REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE
AND LIVESTOCK DEVELOPMENT

County Government
of Taita Taveta

# TAITA TAVETA COUNTY ANIMAL FEED STRATEGY

## 2022 - 2032


**County Government of Taita Taveta**
Department of Agriculture, Livestock, Fisheries & Irrigation


**Physical Address**
Agriculture Offices, Wundanyi – Werugha Road,
opposite the County Assembly of Taita Taveta
P.O. Box 1035 - 80304, Wundayi

**Email** : agriculturetaitataveta@gmail.com
**Website** : https://taitataveta.go.ke


**Overall Design & Layout**
Clare Muthui

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# FOREWORD

The Taita Taveta County Animal Feed Strategy is a 10-year plan developed to provide a means for addressing livestock feed and nutrition for sustainable and increased productivity in the livestock sub-sector in the area. The strategy is aligned with the Constitution of Kenya, 2010, and its content is guided by national and global livestock legislation and strategies that include,Sustainable Development Goals (SDGs); Kenya's Vision 2030; Kenya Agricultural and Livestock Research Act 2013; Range Management and Pastoralism Strategy 2021-2031; and, National Livestock Policy 2013.

Strengthening of technological, institutional and policy dimensions are key to addressing the feed challenges experienced in the county. Specific livestock and animal feed regulations and strategies that provide references for enriching the content include, Taita Taveta County Movement and Protection of Livestock and Livestock Produce Act 2020; Taita Taveta County Agricultural Livestock and Fisheries Sector Strategy 2017-2022; Taita Taveta Ranching and Grazing Management Policy 2019; County Integrated Development Plan III 2023-2027; and, County Annual Development Plans.

Challenges in availability of livestock feed in the county necessitates the need to develop the feed strategy with a view to ensuring availability of quality and affordable feed all year round. Recent studies suggest that the county suffers large deficits of livestock feed, yet the demand is increasing. The demand is expected to increase further due to emerging needs by neighbouring counties. To increase yields and meet the demand for animal products, the targeted strategic feed interventions will be implemented to scale to meet the livestock requirements in the county and supply the surplus to neighbouring counties.

The process of developing the strategy was through consultations with mainstream stakeholders, intensive review of relevant documents and input from experts in the livestock industry. The strategy aims at stimulating increased feed production and ensuring quality animal feed availability in the market. It also seeks to reduce feed production costs and build capacity of private and public sector feed investors to develop the animal feed industry.

**Erickson Johnson Kyongo**
County Executive Committee Member (CEC-M)
Agriculture, Livestock, Fisheries, and Irrigation

# PREFACE

The animal feed strategy is informed by the livestock feed balance analysis and inventory derived from the national feed inventory and feed balance assessment study of 2019. The study underscored the livestock feed deficit in the county, which was 23% but rose to about 60% in 2022. It also provided the framework to address the deficit through development of livestock feed value chains. The strategy is based on validated county data, which include human population trends, per capita consumption of animal source food, livestock population and county feed resources. It is also based on the animal feed requirements for each type of feed resource in terms of dietary requirements for each category of animals.

The county's expansive rangelands provide an underutilized resource with high potential for livestock feed resource development for dairy, beef, and small ruminants. The potential has not been fully exploited because of several challenges that include competition from wildlife, low quality of animal feed, weak animal feed policy environment, regulatory framework as well as inadequate data and information flows among the county animal feed actors. The feed strategy aims at ensuring rangeland resources are managed sustainably and guides decisions in land use planning and investments to safeguard sustainable development of resource exploitation and management. It also seeks to stimulate increased production of other feed types and ensuring quality animal feed availability in the market. In addition, it targets to reduce feed production costs and build capacity of private and public sector feed investors to develop the animal feed industry.

The strategy presents a roadmap for the County Department of Livestock and Fisheries to develop a competitive feed industry to drive vibrant commercially oriented livestock production enterprises in the area and create jobs. Implementation of the strategy shall be achieved through a proper co-ordination mechanism guided by clear financial and investment plans. The county government recognizes the need for collaboration and partnerships with private and public sector actors in the livestock feed value chain. The success of this strategy will be measured through improved livestock production, better utilization of rangeland resources while promoting environmental resilience and social inclusion. Success will also be assessed through provision of safe animal source foods for domestic, regional and international markets.

**Mcharo Stephen Mwalugha**

County Chief Officer, Agriculture, Livestock, Fisheries, and Irrigation

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Gratitude is also extended to the County Executive Committee Member (CECM) and the County Chief Officer in charge of Agriculture Livestock Fisheries & Irrigation for the their overall guidance of the process and the strategic policy.

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**County Director of Livestock Production**

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# Acronyms & Abbreviations

**AI**
Artificial Insemination

**ALF&I**
Agriculture, Livestock, Fisheries and Irrigation

**AMS**
Agricultural Mechanization Service

**ASALs**
Arid and Semi-Arid Lands

**ASDSP**
Agricultural Sector Development Support Programme

**BMU**
Beach Management Unit

**BSF**
Black Soldier Fly

**BSFL**
Black Soldier Fly Larvae

**CASCOM**
County Agricultural Co-ordination Committee

**CCO**
County Chief Officer

**CECM**
County Executive Committee Member

**CGTT**
County Government of Taita Taveta

**CIDP**
County Integrated Development Plan

**CP**
Crude Protein

**CSG**
County Steering Group

**DAC**
Directed Agricultural Company

**DM**
Dry Matter

**DVS**
Director of Veterinary Services

**FAO**
Food and Agriculture Organization of the United Nations

**GAPS**
Good Agricultural Practices

**GDP**
Gross Domestic Product

**HHEA**
Hand in Hand Eastern Africa

**IC**
Indigenous Chicken

**ICRISAT**
International Crops Research Institute for the Semi-Arid Tropics

**ICT**
Information Communication Technology

**IGAD**
Inter-Governmental Authority on Development

**ILRI**
International Livestock Research Institute

**KALRO**
Kenya Agricultural and Livestock Research Organization

**KAVES**
Kenya Agriculture Value Chain Enterprises

**KCSAP**
Kenya Climate Smart Project

**KEBS**
Kenya Bureau of Standards

**KEFRI**
Kenya Forestry Research Institute

**KEPHIS**
Kenya Plant Health Inspectorate Service

**KES**
Kenya Shilling

**KFSSG**
Kenya Food Security Steering Group

**KMC**
Kenya Meat Commission

**KMFRI**
Kenya Marine Fisheries Research Institute

**KMT**
Kenya Market Trust

**KNBS**
Kenya National Bureau of Statistics

**KPHC**
Kenya Population and Housing Census

**LEPZ**
Livestock Export Processing Zone

**M & E**
Monitoring and Evaluation

**MDAs**
Ministries, Departments and Agencies

**ME**
Metabolizable Energy

**MIS**
Management Information System

**MJ**
Megajoules

**MOALF&I**
Ministry of Agriculture, Livestock, Fisheries, and Irrigation

**MSMEs**
Micro, Small and Medium Enterprises

**MT**
Metric Tonne

**NDMA**
National Drought Management Authority

**NEMA**
National Environment Management Authority

**NG-CDF**
National Government Constituency Development Fund

**NGO**
Non-Governmental Organization

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

**PPP**
Public-Private Partnership

**SDG**
Sustainable Development Goals

**SNV**
SNV Netherlands Development Organization

**SWOT**
Strengths, Weaknesses, Opportunities and Threats

**TIMPs**
Technologies, Innovations and Management Practices

**TLU**
Tropical Livestock Units

**TTWCA**
Taita Taveta Wildlife Conservancy Association

**UN-SDGs**
United Nations Sustainable Development Goals

**USAID**
United States Agency for International Development

**USD**
United States Dollar

**VCA**
Value Chain Actors

**VTC**
Vocational Training Centre

**WHO**
World Health Organization

**WRUA**
Water Resources Users Association

**WUA**
Water Use Authority

# EXECUTIVE SUMMARY

Livestock production is a major economic activity in Taita Taveta County, and accounts for over 40% of all agricultural earnings in the area. The main livestock species reared in the area include cattle, goats, sheep, camels, donkeys and poultry. Other species include pigs, rabbits, bees, capture fish and aquaculture. The agro-pastoral zones cover about 80% of the land and provide potential for beef cattle farming in 33 ranches and conservancies. The county hosts wildlife animals that feed on the same natural resource base as livestock.

The potential for livestock production has not been fully exploited due to feed inadequacy, among other challenges. The animal feed include roughages, concentrates, minerals, and vitamins. The greatest proportion of feed for ruminants is roughages that include natural pastures and browse. Climate change has adversely affected pasture and fodder production in cultivated and natural vegetation systems.

