. Low incomes among the feed farmers are an impediment to investment.
vi. High interest rates on loans and lack of collaterals keep investors away.
vii. Limited funding of the agricultural sector in the county level; for extension, research farming inputs and so on.

2.10.3 SOCIAL-CULTURAL FACTORS

i. Change in consumer tastes and preferences leading to increased own feed processing.
ii. An increasing population, especially the youth that is ready to take up feed production as a business.
iii. Access to government support to women and youth groups through credit facilities (co-operative societies, SACCOs, dedicated funds) and farm input subsidies.
iv. Urbanization and land sub-division hindering fodder and animal production.
v. Modernization and rural-urban migration causing abandonment of farming by the young and energetic generation.
vi. Poor negotiation position of the small-holder farmers due to low collective action.

2.10.4 TECHNOLOGICAL FACTORS

i. Access to information and technology from the internet.
ii. Availability of many technological advancements in fodder and feed production, conservation and processing.
iii. Integration of ICT in feed production and pest management, for example, soil fertility maps, agro-weather forecasting, so farmers could know what to plant and when to plant.
iv. High bilateral collaboration facilitated by the national government.
v. Increased research on feed in the research institutions.
vi. Availability of technologies for water harvesting and conservation for fodder production.
vii. Climate smart technologies; integrated pest management strategies, inter-cropping (forages and legumes), zero tillage, bio-gas production to manage manure.
viii. The technology for value addition is available but expensive.

ix. Weak research - extension liaison that needs to be strengthened.
x. Weak linkages affecting technology transfer.

2.10.5 ENVIRONMENTAL FACTORS

i. Existence of institutions that regulate environmental issues such as the National Environment Management Authority (NEMA), public health and local authorities.
ii. Climate smart feed production can be promoted to adapt to climate change effects
iii. Emerging alternative feed resources
iv. Integrated pest management strategies, inter-cropping (forages and legumes), zero tillage, bio-gas production to manage manure, which helps in improving soil fertility and boost fodder production.
v. Invasive plant species, which encroach on the pastures and are brought about by land degradation.
vi. Sustainable farming practices such as diversification.

2.10.6 LEGAL FACTORS

i. Too many legal requirements to operate processing plants.
ii. Inadequate legal framework to guide the industry.

2.11 Stakeholder analysis and mapping along the feed value chain

Table18: Stakeholder Analysis and Mapping Along the Feed Value Chain

	Stakeholder	Role/Responsibilities	Strength / Comparative Advantage
1	Office of the Governor	• Liaison with National Government and other key stakeholders/donors • Enabling cross-border trade in feed ingredients through the national government • Gives policy direction • Goodwill and publicity of the strategy achievements • Support strategy activities	High
2	Kajiado County Assembly	• Legislation of Feed Sector Bills • Approval of budget for agricultural sector • Lobbying and advocacy for feed sector interests	High
3	Kajiado CASSCOM	• Oversight of feed sector projects • Resource mobilization • Policy development	High
4	Narok Kajiado Economic Bloc (NAKAEB)	• Joint feed sector policy development • Free trade area for ease of business • Joint feed sector projects • Resource mobilization	High

	Stakeholder	Role/Responsibilities	Strength / Comparative Advantage
5	Department of Agriculture, Livestock, Veterinary, Fisheries and Irrigation	• Host department • Key source of funding • Provide technical advisory services • Promotion of TIMPs in feed sector • Promotion of CSA in feed sector • Publicity and documentation of feed strategy • Quality assurance • Inspection	High
6	Department of Water, Environment, Natural Resources and Climate Change	• Provide technical advisory services • Mapping for boreholes and water pans development • Protection of water catchment areas • Funding of water for livestock use • Early warning systems- weather/climate forecast • Promotion of climate smart practices	High
7	Ministry of Interior and Co-ordination of National Government	• Community mobilization and co-ordination • Communication and linkage between community and government	High
8	Department of Land, Physical Planning and Urban Development	• Land use laws and spatial planning • Approval of feed production on public land	Medium

	Stakeholder	Role/Responsibilities	Strength / Comparative Advantage
9	Department of Trade, Co-operatives and Enterprise Development	• Providing guidelines on commercialization of agricultural value chains in the county • Development of MSEs and SMEs in feed sectors • Development of start-up friendly packages for investments in feed sector • Initialize county revolving fund for youth involvement in feed sector enterprises • Certification and regulation of feed sector enterprises	High
10	Department of Finance	• Set budget ceiling • Rationalize budgets	High
11	Financial and insurance institutions- AFC, banks, SACCOs, Micro-finance institutions	• Funding • Sponsorship and credit • Technical support • Give guidelines on financing and insurance of agricultural enterprises	High
12	Non-State Actors- SACDEP, NIA, Dupoto-e-Maa	• Resource mobilization • Community mobilization • Funding of feed sector projects • Community development projects • Policy influences and feedback	High
13	Development Partners- World Bank, SIDA, DFID, USAID, FAO, SNV, WFP, World vision, KOICA, JICA, WHH	• Funding of feed sector projects • Policy influence • Community development projects	High

	Stakeholder	Role/Responsibilities	Strength / Comparative Advantage
14	Research institutions- KALRO, universities, KEPHIS, KEFRI, ICIPE, ILRI, KMFRI, KeFS	• Development of feed sector TIMPs • Development of quality feed input • Training of TOTs on TIMPs • Source of credible data on feed sector • Conduct feed sector research	High
15	Regulatory institutions- KEBS, KEPHIS, AFA, DVS, PCPB	• Development of feed standards • Quality assurance • Certification • Inspection of input and products	High
16	Media	• Awareness and publicity • Documentation of achievements • Community sensitization	Medium
17	Feed input/ ingredients suppliers- Kitengela animal feed manufacturers	• Supply of quality raw materials • Supply of quality input-seeds such as fertilizers	High
18	Feed manufacturers/ AKEFEMA- SIGMA, Isinya Feeds, Tam feeds and others.	• Production of quality, accessible, affordable and available feed • Regulation of feed manufactures • Offer information on new feed ingredients and feeds	High
19	Value Chain Organization/CIGs- Kajiado Hay Growers Cooperative, KALIMA, Maasai Women Dairy Cooperative Society, and others.	• Resource mobilization • Communication channels • Community development • Identification of project beneficiaries	High

	Stakeholder	Role/Responsibilities	Strength / Comparative Advantage
20	Value Chain Actors/ Farmers	• Project end-users	High
21	Machinery Service providers	• Provision of ploughing, harvesting, baling services, • Training on machinery operations, • Servicing of the machinery	High

Source: Strategic planning team (2022)

Chapter

THREE

STRATEGIC DIRECTION

3.0 Introduction

The livestock sector has been threatened by the emerging externalities and especially the climate change and variability effects which have led to feed shortages in the Kajiado County thus affecting livestock production and productivity. To mitigate the feed shortages, it becomes necessary to develop a strategy with an overall aim of determining a suitable roadmap for practical feed value chain interventions.

Similarly, it should be able to expand the feed enterprises so that feed resources and feed products that meet international standards and certification could be feasible in the conventional and export markets. The strategy is expected to address the requirements for production, processing, marketing and utilization of quality, healthy and safe feed resources at on-farm and commercial levels. The production of the projected feed resources requirements is summarised in Table 19 below:

Table 19: Summary of current and projected feed resources requirements

Feed resources (MT) as Dry Matter	2022	2027	2032
Energy sources			
Maize	302,925	834,014	2,062,333
Sorghum	51,461	78,239	102,787
Cassava	27,339	59,514	78,315
Sunflower	199,744	554,643	1,159,618
Cotton seed	50,205	76,597	100,322
Soybean	35,152	51,433	69,882
Lucerne	13,366	93,375	187,304
Cowpeas	33,338	91,296	87,647
Sweet potato vines	13,223	64,990	67,019
Black Soldier Fly	5,444	7,115	10,682
Grass hay	330,570	1,218,213	1,207.948
Silage – Sorghum	99,171	633,464	1,907,423
Field based grazing acreages –biomass			
Pastoral	4,009,374	16,832,988	16,133,231
Ranching	34,334	761,246	1,163,837

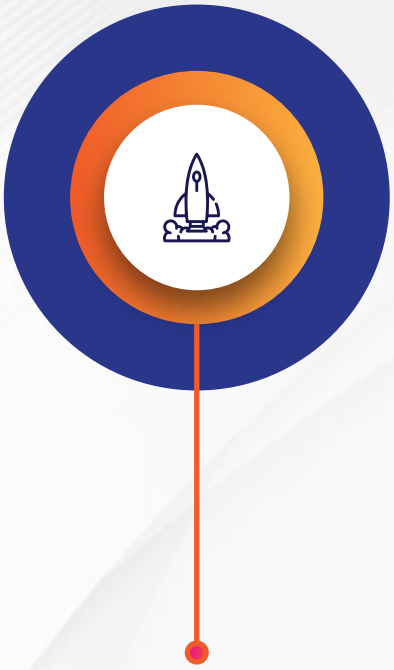
Source: Strategic planning team (2022)

3.1 Broad objective

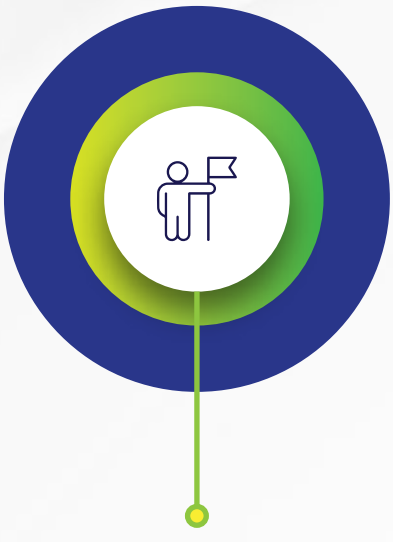
The overall objective of the strategy is to create an enabling environment for sustainable development of the animal feed industry.