In intensive livestock production, a large proportion of concentrate feed is used, which makes up to 100% of feed for commercial production of non-ruminants, especially, pigs and poultry. But these concentrate feed are in short supply. According to the feed inventory and feed balance assessment for the ASAL Counties in 2019, Taita Taveta County had a feed deficit of 23% based on livestock dry matter (DM) requirements. This deficit, which has been exacerbated further by prolonged drought, stood at about 60% by 2022.

The demand for animal source foods is on the rise due to increasing human population and the expanding middle class, who can afford to purchase animal source food. The county is also producing feed to meet demand for animals on transit during export to the Middle East. This demand is expected to rise as the designation of the Livestock Export Processing Zone (LEPZ) at Bachuma station offers opportunities to promote livestock productivity to increase supply of animal source foods for the export market.

To spur growth of the feed industry to meet demand for livestock feeds, a 10-year Taita Taveta County Animal Feed Strategy has been developed. The strategy is expected to enhance delivery of a sustainable and competitive feed industry in the county by 2032. The strategy aims to bridge the feed gap, enhance livestock numbers and livestock products in the county by addressing challenges in the feed industry.

It is anchored on the national livestock policy with a focus to strengthen animal feed resource utilization in line with the provisions of the Constitution of Kenya and other related policies as well as acts that govern natural resources in the country.

The animal feed strategy was developed based on validated county data, which include human population trends, per capita consumption of animal source food, livestock population and county feed resources. It outlines the animal feed requirements for each type of feed resource in terms of dietary requirements for each category of animals. It is anchored on seven key strategic pillars namely:

a. Feed production and productivity;
b. Feed quality;
c. Feed processing/value addition;
d. Marketing of feed and feed products;
e. Profitability in feed business;
f. Sustainable physical environment; and,
g. Enabling policy environment.

The pillars guide the development of the prioritized feed resource value chains in terms of feed strategic issues to be addressed, objectives, and interventions. These feed resources are:

a. Hay;
b. Maize;
c. Forage grasses (Napier, Sugargraze and Brachiaria);
d. Sorghum;
e. Legume fodder (Desmodium, cowpeas, Dolichos, Mucuna and Crotolaria);
f. Sweet potato vines;
g. Groundnuts;
h. Black Soldier Fly Larvae; and,
i. Rangeland/natural pastures.

The strategy aims at stimulating increased feed production and ensuring availability of quality animal feed in the market. It also seeks to reduce feed production costs and build capacity of private and public sector feed investors to develop the animal feed industry. The strategy further aims at ensuring rangeland resources are managed sustainably and guide decisions in land use planning and investments to ensure sustainable development with a clear roadmap of resource exploitation and management.

The feed industry strategic direction will be guided by Taita Taveta County vision and mission.

**Vision:**

A prosperous animal feed industry for sustainable livestock productivity and enhanced livelihoods.

**Mission:**

To enhance livestock and fish productivity through promotion of a sustainable and vibrant feed industry contributing to better quality of life.

The **strategic objectives** are:

i. To improve production and productivity of feed value chains
ii. To enhance animal feed quality
iii. To promote processing/value addition of animal feed
iv. To support marketing of feed to increase profitability
v. To conserve physical environment for sustainable production and climate change mitigation
vi. To support establishment of an enabling policy environment to support feed production

The strategy identifies sources of funding for its implementation, which include the government, development partners, and the private sector. Appropriate mechanisms for access, disbursement, and utilization of the investment resources will be established. Successful implementation of the strategy will cost approximately KES 3.6 billion over a period of 10 years. The strategy provides a detailed implementation framework with clear stakeholder roles and responsibilities and a monitoring and evaluation framework at all levels of implementation.

The County Department of Agriculture, Livestock, Fisheries, and Irrigation will lead the implementation of the strategy in collaboration with other relevant county departments and stakeholders. The department will also ensure that policies, legislations, and institutional frameworks are in place to support growth of the feed industry. The strategy will be reviewed after five years and at the end of the 10 years implementation period.

# Chapter ONE

## INTRODUCTION

### 1.1 BACKGROUND INFORMATION

The United Nations Sustainable Development Goals (SDGs) agenda aims at transforming the world by the year 2030. Within the continent, the Africa Union has put in place 2063 Agenda that focuses on sustainable development initiatives, with particular attention to agricultural production, value addition and trade. For sustainable growth and development of the livestock sub-sector in Kenya, supply of adequate quality animal feed can play a major role in the food industry in the production of animal source foods such as milk, meat, eggs, honey, and fish.

Animal feed consist of roughages, concentrates, minerals, and vitamins. The greatest proportion of feed for ruminants is roughages that include natural pastures and browses. In intensive livestock production concentrates constitute a key feed source, which could be up to 100% for non-ruminant livestock such as pigs and poultry.

The inadequacy of feed in quantity and quality has been a major technical constraint for enhanced livestock productivity in various production systems in the county. Rainfall has been characterized by erratic patterns leading to poor distribution and prolonged periods of drought. This has impacted negatively on availability and adequacy of feed throughout the year. In pastoral and agro-pastoral systems, grazing on traditional communal grazing areas is the primary sources of feed, complemented by feeding crop residues where accessible.

The use of concentrate feed is generally limited by their availability and affordability. National and international research institutions have developed many feed production and utilization technologies but their adoption by small-holder producers is low. Examples of these technologies include, high-yielding grasses and legume forages, dual-purpose crops and balanced rations based on agro-industrial by-products.

Feed availability varies in two main dimensions; temporal/seasonal and spatial. These variations can be addressed through several approaches including, enhanced production during wet seasons, feed conservation, storage (for example, strategic reserves), feed trading and marketing. However, availability of feed will increasingly face the challenge of the effects of climate change, but these can be mitigated by establishing forage species that are adaptable to low precipitation and have short growth cycles. For the agro-pastoral and pastoral areas, mitigation will mainly be through sustainable range management and proper grazing management practices.

## 1.2 COUNTY PROFILE

Taita Taveta County is one of the six counties in the Coastal region of Kenya. It is located approximately 200 km northwest of the coastal city of Mombasa and 360 km southeast of Nairobi, the capital city of Kenya. Taita Taveta borders Tana River, Kitui and Makueni counties to the north, Kwale and Kilifi counties to the east, Kajiado County to the north-west, and the Republic of Tanzania to the south and south-west.

The county lies between latitude 2° 46' South and 4° 10' South and longitude 37° 36' East and 39° 14' East. The county covers an area of about 17,084.1 $km^2$ with 10,649.9 $km^2$ (62.3%) being within Tsavo East and Tsavo West national parks, which provide a major tourism destination. Water bodies within the county occupy 106 $km^2$ comprising Jipe and Chala lakes in Taveta Sub-County. The rest of the area is spread within public and private land such as communal and private ranches. Sisal estates and hilltop forests occupy about 100 $km^2$ (Taita Taveta Fact Sheets, 2019).

Taita Taveta County is divided into three major topographical zones, namely:

a. **Upper zone**, which comprises Taita, Mwambirwa, Kasigau and Sagalla hills region, and is suitable for horticultural and dairy farming,
b. **Lower zone**, which includes plains where the national parks, mines and ranches are found, and these zones are suitable for dry-land farming and livestock keeping, and
c. **Volcanic foothills zone**, which covers the Taveta region with underground water and

springs sourcing water from Mt Kilimanjaro, and this zone is suitable for irrigated agriculture, especially, fruits and horticulture.

The Taita Hills, which covers an approximate area of 1,000 km$^2$, rises to a maximum elevation of 2,208 metres above sea level at the Vuria Peak. In the lowlands and transitional zone lies the vast rangeland where the Tsavo national parks (Tsavo East and Tsavo West) are located. This forms the Tsavo ecosystem which comprises distinct elements including rivers, springs, plains, flora, and fauna. The rangeland that is not part of the parks supports livestock and wildlife species.

The lower regions of the county receive an average of 440 mm of rain per annum whereas the highlands receive up to 1,900 mm. Arable land in the county constitutes only 12% while national parks constitute about 62% of the land, and ranches/conservancies constitute 26%. Rain-fed agriculture is the dominant activity practiced by most households as a subsistence or economic undertaking (CIDP II- 2017-2022).

According to the 2019 Kenya Population and Housing Census (KPHC), the population of Taita Taveta County was 340,671 with females being 167,327, males 173,337 and intersex seven. The population density per square kilometre in the county ranges from three people, in rural areas, to more than 800 people in urban areas (KNBS, 2019).

## 1.3 LIVESTOCK ENTERPRISES AND THE PROJECTED GROWTH

Livestock production is a major economic activity in Taita Taveta County, and accounts for over 40% of all agricultural earnings in the area. The main livestock species reared include cattle, goats, sheep, camels, donkeys and poultry. The ruminant species of livestock are the heaviest feeders of all, with the highest feed resource requirements being roughages obtained from forage materials. Other livestock species kept include pigs, rabbits, and fish as well as emerging species such as ostrich and guinea fowls (Table 1).

The potential for livestock production in Taita Taveta County is high due to expansive rangelands covering 24% or approximately 4,100 km$^2$ of county land with diverse vegetation suitable for commercial ranching and dry land agriculture. Ranching is a major production system for beef cattle rearing. The county has 28 branches and five conservancies, and the average size of the ranches is 12,762.5 hectares (ha). The government is in the process of setting up Bachuma Livestock Export Processing Zone that is strategically identified to take advantage of the expansive rangelands and its proximity to the Port of Mombasa. This

facility will develop livestock enterprises to supply national and international markets with animal source foods.

Red meat production is mainly from ruminant livestock reared in the ranches under extensive farming system while dairy cattle are reared in the hilly areas of the county under small-holder farming systems. Approximately 2,000 beef cattle are exported to the international markets, 13,000 beef cattle sold to Nairobi and Mombasa markets and 5,000 beef cattle and 13,000 sheep and goats are consumed within the county every year. This contributes significantly to the livestock feed demand within the area.

The estimated county livestock population for 2022 is shown in Table 1. The dairy cows are projected to increase by 14% by 2032. Beef cattle are projected to grow by 63%, sheep and goats by over 300% and chickens by about 400% by 2032. Among the chickens, the indigenous chicken is highest in population and therefore most popular for provision of meat and eggs. Pigs and rabbits are currently few, but they are projected to grow by 24% 2032. Donkeys are mainly kept for traction and camels are brought in from other counties in search of pastures.

## 1.4 FISHERIES AND BLUE ECONOMY

The main fisheries activities in the county are aquaculture and capture fisheries. Aquaculture is done in the farms while capture fishery is done in Jipe and Chala lakes. The sector currently supports about 1,000 people directly and 25,000 people indirectly. On average,775 metric tonnes of fish valued at KES 155,000,000 are produced annually. This contribution may be higher if the value addition at the various stages of the fish value chain is considered, and post-harvest losses minimized.

Fish farming is mainly undertaken in Taveta and Wundanyi. The number of fish farmers are 600, with about 792 fish ponds that occupy - 189,000 $m^2$. The main species of fish being cultured/farmed include Tilapia and Catfish. Aquaculture production is presently approximated at 175 MT annually valued at KES 35,000,000. If fully developed, aquaculture has a potential to contribute immensely to food security and reduce poverty in the rural areas. Capture fisheries has an annual fish production of 600 MT valued at KES 120,000,000.

*Table 1: County Livestock Statistics 2022 and Projected Growth up to 2032*

| YEAR | | 2022 | Projections | | | |
|---|---|---|---|---|---|---|
| | | | 2025 | 2027 | 2030 | 2032 |
| Dairy | | 32,587 | 33,874 | 34,761 | 36,134 | 37,080 |
| Beef | | 149,905 | 173,534 | 191,321 | 221,478 | 244,179 |
| Sheep | | 63,994 | 89,907 | 112,779 | 158,447 | 198,756 |
| Meat goat | | 346,358 | 499,759 | 638,142 | 920,773 | 1,175,736 |
| Dairy goat | | 6,070 | 6,479 | 6,768 | 7,224 | 7,546 |
| Pigs | | 2,259 | 2,767 | 3,168 | 3,881 | 4,443 |
| Rabbits | | 14,870 | 18,114 | 20,661 | 25,169 | 28,709 |
| Chickens | Broilers | 45,207 | 68,754 | 90,927 | 138,289 | 182,888 |
| | Layers | 94,643 | 143,940 | 190,361 | 289,515 | 382,884 |
| | Indigenous chickens | 647,080 | 984,128 | 1,301,509 | 1,979,433 | 2,617,799 |
| Donkeys | | 3,704 | 3,885 | 4,010 | 4,206 | 4,341 |
| Camels | | 1,319 | 1,383 | 1,428 | 1,498 | 1,546 |

*Source; 2022 Validated Livestock Statistics for Taita Taveta County*

## 1.5 EMERGING LIVESTOCK

The other potential area that has not been fully exploited is the emerging livestock, which include ostrich, guinea pig and guinea fowl farming. To fully exploit these livestock to supply animal source food, there is need to develop regulations/guidelines and their standard feed requirements.

## 1.6 COUNTY LIVESTOCK FEED SOURCES

The bulk of the animal feed in the county are roughages from natural pastures and forages although their availability is irregular. Other roughages are from residues of crops grown in the area. These roughages are of low quality, and are rarely conserved for use in periods of feed scarcity. Other feed resources are concentrates and minerals. The supply of water is also key to livestock production, but its availability does not meet livestock requirements. The status of these feed resources and water supply in the county is discussed below.

**a) Roughages (DM and CP)**

The common forages and pastures in Taita Taveta County include natural grass, Napier grass (*Pennisetum purpureum*), Rhodes grass - Boma (*Chloris gayana*) and Brachiaria (now known as *Urochloa*) spp. Natural grasslands are mainly found in the lowlands and the species composition changes according to conditions.

The most dominant native grass species in the natural pastures are red oat grass (*Themeda triandra*); Buffel grass/African foxtail grass (*Cenchrus ciliaris*); Maasai love grass (*Eragrostis superba*); Guinea grass (*Panicum maximum*); Horsetail grass (*Chloris roxburghiana*); Cynodon spp; and, Digitaria spp. Some of the naturally growing legumes are Desmodium spp and Leucaena leucocephala as well as the Acacia spp. In some of the ranches in the lowlands, Lucerne and fodder sorghum are grown under irrigation.

Rangeland grasses such as African fox tail grass are common in several farms and ranches in the county, and they are used for hay production. They are drought-tolerant and have high biomass production. In 2018, the area under forages in the county was estimated to be 36,650 ha, comprising 21,762 ha of natural grass and 14,888 ha of cultivated forages (KAVES Report, 2018).

Napier grass varieties namely; Bana, Kakamega I and Kakamega II are the most popular grasses used in the small-holder farming systems in Taita Hills. The Brachiaria varieties Xareas, Piata, Basilisk, MG4 and the hybrid Mulato II have lately been introduced but the total area covered by these grasses is small. The Desmodium spp and Dolichos (*Lablab purpureus*) legumes are used to supply protein-rich forage to livestock. Production of these forages is largely rain-fed and is undertaken by individual farmers and women groups.

Dairy farmers are increasingly adopting improved grasses and legumes for feeding dairy cows. Napier grass, under the prevailing management practices, can offer approximately 6 MJ ME/kg of DM and has CP content of 6%. Nonetheless, due to lack of skills, farmers feed cows on overgrown Napier grass, which does not provide adequate nutrients needed for high milk and beef production. Low-quality grass hay (mainly of Rhodes/Panicum grasses), has an average nutrient content of 5-6 MJ ME/kg DM and 4% CP. These forages have high fibre content and low digestibility, which limits feed intake and, therefore, they do not meet the nutrients requirements of cattle especially the exotic dairy breeds.

**b) Concentrates, minerals, and vitamins.**

The county has no concentrate feed manufacturers but there are small cottage industries that produce homemade rations. Stockists source most of the concentrate feed from major

manufacturers outside the county. Also, some feed ingredients such as sunflower and cottonseed cake, are imported from Tanzania. There ingredients are used in homemade rations mainly for feeding chickens. The main challenges in the use of concentrate feed include, affordability; lack of standardization of homemade rations; poor quality ingredients for ration formulation and inadequate knowledge; skills; tools; and, equipment for concentrate making.

Concentrate feed are formulated from cereal grains such as maize, millet, wheat, barley, and oil crop meals/cakes, for example, cottonseed meal, soybean meal, groundnuts meal, flaxseed cake, canola cake, and sunflower cake. Crops producing concentrate feed are mainly grown to generate human food, and their residues are fed to livestock. However, efforts are being made to promote the crops to produce feed ingredients for livestock feeds. The main trace elements essential for cattle include copper, zinc, manganese, cobalt, iodine, iron, and selenium. Most of these are sourced from outside the county.