The specific objectives of the strategy are to:

i. Increase livestock feed production, conservation and utilization.
ii. Ensure quality and safety of livestock feed for domestic and export markets.
iii. Promote processing, manufacturing and trade in livestock feed.
iv. Promote research and utilization of improved technologies in livestock feed.
v. Promote Public-Private Partnerships (PPP) within the livestock feed industry.
vi. Develop appropriate institutional and legal frameworks for the animal feed industry.
vii. Support the feed industry transition towards a low carbon and climate resilient pathway in line with Kenya's commitment to climate actions that reduce GHGs from livestock-related enterprises.



3.2
VISION
To be the leading county in animal feed and nutrition security in Kenya.



3.3
MISSION
To provide an enabling environment for the production, supply and timely distribution of adequate, quality and affordable animal feed resources.

3.4
GOAL
To promote sustainable livestock production for enhanced livelihoods through strengthened partnerships, collaboration, and coordination among animal feed value chain stakeholders.

3.5 Strategic approach

The strategy intends to enhance delivery of a sustainable and competitive feed industry for Kajiado County by the year 2032. It is anchored on a paradigm shift to developing strategies that are data-driven.

3.6 Background information on feed resources

In the strategy, 10 feed commodities have been identified for promotion to meet the county animal feed requirements. These commodities include energy-rich sources (maize, sorghum, and cassava), protein-rich sources of plant origin (sunflower, cotton, Lucerne, cowpeas, sweet potato vines) as well as pasture and fodder (hay, silage) and protein-rich sources of animal origin (Black Soldier Fly). The above-mentioned feed commodities are produced on small scale and most of them are new in the county.

These commodities will be used in TMR formulation of animal feed while some can be fed directly to the animals. The implementation of the strategy is likely to face challenges such as inadequate finances, inadequate land to grow the proposed feed commodities, and cultural barriers. However, opportunities that exist include favourable agronomic conditions in the county and ready market for animal feed.

To enhance delivery of a sustainable and competitive animal feed industry for Kajiado County by 2032, formulation of an appropriate and practical animal feed development strategy is necessary. The strategy is anchored on six key strategic pillars, namely; Production and Productivity; Quality; Value Addition/Processing; Marketing; Profitability; and, Environment (Physical and Policy).

3.6.1 PASTURE AND FODDER VALUE CHAIN

Kajiado County has about 60% rangelands, which are mostly grasslands and bushes. Currently, productivity in the rangelands is affected by the presence of invasive species, degradation, urbanization, industrialization, mining, crop farming and cultural dynamics.

The main challenges facing the rangelands include unregulated land fragmentations, charcoal burning, sand harvesting, excessive and uncontrolled use of agro-chemicals. Others include poor industrial and agro-chemical waste management, invasion by migratory pests - such as African army worms and locusts - loss of biodiversity as well as overstocking, leading to land degradation.

Opportunities in our rangelands include natural pasture and browse improvement; medicinal plants; apiculture; gums and resins; wildlife; ecotourism; and, carbon credit investments.

The main challenges facing the rangelands include unregulated land fragmentations, charcoal burning, sand harvesting, excessive and uncontrolled use of agro-chemicals. Others include poor industrial and agro-chemical waste management, invasion by migratory pests - such as African army worms and locusts - loss of biodiversity as well as overstocking, leading to land degradation.

Opportunities in our rangelands include natural pasture and browse improvement; medicinal plants; apiculture; gums and resins; wildlife; ecotourism; and, carbon credit investments.

Major grass species of natural pasture are:

i. Red oat grass (*Themeda triandra*)
ii. Bush rye (*Enteropogon macrostachyus*)
iii. African foxtail grass (*Cenchrus ciliaris*)
iv. Maasai love grass (*Eragrostis superba*)
v. Horsetail grass (*Chloris roxburghiana*)
vi. D*igitaria* spp
vii. P*anicum maximum*

Natural browse species are:

i. Desert thorn
ii. A*cacia tortilis*
iii. P*rosopis juliflora* (mathenge)
iv. A*cacia melifera*

The natural pasture and browse are mainly found in the following areas: Matapato South, Matapato North, Purko, Ildamat, Dalalekutuk, Mbirikani/Eselenkei, Entonet/Lenkisim, Kenyawa Poka, Kaputei North, Imaroro, Magadi, Iloodokilani, Keekonyokie, Euwasokedong, Mosiro, Oloosirkon-Sholinke, Kuku, Rombo and Kimana wards.

Established pastures and fodder species are:

i. Rhodes grass (*Chloris gayana*)
ii. Napier grass (*Pennisetum purpureum*)
iii. B*rachiaria* spp
iv. Maize (*Zea mays*)
v. Bush rye (*Enteropogon macrostachyus*)
vi. African foxtail grass (*Cenchrus ciliaris*)

vii. Maasai love grass (*Eragrostis superba*)
viii. Horsetail grass (*Chloris roxburghiana*)

The above species are currently found in: Namanga (Noosikitok); Ilbissil (Lele); Kuku (Nkama, Enkaria Rongena); Rombo (Ilasit, Munyura); Kenyawa Poka (Sultan Hamud); Isinya; and Ngong.

Common challenges under the pasture value chain include, low productivity in the rangelands, land degradation, climate change and vulnerabilities as well as low adoption to technology on pasture production. Opportunities for pasture farming include modern technology; responsive farmers; ready market for pasture; supportive policy environment that enable rehabilitation and reclamation of the degraded rangelands; and, natural pasture improvement. Others include, commercial pasture production, conservation, seed bulking and mechanization services.

Strategic Issues

i. Low pasture/fodder production/productivity
ii. Low quality pasture
iii. Low levels of value addition
iv. Inadequate market linkages
v. Low profits
vi. High losses due to climate change effects
vii. Inadequate pasture/fodder policies
viii. High post-harvest losses

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE

i. To improve rangeland productivity
ii. Strategic interventions:
iii. Rehabilitation of the degraded lands through activities such as reseeding

iv. Control of invasive species
v. Protection of water catchment areas
vi. Capacity development of community organizations such as group ranches, WRUAS and CBOs.
vii. Holistic soil and water management practices
viii. Alternative livelihoods such as support of nature-based enterprises (bee keeping, ecotourism)

STRATEGIC OBJECTIVE TWO

To increase pasture (hay and silage) acreage from current requirement of 171,601 acres to the projected requirement of 606,051 acres and 634,935 acres by 2027 and 2032, respectively.

Strategic interventions:

i. Incentivize communities
ii. Use of underutilized land
iii. Land reclamation and rehabilitation
iv. Promote agricultural mechanization

STRATEGIC OBJECTIVE THREE

To increase pasture (hay and silage) production from current requirement of 429,741 MT to the projected requirement of 1,851,677 MT and 3,115,371 MT by 2027 and 2032, respectively.

Strategic interventions:

i. Increase pasture seed production
ii. Capacity build farmers on ways of increasing pasture production
iii. Incentivize communities with, for example, the provision of inputs and support services for, pricing and marketing
iv. Mechanization- promote use of advanced modes of production
v. Promote climate smart feed production TIMPS

STRATEGIC OBJECTIVE FOUR

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions:

i. Use of certified seeds
ii. Proper use of chemicals for weed control
iii. Timely harvesting using appropriate tools and equipment
iv. Proper transport means to storage facilities
v. Storage of the product in structures that protect from high humidity, rodents and termites infestation and variability of weather
vi. Adding value to the products to increase shelf-life to bridge the feed deficit gap

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE

To improve pasture/fodder quality specifications from the current rating of 30% to the expected rating of 100% by 2032.

Strategic interventions:

i. Timely harvesting
ii. Control invasive species
iii. Control land degradation
iv. Use of certified seeds
v. Proper use of chemicals for weed control
vi. Timely harvesting using appropriate tools and equipment
vii. Proper means of transport to storage facilities
viii. Storage of the product in structures that protect it from humidity, rodents, termites and variabilities of weather
ix. Adding value to the products to increase shelf-life to bridge the feed deficit gap.

Strategic Pillar Three - Value Addition/Processing

STRATEGIC OBJECTIVE ONE

To increase the level of value-added pasture.

Strategic interventions:

i. To promote adoption of value addition techniques
ii. Capacity build farmers on pasture value addition techniques
iii. Incentivize farmers with value addition equipment

STRATEGIC OBJECTIVE TWO

To increase the number of value-added products from the current two to four by 2032.

Strategic Interventions:

i. Awareness and sensitization on value adding feed technologies
ii. Briquette making
iii. Feed fortification

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE

To establish local markets linkages in the 25 wards to meet current and projected demands by 2032.

Strategic intervention:

i. Enhance market linkages

STRATEGIC OBJECTIVE TWO

To establish external market linkages in the county to meet current and projected demands by 2032.

Strategic intervention:

i. Establish a county marketing platform

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To lower the cost of production across the feed value chains by 50% by 2032.

Strategic interventions:

i. Bulk purchase of input
ii. Aggregation centres
iii. Mechanization, technology and innovations

STRATEGIC OBJECTIVE TWO

To increase revenue in the pasture value chain by 50% by 2032.

Strategic interventions:

i. Value addition
ii. Diversification of markets

3.6.2 MAIZE VALUE CHAIN

Maize (Zea mays) is an important food, which is eaten in form of grains and processed to offer various products ranging from maize flour to fodder. The crop is adaptable to a wide range of climatic conditions and is therefore grown extensively in the country from an altitude of 100 m to 2,900 m above sea level, depending on the variety. Rainfall requirements range from 600 mm to 2,500 mm with a temperature range of 150C to 300C. The crop requires well- drained light loamy soils with a pH of 5.5-7.0.

Maize is mainly grown in Kajiado South and Kajiado North sub counties and it is the staple food in the county. Only about 1% is used as animal feed for ruminant livestock, poultry and pigs.

Maize stover is also used to feed free range and zero grazed animals. Maize farming for silage is an upcoming technology for livestock farmers. Major varieties grown include, the six series for high altitude, five series, DK and Pioneer for medium altitude, and Sungura, Duma for low altitude. Total acreage for maize is 30,000 ha with an average yield of 20 bags per hectare (60,000 MT).

The major challenges of maize farming include unreliable rainfall, high production costs, lack of modern farming technologies, poor marketing infrastructure and marketing channels as well as poor varietal selection. However, land availability and a ready market are some of the opportunities that exist.

Strategic issues

i. Low production and productivity of maize hence inadequate maize for animal feed.
ii. Low quality of maize produced leading to poor animal feed quality.
iii. Low level of value addition.
iv. High prices of the maize produced.
v. Low maize profit margin.

Strategic objectives

i. Increase the acreage of maize.
ii. Increase the production of maize.
iii. Increase the quality of maize produced and products.
iv. Minimize the cost of production.
v. Increase the profitability of maize.

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE

To increase maize acreage from current requirement of 134,633 acres to the projected requirement of 370,673 acres and 916,593 acres by 2027 and 2032, respectively.

Strategic interventions:

i. Sensitization of farmers.
ii. Use of underutilized land.
iii. Promote mechanization.

STRATEGIC OBJECTIVE TWO

To increase production from the current requirement of 302,925 MT to the projected requirement of 834,014 MT and 2,062,333 MT by 2027 and 2032, respectively.

Strategic interventions:

i. Promote climate smart agriculture.
ii. Acquisition of farm machinery.
iii. Incentivize farmers with farm inputs across the value chain nodes.

STRATEGIC OBJECTIVE THREE

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions:

i. Use of certified seeds.
ii. Proper use of chemicals for weed control.
iii. Timely harvesting using appropriate tools and equipment.
iv. Proper means of transport to storage facilities.
v. Storage of the product in structures that protect it from high humidity, rodents, termites and variabilities of weather.
vi. Adding value to the product to increase shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE

To increase the use of certified seeds from the current 40% to 80% by the year 2032.

Strategic interventions:

i. Promote use of certified seeds.
ii. Promote use of modern farming technologies.

Strategic Pillar Three - Processing/Value Addition

STRATEGIC OBJECTIVE

To increase levels of value addition from the current three to five products.

Strategic interventions:

i. Promote processing of maize cob meal.
ii. Promote technologies and innovations.
iii. Develop infrastructure and mechanization.

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE

To decrease the prices of maize by 50% by the year 2032.

Strategic interventions:

i. Promote maize marketing organizations.
ii. Promote access to market information.

STRATEGIC OBJECTIVE TWO

To establish external market linkages in the county to meet current and projected demands by 2032.

Strategic intervention:

i. Establish a county marketing platform.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

Increase the profit margin from the current 10% to 30% by the year 2032.

Strategic interventions:

i. Reduce the production cost by 30% by 2027 and 50% by the year 2032.
ii. Promote levels of value addition.
iii. Reduce post-harvest losses.
iv. Increase production per unit area.

STRATEGIC OBJECTIVE TWO

To lower the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Bulk purchase of inputs.
ii. Aggregation.
iii. Mechanization, technology and innovations.

STRATEGIC OBJECTIVE THREE

To increase revenue in the maize value chain by 50% by 2032.

Strategic interventions:

i. Value addition.
ii. Diversification of markets.

3.7.3 SORGHUM VALUE CHAIN

Sorghum (*Sorghum bicolor*), is a cereal crop quantitatively ranked the world's fifth most important cereal grain after wheat, maize, rice and barley. It is a drought-tolerant nutrient-use efficient crop capable of growing in 80% of the world's agricultural lands. It is used as human food, fodder, in manufacturing livestock feed and production of bio-fuels and alcoholic drinks.

It is established from seeds and has various varieties for seed, fodder or both. Sorghum grows best from 800 to 2,500 metres above sea level requiring a minimum rainfall of 250 mm per year but does best above 900 mm per year. Sorghum is well adapted to grow on many different soil types. However, it does best on deep, fertile, well-drained loamy soils and is more tolerant to shallow soil and drought conditions. It can be grown successfully on clay, clay loam, or sandy loam soils. There are about 10 varieties of sorghum in Kenya all yielding an average of 8-20, 90-kg bag/acre.

The current national production is 206,234 MT in 229,883 ha. The county production was 104 MT on 73 ha as at 2018. The average yield nationally is 0.5-0.89 tonnes/ha. The average yield can rise to 1.5 tonnes/ha. Fodder sorghum can be fed as wilted green chop but, it is recommended that it is left to wilt for three days since it contains prussic acid which could be toxic. It can also be fed as silage.

Forage sorghum can form up to 50% of a silage-based feed ration. Dual-purpose sorghum must not go beyond 25% forage. For silage making, the desired moisture content is 63-70% (DM 27-30%). Overall, it is estimated that more than half of the seed/grain sorghum produced is consumed as food, 1% as livestock feed, about one fifth is processed and about 15% wasted through field and post-harvest losses. Fodder sorghum is entirely used as livestock feed.

Challenges

i. Pests and diseases.
ii. Low social economic status of most farmers engaged in sorghum production affecting their ability to access inputs.
iii. Poor marketing systems.
iv. Recurrent droughts and floods.
v. Limited climate-smart agriculture approaches in sorghum production.

Emerging issues

Some of the emerging issues affecting sorghum value chain are:

i. Institutional bottlenecks such as inadequate research capacity and facilities.
ii. Over reliance on harvested seed for next crop.

Opportunities

i. Stable government policies, for example, Agricultural Sector Transformation and Growth Strategy (ASTGS) 2019-2029 and flour blending regulations 2020.
ii. PPPs, say, with East African Breweries Limited (EABL).
iii. Regional integration creating a large consumer base.
iv. Manufacture of Aflasafe® for management of aflatoxin.
v. Reduction in excise duty for sorghum products causing increased demand for the products.

Strategic issues

i. Low sorghum production.
ii. Low sorghum quality.
iii. Low value addition of sorghum.
iv. High cost of marketing.

v. Low profit margins.
vi. Adverse climate change effects.
vii. Inadequate policy on animal feeds.

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE

To increase sorghum acreage from the current requirement of 28,590 acres to the projected requirement of 43,466 acres and 57,104 acres by 2027 and 2032, respectively.

Strategic interventions:

i. Sensitization of farmers.
ii. Promote commercialization of production.
iii. Promote PPPs.
iv. Incentivize communities.
v. Promote mechanization.

STRATEGIC OBJECTIVE TWO

To increase sorghum production from 51,461 MT in 2022 to the projected requirement of 78,239 MT in 2027 and 102,787 MT in 2032.

Strategic intervention

i. Promote use of high yielding certified seed varieties.

STRATEGIC OBJECTIVE THREE

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions

i. Use of certified seeds.
ii. Proper use of chemicals for weed control.
iii. Timely harvesting using appropriate tools and equipment.
iv. Proper means of transport to storage facilities.

v. Storage of the product in structures that protect it from humidity, rodents, termites and variabilities of weather.
vi. Adding value to the product to increase its shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE ONE

To improve quality of sorghum to meet KEBS standard for sorghum specification by the year 2032.

Strategic interventions:

i. Promote production and processing of quality sorghum products.
ii. Promotion and use of certified sorghum seeds.
iii. Timely and effective pest and disease control.
iv. Proper storage

STRATEGIC OBJECTIVE TWO

To reduce post-harvest losses by 50% by the year 2032.

Strategic interventions:

i. Promote harvesting technologies such as rollers, pelletizers that reduce post-harvest losses.
ii. Sensitization of farmers on post-harvest handling.
iii. Promote use of proper and modernized storage facilities such as hermetic bags and portable aluminium silos.

Strategic Pillar Three - Processing/ Value Addition

STRATEGIC OBJECTIVE ONE

To increase the levels of value addition of sorghum to meet the projected demand of 102,787 MT by 2032.

Strategic interventions:

i. Capacity build on sorghum value addition.
ii. Promote adoption of sorghum value addition technologies.
iii. Promote mechanization. .

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE:

To develop strong local markets for sorghum to meet current and projected demands for its inputs and products.

Strategic interventions:

i. To facilitate agro-input dealers to stock and sell sorghum input.
ii. Sensitize and facilitate producer groups' capacity to do collective marketing.
iii. Sensitize farmers to form co-operative societies.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To increase profit margins of the sorghum value chain by 20% by the year 2032.

Strategic interventions:

i. Enhance investments in sorghum value chain.
ii. Increase productivity per unit area (use of high-yielding varieties).
iii. Promote mechanization.

STRATEGIC OBJECTIVE TWO

To lower the cost of production across the sorghum value chain by 50% by 2032.

Strategic interventions;

i. Sensitization of farmers on reduction of production costs.
ii. Bulk purchase of inputs.
iii. Aggregation of produce.
iv. Mechanization, technology and innovations.

STRATEGIC OBJECTIVE THREE

To increase revenue in the sorghum value chain by 50% by 2032.

Strategic interventions:

i. Value addition.
ii. Diversification of markets.

3.7.4 CASSAVA VALUE CHAIN

Cassava (Manihot esculenta Crantz) grows in diverse agro-ecological zones. In Kenya, it is widely cultivated in Western and Coastal regions. It is mainly grown for food and nutrition security and excess roots are sold to generate income for the farm households. Cassava is rarely grown in Kajiado County although the climate is favourable.