**c) Fish Feed**

Aquaculture is growing through promotion of cage farming and rehabilitation/establishment of fish ponds in the county. This is expected to result in increased demand for fish, which would create an opportunity for commercial production, distribution, and sale of fish feed. For this to be achieved, the following challenges need to be addressed:

- Limited availability and high cost of fish feed ingredients
- Poor quality feed that do not meet fish feed standards
- Inadequate knowledge and skills in best aquaculture practices and fish feed formulation
- Low adoption of alternative feed sources such as the Black Soldier Fly

**d) Water**

The available water sources for livestock in Taita Taveta County include boreholes, farm ponds, water pans, earth dams, springs, piped water, shallow wells, lakes, rivers, and canals. Availability of water for livestock in the rangelands is limited mainly during drought periods and due to competition with wildlife from the national parks. Encroachment of water catchment areas and general environmental degradation have led to drying up of various water sources. Soil erosion caused by surface runoff leads to over-siltation of dams, water pans and ponds reducing their water holding capacities leading to reduction of water availability for livestock.

## 1.7 JUSTIFICATION OF THE ANIMAL FEED STRATEGY

According to the National Feed Inventory and Feed Balance Assessment, 2019, Taita Taveta County had a negative feed balance of 23% on dry matter basis. This deficit has been further worsened by prolonged drought and stood at about 60% by 2022. Other factors that have aggravated the deficit include poor grazing management that causes significant loss of feed due to trampling, poor on-farm feeding practices, effects of pests and diseases as well as encroachment of invasive vegetative species.

In addition, there is minimal effort on conservation and preservation of forages in the county, which leads to shortage of feed during dry seasons. The feed deficit will be aggravated further by increase in livestock numbers to meet the rising demand for animal source foods due to increasing human population and expanding the middle class, with high purchasing power. Export of live animals to the Middle East will also demand feed for animals in transit.

Attaining a sustainable and adequate feed supply to meet the demand of an increasing livestock population to produce animal source food for the county and for export requires a comprehensive animal feed strategy. This strategy should address all aspects of feed industry including, production, processing and value addition, trading and marketing, and enabling policy environment. The development of the strategy should consider the available resources in the county and identify strategic interventions to plug the feed deficits in the short, medium, and long terms.

# Chapter TWO

# SITUATION ANALYSIS

## 2.1 OVERVIEW

The main systems of livestock production practiced are pastoralism and agro-pastoralism in the vast rangeland areas of the county. In the hilly areas of Taita Ngolia (Wongonyi), Mwatate (Chawia, Rong'e, Ngerenyi, Wusi and Sagalla) where dairy production is largely practiced cut-and-carry system is employed. Significant loss of forage materials occurs in the fields during grazing and feeding on-farm under the above-mentioned systems of production.

Concentrates, minerals, and vitamins used in livestock and fish feeds are outsourced. Poor-quality feed resources that do not meet feed standards affect livestock productivity and can be hazardous to both animals and humans.

The county water sources include springs, rock catchment, dams, lakes, rivers, boreholes, and shallow wells. The current water available for both human and livestock use is 15,000 cubic metres against a demand of 26,000 cubic metres per day (CIDP III). More interventions should be made to fill this gap.

## 2.2 FEED BALANCE ANALYSIS AND INVENTORY

An animal feed inventory and balance analysis were carried out in 2019 with support of the National government (National Feed Inventory and Feed Balance Assessment, 2019). The inventory formed the basis of understanding the overall feed gap in the county, which was -23%, -42.9% and -50.6% based on DM, CP and ME, respectively (Table 2). The total potential feed availability in 2019 in terms of DM, CP and ME was 597, 293 MT, 63,770 MT and 4, 535.5 (x100 MJ), respectively. Actual feed availability and use as DM, CP and ME was lower than potential feed availability by 54.0%, 56.1%, and 53.9%, respectively. This, therefore, means there is an opportunity for bridging the feed gap to enhance feed availability.

*Table 2: County Feed Balance Analysis for 2019*

| | Dry Matter (MT) | Crude Protein (MT) | Metabolizable Energy (MJ) |
|---|---|---|---|
| Potential feed availability | 597,293 | 63,770 | 4,535,495,932.8 |
| Actual feed availability | 255,388 | 19,416 | 1,997,473,658.9 |
| Livestock requirement | 331,609 | 33,981 | 4,042,424.227.2 |
| Feed balance based on potential feed availability | 80.1% | 87.7% | 12.2% |
| Feed balance based on actual feed availability | -23.0% | -42.9% | -50.6% |

*Source: National Feed Inventory and Balance Analysis, 2019*

The data collected during the feed inventory and feed balance analysis was used as the baseline data from, which projections for 2022, 2027 and 2032 were made.

## 2.3 ANIMAL FEED REQUIREMENTS IN THE COUNTY

The county's human population in 2022 was 360,000 and is projected to grow to 385,600 and 407,280 by 2027 and 2032, respectively (Table 3). This growth in population increases the demand for animal products. To meet this demand, the county's livestock herd should be

fed with quality, safe, and affordable feed resources to produce quality, safe, and affordable animal food products such as milk, meat, and eggs. Table 3 below shows the animal feed requirement and supply based on the annual per capita consumption.

*Table 3: Demand and Supply of Livestock Products in the County*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Year | Human population[1] | | |
| | | | | 2022 | 360,000 | | |
| | | | | 2027 | 385,600 | | |
| | | | | 2032 | 407,280 | | |
| **Current and projected per capita consumption of animal food products** | | | | | | | |
| | **Milk (Lts)** | **Meats (Kg)** | | | | | **Eggs** |
| Per capita consumption (WHO) | 220 | Beef | Mutton | Chevon | Chicken | Pork | |
| | | 9 | 2.4 | 2 | 12 | 0.8 | 180 |
| **Demand for animal products ('000s)** | | | | | | | |
| Required 2022 | 79.2 | 9.4 | | | | | 64.8 |
| Required 2027 | 84.8 | 10.1 | | | | | 69.4 |
| Required 2032 | 89.6 | 10.6 | | | | | 73.3 |
| **Supply of animal products ('000s)** | | | | | | | |
| Produced 2022 | 21.5 | 0.99 | | | | | 61.3 |
| Produced 2027 | 43.1 | 14.5 | | | | | 115.7 |
| Produced 2032 | 86.4 | 16.5 | | | | | 122.2 |

[1] *Source: KNBS census, 2019*

## 2.4 ANIMAL FEED RESOURCES

### i. On-farm feed resources

On-farm feed resources in Taita Taveta County include grasses, legumes, crop residues, cereals and oilseed by-products, vitamins, and minerals. These feed resources, in particular, pasture and crop residues, do often fluctuate seasonally both in terms of quantity and quality. Opportunities for improving availability of feed include on-farm production, pasture improvement, utilization of fodder and crop residues, formulation of feed rations, efficient storage, appropriate water harvesting technologies and development of fodder markets.

To address the feed gap described in Section 2.2 and increase livestock productivity, the strategy has prioritised key animal feed resources for promotion namely:

i. Hay,
ii. Maize grain,
iii. Forage grasses and crops (Napier grass, Sugargraze, Brachiaria, and maize fodder),
iv. Whole sorghum grain,
v. Sunflower cake,
vi. Fodder legumes (Cowpeas),
vii. Sweet potato vines,
viii. Groundnuts,
ix. Black Soldier Fly Larvae

The resources were prioritized based on their adaptability to the local conditions and potential to increase their yield. Table 4 below shows the current production estimates for the value chains and their projected growth over the next 10 years.

### ii. Field-Based Feed Resources (Natural, or Uncultivated Pastures)

Field-based feed (natural, or uncultivated pastures) provides upto 95% of animal feed in the county. It is projected to provide up to 85% by 2032 (Table 4). This is significant animal feed resource in the county which is composed of a herbaceous layer dominated by annual plants (more than 80%), and a scattered population of shrubs and low density of trees. These are naturally occurring plants generally found on uncultivated land including both the palatable and non-palatable species, which animals have access to for grazing.

These natural pastures are found in grazing lands, which are often communally owned. The predominant species are grasses with little legumes. Species composition in natural pasture

differs along the agro-ecological gradient. Naturally occurring green fodder materials such as weeds from cropping areas, roadsides and grasses, serve as sources of feed particularly at the onset of rains.

Natural pasture in the county rangelands is characterized by seasonal, inter-, and intra-annual, and spatial variations. This is a key limiting factor to its productivity which is associated with both the temporal and spatial distribution of the precipitations. There is abundance of good quality pastures during the rainy season and scarcity and poor quality pastures during the dry season.

*Table 4: Current Animal Feed Resources and Projected Demand*

| Feed resources | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT (DM) | Acreage (Acres) | MT (DM) | Acreage (Acres) | MT (DM) | Acreage (Acres) |
| **Energy Sources** | | | | | | |
| Hay | 66,285 | 35,888 | 301,385 | 216,163 | 459,916.1 | 340,601.8 |
| Fodder grasses | 19,885 | 2,463.6 | 52,479 | 8,273 | 80,641 | 12,033 |
| Maize grain | 16,609 | 18,082 | 113,434 | 118,583 | 203,671 | 95,830 |
| Sorghum | 567.6 | 1,135.1 | 1,723.5 | 3,447.0 | 3,449.3 | 6,898.7 |
| **Protein – Plant sources** | | | | | | |
| Sunflower seed cake[1] | 15,427.9 | 55,099.8 | 36,669.9 | 130,963.8 | 55,919.8 | 199,713.5 |
| Desmodium | 6,628.5 | 6,628.5 | 5,247.9 | 5,247.9 | 7,793.5 | 7,793.5 |
| Legume fodder | 2,651.4 | 1,388.4 | 5,247.9 | 2,768.5 | 6,440.1 | 3,380.1 |
| Sweet potato vines | 2,651.4 | 262.3 | 7,871.8 | 1,103.3 | 13,720.3 | 1,811.4 |
| Groundnuts | 456.0 | 608.0 | 1,332.4 | 1,776.5 | 2,629.4 | 3,505.8 |
| **Protein – Animal Sources** | | | | | | |
| Black Soldier Fly Larvae | 190.7 | | 516.2 | | 804.4 | |

| Feed resources | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT (DM) | Acreage (Acres) | MT (DM) | Acreage (Acres) | MT (DM) | Acreage (Acres) |
| **Others** | | | | | | |
| Mineral salts | 8,058.2 | | 16,203.1 | | 33,203.0 | |
| Premixes | 48.7 | - | 146.1 | - | 290.7 | |
| Field-based feed resources[2] | 1,915,839 | 1,481,865 | 2,841,696 | 1,481,865 | 4,622,221 | 1,481,865 |
| **Total** | **2,055,298.4** | **1,603,420.7** | **3,383,952.8** | **1,970,191** | **5,490,699.6** | **2,153,432.8** |

[1] 95% of the sunflower seed cake is imported from outside the county.
[2] Acreage for field-based feed will remain constant over the period. However, the productivity per unit will increase as a result of improved management.

*Source: County strategic plan team 2022*

## 2.5 FEED REQUIREMENT FOR MAIN LIVESTOCK ENTERPRISES

The major livestock enterprises are dairy cattle, beef cattle, goats, sheep, camels, poultry, pigs, rabbits, and apiculture. These enterprises are kept under either intensive (zero-grazing and feed-lots), or semi-intensive (tethering and paddocking) or extensive (pastoral, ranching and free range) production systems. The main livestock enterprises contributing significantly to the county economic growth are dairy and beef cattle, meat goats, meat sheep, pigs, and poultry (indigenous, layers and broilers). The feed requirements for the different enterprises in the county are presented in the sub sections that follow.

### I. DAIRY CATTLE

The county has about 32,587 dairy cattle of which 30% are lactating cows. The projected population in 2027 and 2032 is 34,761 and 37,080, respectively (*Table 1*). A higher percentage of the dairy cattle are crosses and most of them are of Friesian genotype (70%), Ayrshire (15%), and the rest are Jersey, Guernsey, brown Swiss and zebu crosses. The average milk production is about five litres per day.

Dairy production is mainly concentrated in the upper zones of Taita, Voi and Mwatate sub counties. Most of the dairy farming is practiced in Werugha, Wundanyi/Mbale, Mwanda/

Mghange, and Wumingu/Kishushe wards of Taita Sub-County; Wusi/Kishamba, Chawia, Bura, and Rong'e wards of Mwatate Sub-County; Sagalla Ward in Voi Sub-County; and, Mboghoni Ward in Taveta Sub-County.

The main production system is zero grazing practiced by small-holder farmers with an average herd of two dairy cows. There are also some farmers who practice semi-intensive system of production where they tether their animals in the field and herd by the roadside.

Based on per capita consumption, the current county milk requirement is estimated to be 79.2 million litres and is projected to grow to 84.8 million litres and 89.6 million litres in 2027 and 2032, respectively (Table 3). Currently, the milk produced stands at 21,594,240 litres, and it is projected to increase to 43,188,480 litres and 86,376,960 litres in 2027 and 2032, respectively (Table 3).

The total feed requirements were **143,932.2** MT for 2022 and are projected to increase to **179,632.9** MT and **228,728.1** MT in 2027 and 2032, respectively. In addition, total acreage required for pasture/browse production was **106,440.7** acres for 2022 and is projected to increase to **128,417.7** acres and **172,369.9** acres in 2027 and 2032, respectively (Table 5).

*Table 5: Summary of Current and Projected Feed Resources Requirements for the Dairy Enterprise*

| | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| Hay | 61,580.6 | 32,199.0 | 57,584.6 | 28,227.8 | 54,136.8 | 26,537.6 |
| Forage grasses | 18,474.2 | 1,679.5 | 28,792.3 | 2,617.5 | 43,309.4 | 3,937.2 |
| Napier | 17,373.1 | 1,579.4 | 21,275.4 | 1,970.5 | 25,985.7 | 2,362.3 |
| Sugargraze | 1.8 | 0.2 | 5,758.5 | 523.5 | 8,661.9 | 787.4 |
| Brachiaria | 923.7 | 84.0 | 4,318.8 | 392.6 | 6,496.4 | 590.6 |
| Maize | 9.2 | 0.8 | 1,439.6 | 130.9 | 2,165.5 | 196.9 |
| Maize grain | 12,316.1 | 13,684.6 | 21,594.2 | 21,594.2 | 33,835.5 | 33,835.5 |
| Sunflower | 13,547.7 | 48,384.8 | 18,715.0 | 66,839.3 | 27,068.4 | 96,672.9 |
| Desmodium | 6,158.1 | 6,158.1 | 2,879.2 | 2,879.2 | 4,060.3 | 4,060.3 |
| Legume fodder | 2,463.2 | 1,231.6 | 2,879.2 | 1,439.6 | 2,706.8 | 1,353.4 |

| | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| Dolichos | 862.1 | 431.1 | 1,007.7 | 503.9 | 812.1 | 406.0 |
| Mucuna | 615.8 | 307.9 | 719.8 | 359.9 | 541.4 | 270.7 |
| Cowpea | 246.3 | 123.2 | 287.9 | 144.0 | 812.1 | 406.0 |
| Crotolaria | 739.0 | 369.5 | 863.8 | 431.9 | 541.4 | 270.7 |
| Sweet potato vines | 2,463.2 | 207.0 | 4,318.8 | 362.9 | 8,120.5 | 682.4 |
| Mineral salts | 6,158.1 | 0.0 | 7,198.1 | 0.0 | 9,473.9 | 0.0 |
| Agro-pastoral/ Free-range | 0.0 | 0.0 | 0.0 | 0.0 | | |
| **Total** | **143,932.2** | **106,440.7** | **179,632.9** | **128,417.7** | **228,728.1** | **172,369.9** |

## II. BEEF CATTLE ENTERPRISE

The beef cattle population was 149,905 in 2022 and is projected to grow to 191,321 and 244,179 in 2027 and 2032, respectively (Table 1). The main production systems for beef cattle in the county are pastoralism, ranching, feedlots, and agro-pastoralism. The county is planning to improve productivity of existing ranches and promote feedlots by 2027. The predominant beef breeds are Zebu, Boran, Sahiwal and crosses.

The current beef requirement for the county stands at 3,240 MT and is projected to grow to 3,465 MT and 3,665 MT in 2027 and 2032, respectively (Table 3). The beef production in 2022 was 476 MT and is projected to increase to 5,784 MT and 6,700 MT by 2027 and 2032, respectively.

The main feed resources for beef cattle include natural pastures, hay, chopped forage and maize, sunflower, Desmodium, Dolichos, Mucuna, cowpeas, sweet potato vines and mineral supplements. The summary of the feed resources and requirements for beef enterprises is shown in Table 6.