Cassava grows best in areas with a mean temperature of 25-29°C, and a soil temperature of about 30°C; below 10°C the plant stops growing. While the crop grows best in areas with an annual well-distributed rainfall of 1,000-1,500 mm, it can tolerate semi-arid conditions with rainfall as low as 500 mm, and may have a competitive advantage over other crops under those conditions.

Cassava can grow on a wide range of soils, but is best adapted to well-drained, light-textured, deep soils of intermediate fertility. Under high fertility conditions top growth may be stimulated at the expense of root growth. Optimum soil pH is between 4.5 and 6.5. Generally, there are two types of cassava varieties; bitter and sweet cassava. Cassava is referred to as “sweet” when it is less poisonous. Bitter cassava contains large quantities of cyanide compounds, which must be processed out of the tubers before they can be safely eaten. Varieties include Nzalauka, Karibuni, Shibe, Karembo, Tajirika and Siri.

Most varieties mature in eight to 12 months and have the potential of producing up to 28 tonnes per acre. Cassava can stay for up to 24 months in the soil after maturity without going bad. Some varieties are resistant to cassava brown streak virus disease and cassava

mosaic virus disease.

The most commonly consumed part of the cassava plant is the root, which is incredibly versatile. It can be eaten whole, grated, or ground into flour for use in bread and crackers. The leaves, which are also edible, if a person cooks them or dries them in the sun, can contain up to 25% protein. Cassava, in its different forms, has been used as animal feed in many parts of the world.

Cassava forage (leaves and stem), peels and particularly the root; fresh, dried or in silage form, alone or mixed with other feed, is used in feeding different species of animals. Dried fine cassava mash can be fed to poultry, fish, and pigs, while the coarser mash is suitable for cattle, sheep, goats and pigs.

Challenges

i. Cassava production is usually faced with myriad problems ranging from pests to diseases such as cassava mosaic disease, cassava bacterial blight, cassava anthracnose disease, cassava bud necrosis, root rots, mealybugs and green mite. Others are weather-related problems, poor soil, damage by livestock, lack of an efficient, sustainable quality seed production as well as distribution system.
ii. Inadequate skills, inappropriate technologies and technical information on cassava production.
iii. Inefficient utilization of cassava leading to wastage.
iv. Poor marketing of cassava as animal feed.
v. Low utilization of cassava as animal feed.

Opportunities

The ever-increasing competition for cereals in the human food and livestock feed industries in most countries of tropical Africa makes it imperative to explore the potentials of cassava as a replacement for maize and wheat in processed feeds. Opportunity cost favours the use of cassava roots as replacement for maize in livestock feed during the dry season when the price of maize rises considerably.

Simple processing techniques profitable for small-scale farmers are available for producing acceptable cassava products for the livestock feed industry. Inclusion of cassava leaves in such products improves the nutritive value of animal feed through enhancement of its

protein quality, mineral and vitamin contents. Increasing cassava utilization by the food and feed industries will stimulate cassava production by maintaining a high demand for cassava product.

Strategic issues

i. Low cassava production.
ii. Low cassava quality.
iii. Low value addition of cassava as a fodder.
iv. Low market demand for cassava.
v. Low profit margins.

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE

Increase acreage under cassava production from the requirement of 1,094 acres in 2022 to the projected requirement of 2,381 acres in 2027 and 3,133 acres in 2032.

Strategic interventions:

i. Promote mechanization.
ii. Sensitization of farmers.

STRATEGIC OBJECTIVE TWO

Increase cassava production from the requirement of 27,339 MT in 2022 to the projected requirement of 59,514 MT in 2027 and 78,315 MT in 2032.

Strategic interventions:

i. Capacity building of farmers on good agricultural practices in cassava production.
ii. Promote commercialization of production.
iii. Promote PPPs.
iv. Incentivize communities.
v. Mechanization.
vi. Partner with research institutions and development partners.

STRATEGIC OBJECTIVE THREE

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions:

i. Use of certified seeds.
ii. Proper use of chemicals and weed control.
iii. Timely harvesting using appropriate tools and equipment.
iv. Proper means of transport to storage facilities.
v. Storage of the product in structures that protect it from humidity, rodents, termites and variabilities of weather.
vi. Adding value to the product to increase its shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE ONE

To increase the use of certified cassava seeds.

Strategic interventions:

i. Sensitize farmers on sweet cassava varieties.
ii. Promote pest and disease resistant cassava varieties.

Strategic Pillar Three - Processing/ Value Addition

STRATEGIC OBJECTIVE ONE

To promote the incorporation of cassava into livestock feeds by 30% by 2032.

Strategic interventions:

i. Capacity building of farmers.
ii. Incentivize farmers with value addition equipment.

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE

To increase market demand for locally grown cassava and its by-products by 30% by 2032.

Strategic interventions:

i. Promote utilization of cassava and its by-products as livestock feed.
ii. Promote price incentives.
iii. Product aggregation.
iv. Provision of market information.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To lower the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Bulk purchase of input.
ii. Aggregation.
iii. Mechanization, technology and innovations.

STRATEGIC OBJECTIVE TWO:

To increase revenue in the cassava value chain by 50% by 2032.

Strategic interventions:

i. Value addition.
ii. Diversification of markets.

3.7.5 SUNFLOWER VALUE CHAIN

Sunflower (Helianthus annuus), is a herbaceous annual plant in the family of Asteraceae, grown for its seeds. The plant has thick, hairy, erect stems which give rise to a large flower

head. It has large, broad lower leaves, which are oval and arranged alternately on the stem, and smaller narrower upper leaves, which are attached individually to the stem. The flower head is a large disc 10–30 cm (4–12 inch) in diameter which is made up of 16–30 individual florets which are yellow-gold in colour.

The outer florets are sterile and produce the outer petals of the flower head, while the inner florets will mature into the seeds in the central disc. Sunflowers are annual plants, harvested after one growing season and can reach 1–3.5 m (3.3–11.5 ft) in height. The crop is mainly grown in Kajiado South where it is intercropped with maize and beans, with very few farmers growing it as a pure stand. The estimated acreage in the county is about 100 ha with an average yield of 150 MT per hectare

The optimum temperature for growth is 23°C to 28°C. However, a wider range of temperatures up to 34°C shows little effect on productivity. High temperatures have been shown to lower oil percentage, reduce seed fill and germination. The rainfall requirement ranges from 500 to 1,000 mm. Sunflower is an inefficient user of water, as measured by the volume of water transpired per gram of plant above-ground dry matter.

The crop is not considered highly drought-tolerant, but often produces satisfactory results while other crops are damaged during drought. Its extensively branched taproot, penetrating to 2 m, enables the plant to survive times of water stress. A critical time for water stress is the period 20 days before and 20 days after flowering. If stress is likely during this period, irrigation will increase yield, oil percentage and test weight. Protein percentage, however, will decrease.

Emerging issues

i. Over-reliance on seed imports
ii. Limited research on local sunflower eco-types
iii. Limited local capacity on value addition of sunflower

Challenges

i. High cost of certified seeds
ii. Poor seed quality
iii. Not yet commercialized by farmers
iv. Inadequate technical knowledge
v. Pests and diseases

Opportunities

i. Availability of land for its promotion
ii. Ready market for both seed and foliage
iii. The crop is drought tolerant

Strategic issues for sunflower value chain

i. Low sunflower production/productivity
ii. Low quality of sunflower seeds
iii. Low levels of value addition
iv. High cost of certified seeds
v. Low levels of profits
vi. Adverse climate change effects

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE

To increase sunflower acreage from the current requirement of 237,791 acres in 2022 to the projected requirements of 660,289 acres and 1,380,498 acres for the year 2027 and 2032, respectively.

Strategic intervention

i. Promote climate smart technologies
ii. Incentivize communities
iii. Use of underutilized land
iv. Promote agricultural mechanization

STRATEGIC OBJECTIVE TWO

To increase sunflower production from 199,744 MT in 2022 to 554,643 MT in 2027 and 1,159,618 MT in 2032.

Strategic interventions:

i. Capacity building of farmers.
ii. Promote commercialization of production.

iii. Promote Public-Private Partnerships.
iv. Incentivize communities.
v. Promote and improve access to mechanization.
vi. Partner with research institutions and development partners.
vii. Increase sunflower seed production.

STRATEGIC OBJECTIVE THREE

To reduce the current pre- and post-harvest losses by 50% by 2032.

Strategic interventions:

i. Use of certified seeds.
ii. Proper use of chemicals, weed control.
iii. Timely harvesting using appropriate tools and equipment.
iv. Proper means of transport to storage facilities.
v. Storage of the product in structures that protect it from humidity, rodents, termites and variabilities of weather.
vi. Adding value to the product to increase its shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE ONE

To increase the quality of sunflower seed cake from the current crude protein of 25.0% to 32.0% as per KEBS standard by the year 2032.

Strategic interventions:

i. Promote use of certified and high-quality sunflower seeds.
ii. Reduce post-harvest losses.

STRATEGIC OBJECTIVE TWO

To promote adoption of recommended technologies in sunflower production by 20% by the year 2032.

Strategic intervention:

i. Adoption of appropriate harvesting techniques /equipment.

Strategic Pillar Three - Processing/Value Addition

STRATEGIC OBJECTIVE ONE

To establish three sunflower processing facilities in the county by 2032.

Strategic interventions:

i. To enhance adoption of sunflower value addition techniques.
ii. Promote use of appropriate processing techniques.
iii. Establishment of a sunflower oil processing plant/cottage industries.

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE

i. To establish three sunflower aggregation centres in sunflower-producing zones in the county by 2032.

Strategic interventions:

i. Establish and strengthen producer groups and aggregation centres

STRATEGIC OBJECTIVE TWO

To establish external market linkages in the county to meet current and projected demands by 2032.