*Table 6: Feed Requirements for Beef Enterprise*

| Feed resources (MT) | 2022 | | Projected | | | |
|---|---|---|---|---|---|---|
| | | | 2027 | | 2032 | |
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| **Energy sources** | | | | | | |
| Hay | 4,705 | 3,690 | 29,279 | 19,683 | 44,563 | 30,757 |
| Forage grasses | 1,411 | 784 | 14,640 | 4,246 | 22,281 | 5,753 |
| Napier | 1,327 | 737 | 10,248 | 2,972 | 13,369 | 3,452 |
| Sugar graze | 0 | 0 | 2,196 | 637 | 4,456 | 1,151 |
| Brachiaria | 71 | 39 | 1,464 | 425 | 3,342 | 863 |
| Maize | 1 | 0 | 732 | 212 | 1,114 | 288 |
| Maize grain | 941 | 1,045 | 10,980 | 11,502 | 16,711.1 | 17,379.5 |
| **Protein – Plant sources** | | | | | | |
| Sunflower | 1,035 | 3,696 | 9,516 | 33,985 | 14,482.9 | 51,724.7 |
| Desmodium | 470 | 470 | 1,464 | 1,464 | 2,228.1 | 2,228.1 |
| Legume fodder | 188 | 157 | 1,464 | 941 | 2,228.1 | 1,381.4 |
| Dolichos | 56 | 47 | 439 | 282 | 668 | 414 |

| Feed resources (MT) | 2022 | | Projected | | | |
|---|---|---|---|---|---|---|
| | | | 2027 | | 2032 | |
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| Mucuna | 38 | 31 | 293 | 188 | 446 | 276 |
| Cowpea M66- | 56 | 47 | 439 | 282 | 668 | 414 |
| Crotalaria | 38 | 31 | 293 | 188 | 446 | 276 |
| Sweet potato vines | 188 | 55 | 2,196 | 382 | 3,342 | 533 |
| Mineral salts | 1,411 | - | 3,660 | - | 5,570 | |
| **Field Based feeds/Non – cultivated** | | | | | | |
| Agro-pastoral / Free-range | 1,457,120 | 962,391 | 1,840,970 | 1,042,815 | 2,214,970 | 1,703,823 |
| Ranches | - | 180,448 | - | 401,083 | 654,568 | 513,386 |
| **Total** | **1,469,056** | **1,153,668** | **1,930,273** | **1,521,287** | **3,005,453.2** | **2,334,099.7** |

## III. SHEEP ENTERPRISE

The total sheep population is 63,994 and is projected to increase to 112,779 and 198,756 in 2027 and 2032, respectively (Table 1). The major sheep production systems in the county are agro-pastoral/free-range and ranching. It is planned that feedlots will be promoted and adopted by some farmers by 2027. The most predominant sheep breeds are Black Head Persian, Dorper and Red Maasai.

The WHO per capita consumption of mutton stands at 2.4 kg per person per year. Mutton required in the county is 864,000 kg and is projected to grow to 925,440 kg and 977,471 kg in 2027 and 2032, respectively. Mutton production for 2022 was 11,960 kg and is projected to be 203,002 kg and 357,761 kg in 2027 and 2032, respectively.

The main feed resources for sheep are natural pastures, hay, maize, sunflower, Desmodium, Dolichos, Mucuna, cowpeas, sweet potato vines and mineral supplements. Silage-making from maize and other fodder legumes is being promoted for wide adoption in sheep ranching and feedlots. The total feed requirements for sheep were 66,532 MT for 2022, 176,793 MT for 2027 and 275,087.7 MT for 2032 (Table 7). Total acreage required for pasture/browse in 2022 was 51,885 acres, and it is projected to grow to 139,147 acres and 193,958.8 acres in 2027 and 2028, respectively (Table 7).

*Table 7: Projected Feed Resources Requirements for Sheep Enterprise*

| Feed resources (MT) | 2022 | | Projected | | | |
|---|---|---|---|---|---|---|
| | | | 2027 | | 2032 | |
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| **Energy Sources** | | | | | | |
| Hay | - | - | 27,271 | 21,389 | 52,233.1 | 40,967.1 |
| Forage grasses | - | - | 1,136 | 103 | 2,176.4 | 197.9 |
| Napier | | | 795 | 72 | 1,306 | 119 |
| Sugargraze | | | 170 | 15 | 435 | 40 |
| Brachiaria- | | | 114 | 10 | 326 | 30 |
| Maize | | | 57 | 5 | 109 | 10 |
| Maize grain | - | - | 1,704 | 1,799 | 19,587 | 21,582 |
| **Protein Sources** | | | | | | |
| Sunflower | - | - | 739 | 2,638 | 1,414 | 5,052 |
| Desmodium | - | - | 114 | 114 | 217.6 | 217.6 |
| Legume fodder | - | - | 114 | 57 | 217.6 | 108.8 |
| Dolichos | | | 34 | 17 | 65 | 33 |
| Mucuna | | | 23 | 11 | 44 | 22 |
| Cowpea | | | 34 | 17 | 65 | 33 |
| Crotolaria | | | 23 | 11 | 44 | 22 |
| Sweet potato vines | - | - | 170 | 14 | 326 | 27.4 |
| Mineral salts | 379 | - | 379 | - | 2,539 | |
| **Non – Cultivated** | | | | | | |
| Field-based feed | 39,692 | 31,131 | 60,596 | 47,526 | 81,500 | 37,275 |
| Ranches- | 26,461 | 20,754 | 83,320 | 65,349 | 112,483 | 88,222 |
| **Total** | **66,532** | **51,885** | **176,793** | **139,147** | **275,087.7** | **193,958.8** |

## IV. MEAT GOAT ENTERPRISE

Taita Taveta County is one of the areas producing meat goats among the ASAL counties in Kenya. The population of meat goats in 2022 was 346,358, while it is projected to increase to 638,142 in 2027 (Table 1). The main meat goat production system practiced currently is agro-pastoralism and ranching. In future, systems such as feedlot will be promoted to meet the projected increase in demand. Breeds reared include Galla goats, Small East African goat, and a few Boers.

The county goat meat supply in 2022 was 720,000 kg against a demand of 751,935 kg. The projected goat meat requirements by 2027 is 771,200 kg and 814,559 kg in 2032. The feed requirement for meat goats is projected to increase from 785,131.68 MT in 2022 to 2,039,072.7 MT and 4,637,568.3 MT in 2027and 2032, respectively (Table 8).The main meat goat feed resources for energy are natural forage and browse composed of hay, chopped forage (Sugargraze, Napier) and maize grain. Protein sources are sunflower, Desmodium, Dolichos, Mucuna, cowpeas and sweet potato vines. Mineral supplements are also required.

*Table 8: Projected Feed Resources Requirements for Meat Goat Enterprise*

| Feed resources (MT) | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| **Energy Sources** | | | | | | |
| Hay | - | - | 185,899 | 145,803 | 308,983 | 242,340 |
| Fodder grasses | - | - | 7,746 | 1,291 | 12,874.3 | 2,146 |
| Napier- | - | - | 5,422 | 904 | 7,725 | 1,287 |
| Sugargraze- | - | - | 1,162 | 194 | 2,575 | 429 |
| Brachiaria | - | - | 774.58 | 129.10 | 1,931 | 322 |
| Maize- | - | - | 387 | 65 | 644 | 107 |
| Maize grain | - | - | 69,712 | 3,227 | 115,869 | 5,364 |
| Protein – Plant Sources | | | | | | |
| Sunflower | - | - | 5,035 | 17,981 | 8,368 | 29,887 |
| Desmodium | - | - | 775 | 775 | 1,287 | 1,287 |

| Feed resources (MT) | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| Fodder legume | - | - | 775 | 323 | 1,287 | 536 |
| Dolichos | - | - | 232 | 97 | 386 | 161 |
| Mucuna | - | - | 155 | 65 | 257 | 107 |
| Cowpea | - | - | 232 | 97 | 386 | 161 |
| Crotolaria | - | - | 155 | 65 | 257 | 107 |
| Sweet potato vines | - | - | 1,162 | 342 | 1,931 | 568 |
| Mineral salts | 2,248 | - | 45,829 | - | 15,020 | |
| **Non-Cultivated** | | | | | | |
| Pastoral/ Rangeland/ Free Range | 392,566 | 307,895 | 856,810 | 672,008 | 2,078,894 | 1,630,503 |
| Ranching | 157,026 | 123,158 | 342,724 | 268,803 | 831,557.60 | 652,201.20 |
| Free Range | 235,539.68 | 184,737.00 | 514,086.12 | 403,204.80 | 1,247,336.40 | 978,301.80 |
| **Total** | **785,131.68** | **615,790** | **2,039,072.7** | **1,515,373.9** | **4,637,568.3** | **3,545,815** |

## V. PIG ENTERPRISE

Pork accounts for 38% of the world's meat production, making it a very popular meat. The main breeds of pigs in Kenya are Large White, Landrace, Hampshire and Duroc. Pigs need a high energy diet, high in protein and low in fibre. To raise and maintain a healthy and productive pig stock, it is necessary to maximize growth and reproduction by feeding them the right quantities of well-balanced diets from weaning to finish.