Strategic intervention:

i. Facilitate a county marketing platform.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To reduce the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Bulk purchase of input.
ii. Aggregation.
iii. Mechanization, technology and innovations.

STRATEGIC OBJECTIVE TWO

To increase farmer income in the sunflower value chain by 50% by 2032.

Strategic interventions:

i. Value addition.
ii. Diversification of markets.

3.7.6 COTTON VALUE CHAIN

Before liberalization, cotton (Gossypium herbaceum) was once one of Kenya's main foreign exchange earners. Under the structural adjustment policies, there has been a collapse of the vertically integrated system for input supply, extension and buying of seed cotton. This, combined with falling world prices, have resulted in thousands of cotton growers abandoning the crop.

Cotton in Kenya is mainly grown in arid and semi-arid areas where there are limited economic activities. Cotton is also grown by small-scale farmers in Western, Nyanza, Central, Rift Valley, Eastern and Coast regions of Kenya. An estimated 200,000 farmers grow most of the cotton on holdings of less than one hectare.

National cotton production reached a peak of 38,000 metric tonnes of seed cotton in 1984/85. Production declined to 14,000 MT by 1995 following liberalization of the sector and withdrawal of the Kenya Government from the provision of credit and input. The Cotton Development Authority estimated that there are 350,000 ha in the country suitable for cotton production, with a potential production of 50,000 tonnes annually.

Until the national government initiatives encouraging cotton growing began to take effect in 2006, national production stood at only 5,000 tonnes from 30,000 ha in 2005. In 2008/09 production was estimated at 10,000 tonnes from 46,000 ha. The current average yield of cotton seed in Kisumu County in Nyanza, is 300 kg per acre.

Potential maximum yield of the new cotton hybrid seed under rain-fed production is 2,000 kg per acre while the potential maximum yield of the new cotton hybrid of BT seed under irrigation is 2,500 kg per acre. After cotton is harvested, it produces lint, cotton seed and residue. Cotton seed takes up approximately 53% of the total cotton harvested. The standard conversion rate of cotton seed to cotton seed cake is 0.7. Cotton is a new crop in the Kajiado County, and there will be efforts to have women and youth as well as people living with disabilities involved in its cultivation.

Challenges

i. Climate change effects on production of cotton.
ii. Low levels of adoption of cotton as a livestock feed among the community.
iii. Reducing land sizes as most pastoralists are selling their land

Opportunities

There are myriad opportunities yet to be exploited in cotton as a livestock feed in Kajiado County.

Strategic issues

i. Inadequate locally available cottonseed cake.
ii. Low quality of cottonseed cake.
iii. Low levels of processed and value-added cottonseed cake.
iv. Low levels of produced cottonseed cake for marketing and poor marketing channels.
v. Low level of commercialization of cottonseed cake.

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE

To identify land for cotton production to meet current requirements of 35,861 acres and projected requirements of 54,712 acres and 71,659 acres by 2027 and 2032, respectively.

Strategic interventions:

i. Awareness and sensitization of farmers.
ii. Establish demo farms for cotton production.

STRATEGIC OBJECTIVE TWO

To increase cotton production from 50,205 MT in 2022, to 76,597 MT in 2027 and 100,322 MT in 2032.

Strategic interventions:

i. Capacity building of farmers.
ii. Promote commercialization of production.
iii. Promote PPPs.
iv. Incentivize communities.
v. Promote mechanization.
vi. Partner with research institutions and development partners.

STRATEGIC OBJECTIVE THREE

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions:

i. Use of certified seeds.
ii. Pest and diseases control and management.
iii. Timely harvesting.
iv. Use of proper transport.
v. Storage of the product in structures that protect it from humidity, rodents, termites and variabilities of weather.
vi. Adding value to the product to increase its shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE

To improve the quality of cotton seed cake by standardizing the cottonseed cake meals according to the recommended CP content by East African Community standards of 33%

for cottonseed cake and 43% for cottonseed meal.

Strategic interventions:

i. Capacity building.
ii. Reduction of pre- and post-harvest losses.
iii. Promotion of improved cotton varieties.

Strategic Pillar Three - Processing/Value Addition

STRATEGIC OBJECTIVE

Establish processing and value addition facility in prioritized areas across the county by 2032.

Strategic interventions:

i. Capacity build the value chain actors and service providers.
ii. Establish and equip cottonseed cake processing plants.
iii. Promote up-to-date processing/value addition technologies.

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE

To establish reliable and sustainable markets for cottonseed cake by 2032.

Strategic interventions:

i. Capacity build service providers and value chain actors to engage in various market development activities
ii. Develop marketing strategies for introduction of cotton as animal feed
iii. Establish efficient marketing models and channels to position cottonseed cake as animal feed

STRATEGIC OBJECTIVE TWO

To reduce the high prices of cottonseed cake in the market by reducing the cost of production.

Strategic interventions:

i. Streamline availability and accessibility of input.
ii. Reduce post-harvest losses through extensive capacity building/extension services on the cotton value chain.

STRATEGIC OBJECTIVE THREE

To establish external market linkages in the county to meet current and projected demands by 2032.

Strategic intervention:

i. Establish a county marketing platform.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To lower the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Facilitate bulk purchase of input by various players and streamline affordable distribution to co-operative societies.
ii. Establish aggregation centres at strategic points in the county to simplify logistics.
iii. Support efforts to promote mechanization, technology and innovation in the value chain.

STRATEGIC OBJECTIVE TWO

To increase income in the cotton value chain by 50% by 2032.

Strategic interventions:

i. Promote value addition activities among co-operative societies.
ii. Explore and facilitate diversification of markets.

3.7.7 LUCERNE VALUE CHAIN

Lucerne or Alfalfa (Medicago sativa) is one of the most valuable and widely grown forage in the world. It is a perennial legume, able to produce good quality forage throughout the year, if irrigated. It is established from seed, is high yielding and is highly palatable. Lucerne has 25% crude protein and is low in fibre, below 30%. It is used primarily as hay, but can also be used as cut-and-carry forage for stall feeding systems or harvested for silage and can also be processed into leaf meal, pellets, hay, cubes and briquettes.

There are about six varieties of Lucerne found in Kenya. Lucerne is best grown as a pure stand. It is also not desirable to establish a new Lucerne crop within an existing crop as mature plants kill new seedlings. Lucerne is a deep-rooted leguminous crop with very small seeds that require a fine seedbed.

Ploughing, several harrowing and allowing for weeds to dry and raked away will produce a fine tilth for seed establishment. Lucerne seeds are supposed to be inoculated with Rhizobia spp before sowing to promote nodulation for fixing nitrogen in the soil. Seeds are drilled at rates of 12-18 kg per hectare on furrows of 15-22 cm spacing. For enhanced germination, sowing is done at the onset of rains or when ready to irrigate.

It is well adapted to a wide range of soils but deep, well-drained, fertile loamy soils are preferred. Soil should be tested to correct for macro and trace elements. Phosphate fertilizers are applied at a rate of 40 kg P2O5 per acre during establishment or six tonnes of manure/ acre ploughed in before seed sowing. A combination of mechanical and herbicide weed control can be used depending on the spacing used during establishment at the early stages of the crop as pure stands will outcompete weeds as the crop matures.

Lucerne crop pests are mainly red-legged spider, Lucerne flea, cutworm, Lucerne weevil, aphids and leaf-hoppers, while diseases of economic importance include, bacterial leaf spot, common leaf spot, downy mildew, and stem blight. Crop rotation and use of resistant varieties reduce incidences. Pesticides are used to control aphids, while leaf spot and rust can be reduced by adopting a wider spacing between rows.

For extended productivity of Lucerne stand, rainfall or irrigation is to be received after harvesting, and weeds, pests and diseases controlled in good time. A healthy Lucerne stand can last 4-6 years. There is a wide range of varieties in the market to choose from. Generally, Lucerne will grow in a wide-range of climatic conditions. It is important to grow varieties suitable to a given ecological zone.

To achieve quality yields, Lucerne should be allowed to grow until 10% flowering (that is, early flowering) stage then cut at 8-10 cm above the ground. This should result in 10 cuts per year when producing under irrigation and 4-6 cuts under rain-fed conditions. Irrigated Lucerne of 10 cuts per year will yield 15 tonnes/ha. The potential number of cuts under rain-fed conditions varies depending on variety and agro-ecological zone. Under these conditions, only one tonne/ha per cut has been recorded in Kenya so far. In general, annual yields of Lucerne, decline with the age of stand (drops markedly in the third year). The decline is faster if the crop is poorly managed, affected by extreme weather, attacked by pests and diseases or grazed directly.

Emerging issues

Some of the emerging issues affecting Lucerne value chain are:

i. Over-reliance on seed imports.
ii. Limited research on local Lucerne eco-types to promote adoption by producers.
iii. Limited capacity on value addition of Lucerne.

Challenges

Challenges affecting Lucerne production include;

i. High cost of establishment;
ii. High seed cost and seed shortage;
iii. Pest and diseases; and,
iv. Post-harvest losses.

Opportunities

Lucerne value chain presents a lot of opportunities in the following areas:

i. **Quality seed production**: There is over dependence on imports. Locally produced seed will be cheaper and easily accessible to producers.
ii. **Value addition**: Currently, Lucerne is utilized by farmers as wilted green chop, hay and limited silage. Lucerne can be value added to various products like leaf meal, pellets, cubes and briquettes. These products increase the shelf-life and ensure availability of quality Lucerne throughout the year.
iii. **Commercial production of Lucerne**: With projected increase in human population and increased demand for animal origin protein, more market-oriented livestock enterprises such as feedlots are going to increase. This will elicit a demand for high

quality crude protein sources such as Lucerne to accelerate growth and weight of livestock in such enterprises.

Strategic issues

i. Low Lucerne production/productivity in Kajiado (67.4 ha translating to 1,479.8 MT)
ii. Low quality of fresh Lucerne and value-added products
iii. High post-harvest losses
iv. Little value addition of Lucerne into hay, silage, briquettes, pellets and meal
v. Low commercialization levels of Lucerne value chain
vi. Adverse effects of climate change on Lucerne production
vii. Inadequate policy on fodder

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE

To expand Lucerne acreage from the current requirement of 1,671 acres to the projected requirement of 11,672 acres and 23,413 acres by 2027 and 2032, respectively.

Strategic interventions:

i. Promote adoption of Lucerne as fodder and cash crop among livestock and crop producers.
ii. Use of underutilized land to increase acreage of Lucerne.

STRATEGIC OBJECTIVE TWO

To increase production/productivity of Lucerne to meet current demand of 13,366 MT, to the projected requirement of 93,375 MT by 2027 and 187,304 MT by 2032.

Strategic interventions:

i. Provide incentives to producers to enhance adoption
ii. Promote mechanization
iii. Promote climate smart agriculture

STRATEGIC OBJECTIVE THREE

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions:

i. Use of certified seeds.
ii. Proper use of chemicals, weed control.
iii. Timely harvesting using appropriate tools and equipment.
iv. Proper means of transport to storage facilities.
v. Storage of the product in structures that protect it from humidity, rodents, termites and variabilities of weather.
vi. Adding value to the product to increase its shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE ONE

To improve quality of Lucerne and reduce post-harvest losses to meet the Kenya Bureau of Standards (KEBS) threshold of 25%.

Strategic intervention

i. Promote production and processing of quality Lucerne and products

STRATEGIC OBJECTIVE TWO

To reduce post-harvest losses by 50%

Strategic intervention

i. Promote harvesting technologies such as rollers, pelletizers that reduce post-harvest losses.

Strategic Pillar Three - Processing/Value Addition

STRATEGIC OBJECTIVE

To add value to Lucerne to meet current and projected demands

Strategic interventions:

i. Capacity build on Lucerne value addition
ii. Promote adoption of Lucerne value addition technologies

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE

To develop local markets for Lucerne to meet current and projected demands

Strategic interventions:

i. To facilitate agro-input dealers to stock and sell Lucerne inputs.
ii. Federate producer groups into co-operatives for collective marketing of Lucerne input and products

STRATEGIC OBJECTIVE TWO

To establish external market linkages in the county to meet current and projected demands by 2032.

Strategic intervention:

Facilitate establishment of a county marketing platform.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE:

To lower the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Facilitate bulk purchase of input by various players and streamline affordable distribution to cooperative societies.
ii. Establish aggregation centres at strategic points in the county to simplify logistics.
iii. Support efforts to promote mechanization, technology and innovation in the value chain.

STRATEGIC OBJECTIVE TWO:

To increase revenue in the Lucerne value chain business by 50% by 2032.

Strategic interventions:

i. Value addition.
ii. Diversification of markets.

3.7.8 COWPEAS VALUE CHAIN

The cowpea (Vigna unguiculata), also known as black-eyed pea, is popular in Kenya's arid and semi-arid areas due to its high nutrition value, short harvest period and hardiness. In Kenya, it is popularly known as Kunde. Cowpea is a heat-loving and drought-tolerant crop. The optimum temperature for growth and development is around 30°C. The optimum sowing times are December to January.

Cowpeas are grown on a wide range of soils but the crop shows a preference for sandy soils, which tend to be less restrictive on root growth. It is more tolerant to infertile and acid soils than many other crops. This adaptation to lighter soils is coupled with drought tolerance through reduced leaf growth, less water loss through stomata, and leaf movement to reduce light and heat load under stress. Cowpeas thrive in well-drained soil and less on heavy soils. The crop requires a soil pH of between 5.6 and 6.0.

Cowpea can produce good yields of high-quality dry matter. Under dry land conditions, yields of cowpea forage have ranged from 0.5 MT DM/Ha to over 4 MT DM/Ha under favourable conditions. Production per season is usually 2 to 3 MT DM/Ha. A potential yield of 4 MT/Ha of hay can be achieved with good management from a pure stand of cowpea. Cowpea is used as fodder crop for green feeding, hay making, grazing and for ensiling in mixtures with sorghum or maize. The grains are used as human food as well as animal feed. Cowpea is also used as green manure crop and as cover crop in plantations. The feeding value of cowpea forage is high.

Strategic issues:

i. Inadequate locally available cowpea seeds
ii. Inadequate locally processed and value-added cowpeas
iii. Inadequate locally produced cowpeas for marketing and marketing channels
iv. Low level of commercialization of cowpeas value chain as fodder

Strategic Pillar One - Production and productivity

STRATEGIC OBJECTIVE ONE:

To increase cowpeas acreage from 4,763 acres to 13,042 acres and 12,521 acres by 2027 and 2032, respectively.

Strategic interventions:

i. Sensitization of farmers.
ii. Promote and facilitate mechanization of farm operations.

STRATEGIC OBJECTIVE TWO:

To increase cowpeas production from current 33,338 MT to 91,296 MT and 87,647 MT by 2027 and 2032, respectively.

Strategic interventions:

i. Incentivize cowpea farmers.
ii. Use of quality certified seeds.

STRATEGIC OBJECTIVE THREE:

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic Interventions:

i. Use of certified seeds.
ii. Proper use of chemicals, weed control.
iii. Timely harvesting using appropriate tools and equipment.
iv. Proper means of transport to storage facilities.
v. Storage of the product in structures that protect it from humidity, rodents, termites

and variabilities of weather.

vi. Adding value to the product to increase its shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE ONE

To promote and avail the use of quality cowpea seeds.

Strategic interventions:

i. Capacity building.

ii. Advocate for use of certified cowpea seeds.

Strategic Pillar Three - Processing/Value Addition

STRATEGIC OBJECTIVE

To promote adoption of processing and value addition.

Strategic intervention:

Capacity build the value chain actors and service providers.

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE

To promote creation of market linkages for easy access of farm input such as seeds and fertilizer.

Strategic intervention:

Link farmers to other value chain actors

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To lower the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Bulk purchase of input.
ii. Aggregation.
iii. Mechanization, technology and innovations.

STRATEGIC OBJECTIVE TWO

To increase income in the cowpeas value chain by 50% by 2032.

Strategic interventions:

i. Value addition.
ii. Facilitate capacity building of value chain actors on value addition intervention/ activities.
iii. Support diversification of markets.

3.7.9 SWEET POTATO VINES VALUE CHAIN

Sweet potato (Ipomoea batatas) is a plant grown for its tuberous roots in tropical, sub-tropical and warm-temperate regions. Sweet potato tubers are a staple food or an alternative food in many countries and part of the production is used for animal feeding. Sweet potato fodder can be the main source of protein that animals need for healthy and rapid growth because the vine contains between 15 and 30% protein. Sweet potato vines are easy to grow, cheap and beneficial because they are loaded with essential vitamins.

Sweet potato is adaptable to different agro-ecological zones ranging from 0-2,100 m above sea level and occasionally is found in altitudes of about 2,400m. It thrives at temperatures above 24°C in abundant sunshine. In Kajiado County sweet potato vines are grown in Kajiado North, Kajiado West and Kajiado South sub counties, which suit the climate required.

Farmers in these regions grow sweet potatoes on small scale mainly for subsistence. Common varieties grown include K117 that produce 23 MT/Ha forage vine yield and Mwavuli that produce 20 MT/Ha forage vine. However, there is a big opportunity to venture into improved varieties for fodder including Ex-Mukurweini - with a maturity period of three months and yields 60-65 MT forage /Ha and Musinya that also matures in three months and yields 90-95 MT foliage /Ha.

The total acreage under sweet potato vines for fodder in the county is 378 acres and the current yields stand at 1,381 MT. However, there is an opportunity to increase acreage under sweet potato vines to 5,802 acres and 7,583 acres by 2027 and 2032, respectively. With increase in acreage the yields are expected to increase to 24,661 and 30,942 MT by 2027 and 2032, respectively. Commonly available sweet potato vines are utilized in two ways:

i. **Green chop**: Sweet potato vines are often fed separately from other fodder. If the cows are fed vines in the morning, they are then fed other fodder in the afternoon, or vice versa.
ii. **Silage**: During the dry seasons such as May-September, and December-March in Kajiado, feed is less available and milk production is greatly reduced and sweet potato vines are scarce and costlier. Few farmers use silage that is processed during the wet season when vines are abundant to provide nutritious feed during the dry season.

Challenges

i. Use of low-quality planting materials leads to low yields and poor-quality produce.
ii. Processing opportunities are not exploited as selling of fresh tubers gives low value for the commodity.
iii. Poor post- harvest handling techniques.
iv. High-cost of vines for planting.
v. Sweet potato virus causing dwarfing of the plants,
vi. Unaffordability of cutting machine to cut the vines.

Opportunities

i. Availability of affordable certified planting materials
ii. Value addition
iii. Development of new technology and skills
iv. Production of high-quality vines or cuttings to farmers

Strategic issues

i. Low production/productivity of the vines
ii. Low quality of sweet potato vines
iii. Little value addition on sweet potato vines
iv. High prices of sweet potato inputs
v. Unreliable supply of sweet potato vines for fodder
vi. Low profit margins
vii. Adverse climate change effects
viii. Inadequate policy on fodder

Strategic Pillar One - Productivity and Production

STRATEGIC OBJECTIVE ONE

To increase sweet potatoes vine production from the current 13,223 MT to 64,990 MT and 67,019 MT by 2027 and 2032, respectively.