In Taita Taveta County pig production is not a major enterprise but it is growing in popularity. The pig population in 2022 was 2,259 and it is projected to increase to 3,168 and 4,443 in 2027 and 2032, respectively (Table1). The total feed requirements are 761.8 MT, 1,068.4 MT and 1,213.1 MT for 2022, 2027 and 2032, respectively (Table 9).

*Table 9: Required Raw Materials to Produce Pigs.*

| Feed resources (MT) | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| **Energy** | | | | | | |
| Maize grain | 571.4 | 571.4 | 801.3 | 801.3 | 909.8 | 909.8 |
| **Protein** | | | | | | |
| Sunflower | 137.1 | 489.8 | 192.3 | 686.9 | 218.3 | 779.8 |
| Groundnuts | 38.1 | 50.8 | 53.4 | 71.2 | 60.7 | 80.9 |
| Mineral salts | 15.2 | 0.0 | 21.4 | 0.0 | 24.3 | 0.0 |
| **Total** | **761.8** | **1,112.0** | **1,068.4** | **1,559.4** | **1,213.1** | **1,770.5** |

## VI. POULTRY ENTERPRISE

Poultry farming is the raising of domesticated birds such as chickens, turkeys, ducks and geese for meat and eggs. The chicken is the predominant bird reared in the county. Some farmers specialize in rearing exotic chickens for meat only (broilers) and egg production only (layers). They buy chicks from commercial hatcheries, where they are reared in modern well-ventilated chicken houses. The birds are fed on commercial feed and the chicken meat and eggs are marketed in urban centres in the county.

Other farmers specialize in rearing the indigenous (Kienyeji) chickens, which are either improved or non-improved, both cocks and hens being reared together. The indigenous chicken enterprise does not require a high start-up capital since it is mainly done at subsistence level, in a free-range system. A few farmers practice a semi-intensive production system. Because the volumes are always very low, the demand for input is also very low. The input required include housing, feeds, drugs and occasionally feeders and drinkers.

The county has an estimated poultry population of 806,930 birds, 68% of which are indigenous (Table 1). The mean annual poultry egg production is about 61.3 million, and it is expected to grow to 115.7 million and 122.2 million by 2027 and 2032 respectively.

### a. Layers Enterprise

The county had a population of 94,643 layers in 2022 and they are projected to increase to 190,361 in 2027 and 382,884 in 2032. The main production system is intensive, which can further be categorized as commercial/large -scale and backyard/small -scale. Commercial systems are operated by producers who derive a larger percentage of their income from egg production and keep between 150 and 1,500 birds per cycle. Backyard producers rear fewer layers of between 50 and 100 birds for subsistence use and supply to small-scale traders/businesses.

Common ingredients for layers feed are maize, sorghum, cassava, sunflower, soya bean, groundnuts, cottonseed, minerals, and premixes. Demand for layers feed will increase from 2,832.2 MT in 2022 to 5,867.5 MT in 2027 and 11,285.0 MT in 2032 (Table 10).

*Table 10: Required Raw Materials to Produce Layers Chicken Feed*

| Feed resources (MT) | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| **Energy** | | | | | | |
| Maize grain | 1,642.7 | 1,642.7 | 3,304.0 | 3,304.0 | 6,645.5 | 6,645.5 |
| Sorghum | 339.9 | 679.7 | 683.6 | 1,367.2 | 1,374.9 | 2,749.9 |
| **Protein Sources** | | | | | | |
| Sunflower | 424.8 | 1,517.2 | 1,025.4 | 3,662.1 | 1,718.7 | 6,138.1 |
| Groundnuts | 254.9 | 339.9 | 512.7 | 683.6 | 1,031.2 | 1,374.9 |
| BSFL | 85.0 | 0.0 | 170.9 | 0.0 | 170.9 | 0.0 |
| **Minerals Sources** | | | | | | |
| Mineral salts | 56.6 | 0.0 | 113.9 | 0.0 | 229.2 | 0.0 |
| Premix | 28.3 | 0.0 | 57.0 | 0.0 | 114.6 | 0.0 |
| **Total** | **2,832.2** | **4,179.5** | **5,867.5** | **9,016.9** | **11,285.0** | **16,908.4** |

### b. Broilers Enterprise

The broiler farmers in the county mainly use an intensive system of production to produce such chickens. The county does not have hatcheries; chicks are outsourced from Kenchic, Kukuchic and Isinya hatcheries. The broiler population in 2022 stood at 45,207 and is projected to increase to 90,927 in 2027 and 182,888 in 2032. The bird population per farm ranges from 100 to 1,500.

The demand for broiler meat in the area is quite high and the deficits are met through supplies from outside the county. The main factor limiting production is the high cost of commercial feed. Majority of the farmers do not have the capacity to formulate their own rations due to lack of knowledge and limited availability of the necessary ingredients. The county broiler feed requirements are presented in Table 11.

*Table 11: Required Raw Materials to Produce Feed for Broiler Chickens*

| Feed resources (MT) | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| **Energy** | | | | | | |
| Maize | 16.2 | 16.2 | 32.5 | 32.5 | 65.3 | 65.3 |
| Sorghum | 3.3 | 6.7 | 6.7 | 13.4 | 13.5 | 27.0 |
| **Protein** | | | | | | |
| Sunflower | 4.2 | 14.9 | 8.4 | 30.0 | 16.9 | 60.4 |
| Groundnuts | 2.5 | 3.3 | 5.0 | 6.7 | 10.1 | 13.5 |
| BSFL | 0.8 | 0.0 | 1.7 | 0.0 | 3.4 | 0.0 |
| **Minerals** | | | | | | |
| Mineral salts | 0.6 | 0.0 | 1.1 | 0.0 | 2.3 | 0.0 |
| Premix | 0.3 | 0.0 | 0.6 | 0.0 | 1.1 | 0.0 |
| **Total** | **27.9** | **41.1** | **56.0** | **82.6** | **112.6** | **166.2** |

*Source: Strategic planning team (2022)*

### c. Indigenous Chicken Enterprise

The indigenous chicken population has been increasing. According to the livestock department records, the county population of indigenous chickens in 2022 was 647,080 and is projected to grow to 1,301,509 and 2,617,799 in 2027 and 2032, respectively (Table 1). The increase could be attributed to an increase in the demand associated with the rising human population and an emerging preference for indigenous chicken meat compared to broiler chicken meat. The indigenous chickens are mainly kept under extensive system where farmers provide a house to shelter them at night and during the day the birds are released to scavenge for feed through which they are expected to obtain 50% of their total daily feed requirements.

The common feed resources required to produce indigenous chickens include maize, sorghum, sunflower, groundnuts, mineral salts, and premixes. It is anticipated that 50% of the indigenous chicken feed requirements will be provided by complete feed rations while the rest will be obtained through scavenging. There are commercial feeds for indigenous poultry. However, most farmers are unable to afford such feeds. The total feed requirements were 1,747.1 MT for 2022. The estimated requirements in 2027 and 2032 are 8,394.6 MT and 16,884.7 MT, respectively (Table 12).

*Table 12: Required Raw Materials to Produce Indigenous Chicken Feed*

| Feed resources (MT) | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| **Energy Sources** | | | | | | |
| Maize | 1,013.3 | 1,013.3 | 4,868.9 | 4,868.9 | 9,793.2 | 9,793.2 |
| Sorghum | 209.7 | 419.3 | 1,007.4 | 2,014.7 | 2,026.2 | 4,052.4 |
| **Protein Sources** | | | | | | |
| Sunflower | 262.1 | 936.0 | 1,259.2 | 4,497.2 | 2,532.7 | 9,045.4 |
| Groundnuts | 157.2 | 209.7 | 755.5 | 1,007.4 | 1,519.6 | 2,026.2 |
| BSFL | 52.4 | 0.0 | 251.8 | 0.0 | 506.5 | 0.0 |
| **Mineral Sources** | | | | | | |
| Mineral salts | 34.9 | 0.0 | 167.9 | 0.0 | 337.7 | 0.0 |
| Premix | 17.5 | 0.0 | 83.9 | 0.0 | 168.8 | 0.0 |
| **Total** | **1,747.1** | **2,578.3** | **8,394.6** | **12,388.2** | **16,884.7** | **24,917.2** |

### vii. Fisheries Enterprise

The current fish production is estimated to be 775 tonnes per year. The total current feed requirement is estimated to be 262.5 tonnes considering a feed conversion ratio of 1.5. The total feed requirement is projected to increase by 43% to 201 tonnes by 2027 when the fish production is expected to grow to 395.3 tonnes. The feed requirement is further projected to increase to 532.3 tonnes by the year 2032 (Table 13).