Strategic interventions:

i. Sensitization of farmers.
ii. Incentivize communities.
iii. Use of underutilized land.
iv. Promote agricultural mechanization.
v. Promote climate smart agriculture.

STRATEGIC OBJECTIVE TWO

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions.

i. Use of certified seeds.
ii. Proper use of chemicals, weed control.
iii. Timely harvesting using appropriate tools and equipment.
iv. Proper means of transport to storage facilities.
v. Storage of the product in structures that protect it from humidity, rodents, termites and variabilities of weather.
vi. Adding value to the product to increase shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE ONE

To provide high quality sweet potato vines/cuttings to farmers.

Strategic interventions:

i. Promotion of use of certified sweet potato vines/cuttings.
ii. Provision of pest and disease control.
iii. Engage research institutions in providing research and advice on high quality and adaptable varieties of sweet potato.

Strategic Pillar Three - Value Addition

STRATEGIC OBJECTIVE:

To promote value addition on sweet potato vines for fodder.

Strategic intervention:

Sensitize farmers on value addition.

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE

To upscale/facilitate creation of market linkages to enhance profitability.

Strategic interventions:

i. Promote subsidized sweet potato splits.
ii. Promote the use organic fertilizers to farmers.
iii. Establish/facilitate a county marketing platform.

STRATEGIC OBJECTIVE TWO

To streamline supply of sweet potato vines.

Strategic interventions:

i. Promote bulking for production of splits.
ii. Promote commercialization of sweet potato vines.
iii. Sensitize farmers through extension services.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To lower the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Bulk purchase of inputs.
ii. Aggregation of produce.
iii. Mechanization, technology and innovations.

STRATEGIC OBJECTIVE TWO

To increase revenue in the sweet potato vines value chain business by 50% by 2032.

Strategic interventions

i. Value addition.
ii. Diversification of markets.

3.7.10 BLACK SOLDIER FLY (BSF) VALUE CHAIN

The Black Soldier Fly, (Hermetia illucens) is a common and widespread fly of the family Stratiomyidae. It is presently the most widespread form of insect farming in the world. The insect is ideally suited for food and feed production due to its rapid production cycle and high concentration of protein. It plays a similar role to that of red worms as an essential decomposer in breaking down organic substrates and returning nutrients to the soil.

The larvae have voracious appetites and can be used for composting household food scraps and agricultural waste products. They are an alternative source of protein of feed for fish, livestock and pet food. Under culture systems BSF eggs are laid in the decomposing matter so that the emerging larvae will have immediate access to food source. With warm (about 270C) and moist conditions (of 30-70% humidity) an adult female lays 206-639 eggs.

There are over 20 farms rearing BSF in Kenya and five of them are located in Kajiado County. Farmers can get the breeding stock from ICIPE Kenya, Insect Pro Ltd, Ressect in Njoro, Ololo Farm in Ongata Rongai, Zihanga Limited, Tripple P Ltd, Protein Masters Ltd, Sanergy, Dudu Masters, Afriprot, Ecodudu, Namahi Farm in Isinya and Amboseli Eco farm in Kimana.

The flies are mostly reared in indoor cages with good light penetration under light houses and greenhouses. During the breeding phase, also referred to as the hatchery phase, the eggs deposited by the adult flies are placed in vertically racked containers filled with compost consisting of residual waste streams such as organic food waste. Under completely controlled climate conditions, the eggs hatch very quickly into tiny larvae.

During the production phase, temperature, humidity, and food supply are carefully controlled and optimized for growth of the larvae, which reach their maximum body mass in only six days. During this period, the larvae rapidly consume nutrients from the organic waste to prepare themselves for the following stage of their life as an adult fly. When they are ready to be harvested, the larvae consist of 40% to 65% of protein.

They are dried and then processed to provide an insect meal that is ready for distribution and further processing. It takes on average of about 9.35 MT of food scrap (wet weight) to produce 1 MT (wet weight) of harvested BSFL. About 18.7 MT of larvae produce 1 MT of dried larvae. The production of the larvae in a 5 M by 10 M yields 2 T fresh larvae per month. This translates to annual average production of about 2 MT of dry larvae /year.

Challenges in Black Soldier Fly farming

i. Staffing and training
ii. Seed funding and financial sustainability
iii. Poor environmental conditions for BSF systems
iv. Low community acceptance

Opportunities

i. Training of farmers
ii. Readily available food waste to be recycled

Strategic issues

i. Limited production of BSF larvae for feed formulation
ii. Lack of processing and value addition of larvae
iii. Climate change effects on BSF farming and on agricultural products
iv. Low community acceptance of insect farming
v. Inadequate policy on insect farming
vi. High prices of BSF seed
vii. Challenging techniques of breeding BSF
viii. High toxic farm wastes and industrial products
ix. Inadequate value addition equipment

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE:

To establish BSF culture across the county to meet the projected BSFL meal requirements of 7,115 MT in 2027 to 10,682 MT in 2032, respectively

Strategic interventions:

i. Sensitization and capacity building of farmers on insect farming.
ii. Incentivize the community.
iii. Promote mechanization.

STRATEGIC OBJECTIVE TWO:

To promote insect farming as an alternative protein in animal feed.

Strategic interventions:

i. Sensitization and capacity building of farmers.
ii. Equip the existing BSF farms to be centres of excellence.
iii. Incentivize the community.
iv. Promote and provide BSF mechanization services.

STRATEGIC OBJECTIVE THREE

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions:

i. Use of certified brooders.
ii. Apply proper use of fumigation.
iii. Timely harvesting of larvae using appropriate tools and equipment.
iv. Proper storage of BSFL products.
v. Adding value to the product to increase its shelf-life to bridge the feed deficit gap.

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE:

To ensure the BSF produced meet quality required.

Strategic interventions

i. Acquiring high quality starter kits.
ii. Promote mechanization.
iii. Capacity building.
iv. Timely harvesting.

Strategic Pillar Three - Processing/Value Addition

STRATEGIC OBJECTIVE ONE:

To establish processing and value addition plants across the county.

STRATEGIC OBJECTIVE TWO

To implement up-to-date BSF processing techniques.

Strategic interventions:

i. Establish processing units and rearing centres.
ii. Promote mechanization.

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE:

To promote BSF as an alternative protein source in animal feed.

Strategic interventions:

i. Capacity build farmers and groups on insect farming
ii. Establish marketing channels

STRATEGIC OBJECTIVE TWO

To establish external market linkages in the county to meet current and projected demands by 2032.

Strategic intervention:

Establish a county marketing platform.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To lower the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Bulk purchase of input.
ii. Aggregation centres for the dry larvae.
iii. Mechanization, technology and innovations.

3.7.11 SOYBEANS VALUE CHAIN

Soybean (Glycine max) is a species of legume which is native to East Asia. It is widely grown for its edible bean which has numerous uses including feeding livestock as a source of protein. Soybean is moderately drought-tolerant requiring a minimum of 400 mm of well-distributed rainfall during the vegetative growth period which lasts 3-4 months. For good germination soil temperatures should be above 15°C and for growth about 20-25°C. Soybeans perform better under sand, clay loams and alluvial soil of good fertility at an altitude of 0-2,000 m above sea level.

Common varieties suited to Kajiado County include Gazelle, EAI 3600 and Nyala. However, no soybean is currently grown in the county. These varieties are drought resistant and do well in areas with moderate temperatures, presenting a huge potential in the county. The current production of soybean in Kenya is estimated to be 3,500 MT per year against a demand of 120,000 MT. The average production is about 0.8 MT per acre.

To bridge the gap, the country imports about 116,500 MT. In Kajiado County, the current demand for soybean is about 40,387 MT. This implies that the current demand is wholly met by importation from other counties and outside the country. The demand is projected to rise to 58,274 MT in 2027 and 69,882 MT in 2032. The seeds are the ones used as feed for livestock.

Challenges

The crop is currently not grown commercially in Kajiado County.

Opportunities

i. As human food: a source of protein, fatty acids, minerals and vitamins.
ii. Source of animal feed: soybean meal is a source of protein to livestock.
iii. Soil and water conservation: The plant allows water percolation while the roots fix nitrogen.

Emerging issues

i. In developed countries, soybeans provide 60% of crude protein given to livestock.
ii. About 85% of the world's soybean crop is processed into soybean meal and soybean oil. The remainder is either eaten whole or processed to other products.

Strategic issues

i. Lack of soybean production in Kajiado County
ii. Low quality of soybean meal in the Kajiado market
iii. Lack of processing and value addition of soybean
iv. High cost of soybean meal
v. Small profit margin for soybean meal
vi. Climate change effects
vii. Inadequate policy on animal feed

Strategic Pillar One - Production and Productivity

STRATEGIC OBJECTIVE ONE:

To increase soybean meal acreage from the current 47,632 acres to 69,693 acres by 2027 and 71,019 acres by 2032.

Strategic Interventions:

i. Sensitization of farmers.
ii. Incentivize communities.
iii. Promote mechanization.

STRATEGIC OBJECTIVE TWO

To increase soybean meal production from current 35,152 MT to 51,433 MT and 69,862 MT by 2027 and 2032, respectively.

Strategic interventions:

i. Sensitization of farmers
ii. Incentivize communities
iii. Use of underutilized land
iv. Promote mechanization
v. Promote climate smart agriculture

STRATEGIC OBJECTIVE THREE

To reduce pre- and post-harvest losses by 50% by 2032.

Strategic interventions:

i. Use of certified seeds
ii. Proper use of chemicals for weed control
iii. Timely harvesting using appropriate tools and equipment
iv. Proper means of transport to storage facilities
v. Storage of the product in structures that protect it from humidity, rodents, termites and variabilities of weather
vi. Adding value to the product to increase their shelf-life to bridge the feed deficit gap

Strategic Pillar Two - Quality

STRATEGIC OBJECTIVE:

To improve quality of soybean meal to meet the KEBS standards (CP level should be 43%).

Strategic interventions:

i. Support use of certified seeds.
ii. Promote use of modern farming technologies.
iii. Promote mechanization

Strategic Pillar Three - Processing/ Value Addition

STRATEGIC OBJECTIVE ONE:

To increase the soybean products from the current two (meal and cake) to three (meal, cake and hull) by the year 2032.

Strategic Interventions:

i. Promote processing of soybean meal.
ii. Support mechanization.

Strategic Pillar Four - Marketing

STRATEGIC OBJECTIVE ONE

To reduce the price of soybean meal by 50% by promoting bulk production.

Strategic intervention:

Reduction of cost of production by subsidizing input cost.

STRATEGIC OBJECTIVE TWO:

To facilitate external market linkages in the county to meet current and projected demands by 2032.

Strategic intervention:

Facilitate the establishment of a county marketing platform.

Strategic Pillar Five - Profitability

STRATEGIC OBJECTIVE ONE

To lower the cost of production across the value chain by 50% by 2032.

Strategic interventions:

i. Bulk purchase of inputs.
ii. Support aggregation of produce
iii. Mechanization, technology and innovations.

STRATEGIC OBJECTIVE TWO:

To increase income in the soybean VC by 50% by 2032.

Strategic interventions:

i. Value addition.
ii. Diversification of markets.

Strategic Pillar Six - Environment

a) Physical environment

STRATEGIC OBJECTIVE ONE:

To reduce losses due to the effects of climate change.

Strategic intervention:

i. Facilitate implementation of climate smart technologies.
ii. Enhance mitigation measures on the effects of climate change and mobilize resources from carbon finance mechanisms such as carbon credits.

b) Policy environment

STRATEGIC OBJECTIVE ONE:

To develop policy for all feed commodities.

Strategic intervention:

Develop or domesticate a need-based policy on all feed commodities and by-products.

Chapter

FOUR

Implementation

To promote quality production, the implementation of the Kajiado County Animal Feed Strategy is structured around strategic objectives in the following six components: coordination mechanism; implementation plan; financial plan; investment plan; communication plan; and, monitoring and evaluation.

The strategy will be put into operation upon approval by the County Executive Committee Member for Agriculture, Livestock, Irrigation & Fisheries (ALI&F). The department shall disseminate the approved document to organized actors who will directly benefit from the proposals and will implement some of the provisions of the animal feed strategy. A commitment from all these stakeholders will allow for the achievement of the set targets and for more resources to be mobilized.

4.1 Co-ordination mechanisms

County departments, directorates and agencies will play a leading role in the implementation of the Kajiado County Animal Feed Strategy. The Department of ALI&F will implement the feed strategy and associated strategic plans and action plans. The County Agricultural Sector Steering Committee (CASSCOM) will be responsible for co-ordination of all players involved, which are the public sector, private sector, NGOs and civil society organizations.

The Chief Officer responsible for livestock shall convene a county steering committee to approve decisions of technical committees for animal feed. The Chief Officer, in consultation with technical directorate, will form technical committees for the implementation of the strategy. To ensure effective coordination of this strategy, the Chief Officer responsible for livestock shall approve implementation programmes, project proposals and plans prepared by the technical directorates.

4.2 Implementation plan

Programs, projects and plans will be developed to implement strategic interventions. The strategy implementation will be aligned with the most recent Kajiado spatial plan for effective mapping of suitable areas for feed production. A summary outlining the objectives, activities output, indicators of performance and time-frame is shown in Table 20 below:

Table 20: Summary of implementation activities by pillar from Year 1 to 10

Strategic pillars	Strategic objective	Targets	Responsibility	Timeliness
Production/ Production	To increase animal feed availability to meet the projected 2027 demands	Increase production and acreage in 2027	Farmers, NG, CG	Year 1 to 10
Quality	To increase access to quality input	Develop and validate10 technologies to minimize mycotoxins and other feed contaminants	Regulators - (KEPHIS, KEBS, DVS) NG, CG	Year 1 to 10
Value Addition and Processing	Avail adequate raw material to increase processing volumes	Establish 12 feed business hubs (two per sub county)	NG, CG, development partners, NGOs, private sector	Year 1 to 10

Strategic pillars	Strategic objective	Targets	Responsibility	Timeliness
Marketing	Increase the number of marketing hubs from 4 to 180	Establish 180 marketing hubs	NG, CG, development partners, NGOs, private sector	Year 1 to 10
Profitability	To increase profitability by reducing post-harvest losses	Reduce feed post-harvest losses to 10% total production	NG, CG, development partners, NGOs, private sector	Year 1 to 10
Policy Environment	To lobby for favourable tax regimes that enhance access to quality and affordable raw materials for feed manufacture	• Review annual fiscal finance policies • Review policy environment on GMO and access to alternative feed resources	NG, CG, development partners, NGOs, private sector	Year 1 to 10

Source: Strategic planning team (2022)

4.3 Financial plan

To fully implement this Strategic Plan over the 10-year period, the Government of Kajiado County will require about Kshs 2.2 billion as shown in Table 21. The Chief Officer, livestock, shall prepare financial plans to mobilize resources for the animal feed strategy. The developed plans shall be used to apply for and secure the required financing and preparation of a medium-term expenditure framework for animal feeds.

Table 21: Breakdown of resource requirements by feed value chain

Value chain	Strategic pillars							Totals
	Production and Productivity	Quality	Processing and Value Addition	Marketing	Profitability	Physical Environ	Policy Environ	
Lucerne	509.0	7.6	100.1	5.7	1.2	2.1	1.9	627.6
Sorghum	200.0	2.3	153.8	-	8.7	2.1	1.9	368.8
Maize	19.7	49.7	20	19.7	59.7	2.1	1.9	172.8
Sunflower	125.6	78.8	39.4	39.4	19.7	2.1	1.9	306.9
BSFL	39.7	-	-	-	-	2.1	1.9	43.7
Pasture	19.7	19.7	77.6	39.4	19.7	2.1	1.9	180.1
Cotton	55.0	7.9	11.3	24.0	6.7	2.1	1.9	108.9
Cassava	37.0	5.5	-	-	-	2.1	1.9	46.5
Sweet Potato Vines	280.0	31.8	12.3	29.2	17.4	2.1	1.9	374.7
Totals	**1,285.7**	**203.3**	**414.5**	**157.4**	**133.1**	**18.9**	**17.1**	**2,230**

4.4 Investments plans

Investment plans shall be periodically generated to demonstrate the value of the strategy in terms of volumes or quantities of products for animal feed. The feed commodity cost-benefit analysis and value proposition to investors is presented in Table 22.

Table 22: Feed commodity cost-benefit analysis and value proposition to investors

Value chains	Input Analysis			Output Analysis	
	Acres	Metric Tonnes	Total cost (Kshs)	Net Margin per Annum (Kshs)	Jobs creation
Pasture (Hay)	541,428		27,057,599,269	5,411,519,854	1,933
Maize	370,673	834,014	18,255,852,969	3,651,170,594	1,304
Sorghum	43,466	43,466	2,436,885,080	487,377,016	174
Cassava	2,381	2,381	165,073,489	16,507,349	6
Sunflower	660,289	554,643	34,842,469,522	10,452,740,857	3,733
Cotton	54,712	76,597	6,157,152,106	1,847,145,632	660
Lucerne	11,672	93,375	1,194,762,393	358,428,718	128
Cowpeas	13,042	91,296	545,775,537	163,732,661	58
Sweet potato vines	4,062	64,990	545,775,537	58,963,030	21
BSF	593	7,115	1,157,309,981	1,157,309,981	413
Totals	1,702,318	1,767,877	92,358,655,883	23,604,895,692	8,430

4.5 Communication plan

The communication plan will be developed to ensure flow of information among all the stakeholders. The communication will follow the existing channels in the department where the CEC and CO are the main decision makers in consultation with the technical directorates and the implementing technical officers.

4.6 Monitoring and evaluation

Upon the official adoption of this strategy a monitoring and evaluation framework that includes targets and outlining the review process, will be developed. Efforts shall be dedicated to follow the National Integrated Monitoring and Evaluation System (NIMES) and the County Integrated Monitoring and Evaluation System (CIMES) guidelines, tools and principles.

NIMES is a governance instrument under the Results Based Management system, designed to show transparency in the execution of policies and programmes by government, civil society, private sector and development partners. It is a tracking, reporting and evaluation system for all development output, outcomes, as well as resource utilization.

REFERENCES

1. Agriculture Sector Development Strategy (ASDS), 2010-2020
2. Agriculture Sector Transformation and Growth Strategy (ASTGS), 2019-2029
3. Bottom-Up Economic Transformation Agenda (BETA), 2022-2027.
4. Constitution of Kenya (COK), 2010
5. County Climate Change Action Plan,2022-2027
6. County Emergency Unit Estimates, 2023
7. Kajiado County Integrated Development Plan (CIDP), 2018-2022
8. Department of Agriculture, Livestock and Fisheries Strategic Plan, 2020-2025
9. Green Economy Strategy and Implementation Plan, 2016-2030
10. Kajiado County Spatial Plan,2019-2029
11. Kenya National Bureau of Statistics (KNBS), 2019.
12. Kenya Population and Housing Census, 2019
13. Kenya National Bureau of Statistics (KNBS), Economic Survey, 2021-2022
14. Medium Term Plan III, 2018-2023, of Kenya Vision 2030
15. Ministry of Agriculture, Livestock and Fisheries Strategic Plan,2018-2022
16. Short Rains Assessment Report, 2023.
17. National Drought Management Authority (ADMA), February 2023