*Table 13: Required Raw Materials to Produce Fish Feed*

| Feed resources (MT) | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|
| | MT | Acreage (Acres) | MT | Acreage (Acres) | MT | Acreage (Acres) |
| **Energy** | | | | | | |
| Maize | 108.3 | 108.3 | 189.4 | 189.4 | 255.0 | 255.0 |
| Sorghum | 14.7 | 29.4 | 25.8 | 51.6 | 34.7 | 69.4 |
| **Protein** | | | | | | |
| Sunflower | 17.0 | 60.7 | 73.4 | 262.3 | 98.9 | 353.1 |
| Ground nuts | 3.3 | 4.4 | 5.7 | 7.6 | 7.7 | 10.3 |
| BSFL | 52.5 | 0.0 | 91.8 | 0.0 | 123.6 | 0.0 |
| **Minerals** | | | | | | |
| Mineral salts | 2.6 | 0.0 | 4.6 | 0.0 | 6.2 | 0.0 |
| Premix | 2.6 | 0.0 | 4.6 | 0.0 | 6.2 | 0.0 |
| **Total** | **201** | **202.8** | **395.3** | **510.9** | **532.3** | **687.8** |

## 2.6 WATER FOR LIVESTOCK

The available water sources for livestock in the county include boreholes, farm ponds, water pans, earth dams, springs, piped water, shallow wells, lakes, rivers, and canals (Table 14). Water for livestock in the rangelands is scarce during drought periods leading to human wildlife conflicts. Anthropogenic activities including encroachment of the water catchment areas, deforestation, urbanization, and poor farming practices have led to drying up of various water sources. Soil erosion caused by surface runoff leads to over-siltation of dams, pans and ponds reducing their water holding capacities. This further lowers the water availability for livestock.

*Table 14: Water Source in the County*

| Livelihood zone | Water resources |
|---|---|
| Food Crop/ Livestock | Bore holes, Farm ponds, Water pans, Earth dams (Mkuru, Kishenyi) Piped water, Shallow wells |
| Horticulture/ Dairy | Springs, Streams, Piped water, Riverbeds, Rivers |
| Irrigation / Livestock | Lake Jipe, Lake Chala, Njoro Kubwa canal, River Lumi and springs |

*Source: CIDP 2022*

The current and projected water requirement for livestock is shown in Table 15. In 2022 the total water requirement was 8,763,840 litres per day, but available water was 7,795,334 litres per day, giving a water deficit of 968,506 litres per day. Therefore, the current annual water deficit is about 353,505 m3 and is projected to grow to about 1,518,074 m3 by 2027 and to about 2,661,914, m3in 2032. In liaison with the Department of Water in the County, strategies will be developed to address the water deficit as livestock numbers increase in the area.

*Table 15: Current and Projected Water Requirements for Livestock*

| Livestock Type | Average Water Needs (Ltr/ Head/ Day) | 2022 | | 2027 | | 2032 | |
|---|---|---|---|---|---|---|---|
| | | No. of Animals | Water Requirement (L) | No. of Animals | Water Requirement (L) | No. of Animals | Water Requirement (L) |
| Dairy cattle | 50 | 32,587 | 1,606,800 | 34,761 | 1,643,400 | 37,080 | 1,854,000 |
| Beef cattle | 30 | 149,905 | 4,296,390 | 191,321 | 5,729,760 | 244,179 | 7,325,370 |
| Goat | 4 | 346,358 | 1,231,584 | 638,142 | 2,829,508 | 1,175,736 | 4,702,944 |
| Sheep | 4 | 63,994 | 1,503,872 | 112,779 | 1,527,932 | 198,756 | 795,024 |
| Poultry | 0.1 | 786,930 | 80,014 | 1,582,797 | 160,481 | 3,183,571 | 322,052 |
| Pig | 20 | 2,259 | 45,180 | 3,168 | 63,360 | 4,443 | 88,860 |
| Total water requirement (Litres/Day) | | | 8,763,840 | | 11,954,441 | | 15,088,250 |
| Water available for livestock (Litres/Day) | | | 7,795,334 | | 7,795,334 | | 7,795,334 |
| Balance (Litres/Day) | | | 968,506 | | 4,159,107 | | 7,292,916 |
| Balance per year (365 days) | | | 353,504,690 | | 1,518,074,055 | | 2,661,914,340 |

## 2.7 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

The county is highly dependent on the national government and global livestock legislation and strategies to guide its development plans. These policies and strategies include Kenya's Vision 2030, Sustainable Development Goals (SDGs), Livestock Bill 2021, National Livestock Policy 2013, Range Management and Pastoralism Strategy 2021-2031, and the Kenya Agricultural and Livestock Research Act 2013. The county has domesticated several policies, acts, bills and regulations to guide it on various engagements on feed and feeding of livestock among stakeholders and has developed the following county documents:

- The Ranching and Grazing Management Policy: The policy seeks to streamline the grazing and utilization of natural pastures within the county to achieve a sustainable and commercialized livestock sector.
- Movement of Livestock and Livestock Products Act of 2021: The act seeks to manage and control movement of both livestock and livestock products within the county to enhance food safety through adherence to feed safety standards and control of animal diseases within and across borders.
- The draft Animal Disease Control Bill: The Bill seeks to enhance animal feed safety through proper feed quality assurance measures.
- Taita Taveta County Fisheries and Aquaculture Management and Development Bill: The Bill seeks to provide guidelines and legislations in management of aquaculture and capture fish.
- Taita Taveta County Mechanisation Services Policy 2020: This is at the initiation stage of development.
- Draft County Agricultural Sector Strategy.
- County Integrated Development Plan III, and County Annual Development Plans.

The policy, legal and institutional challenges encountered in the county include inadequate funding to develop and domesticate appropriate policies and inadequate technical capacity in development of policy, legal and institutional frameworks.

## 2.8 CO-ORDINATION AND FINANCING

Generally, the county livestock feed activities are coordinated within the livestock technical working group, which meets on an ad hoc basis. The group is institutionalized within the County Agricultural Sector Steering Committee (CASSCOM), but it is not properly institutionalized in the county structure, which limits its effectiveness in ensuring coordinated development of livestock feeds. Nevertheless, it is an important organ to coordinate livestock feed activities in the county.

The financing of animal feed activities from the County Government is mainly done through the Department of Agriculture, Livestock, Fisheries, and Irrigation. However, there are other stakeholders that contribute significantly to the financing of the Department. They include National Drought Management Authority (NDMA); Agricultural Sector Development Support Programme (ASDSP); Food and Agriculture Organization of the United Nations (FAO); SNV Netherlands; Kenya Climate Smart Agriculture Project (KCSAP); and, Wildlife Works. Others include, Kenya Agricultural and Livestock Research Organization (KALRO); Kenya Red Cross; World Vision; Kenya Climate Innovation Centre (KCIC); World Wildlife Fund (WWF); and, Kenya Marine and Fisheries Research Institute (KMFRI). Effective engagement and co-ordination of these actors is required to achieve the objectives of this strategy.

Challenges regarding co-ordination and financing are:

- Inadequate extension staff.
- Inadequate extension services targeting livestock feed.
- Uncoordinated feed project implementation leading to duplication of activities.
- Inadequate staff capacity especially on landscape management.
- Low investment in the livestock feed sector.
- Inadequate financing leading to low investment in pasture and fodder development.

## 2.9 COMMUNICATION AND KNOWLEDGE MANAGEMENT

Effective communication can equip pastoralists with knowledge on how to benefit from the use of innovative technologies in the feed sector and integrated landscape management practices. A communication strategy was, therefore, developed to aid in effectively communicating existing and emerging issues and best practices and solutions in the forage value chain and integrated landscape management in the county. It is envisaged that implementation of the feed strategy will lead to better adoption of fodder technologies and

innovations; improved livestock productivity; better animal husbandry; enhanced livelihoods, development of integrated landscape management policies and strengthened community resilience to climate change. The feed strategy embraces gender and social inclusion in, and links with the county communication strategy.

The implementation of this animal feed strategy will be guided by the communication strategy in the identification and documentation of successes and lessons learnt. This will be done continually through monthly, quarterly, and annual reports. Information sharing to stakeholders will be done through various communication channels such as social media including the county Facebook page as well as the mass media and local radio stations, for example, Anguo FM, Sifa FM and Kididi FM.

## 2.10 THE FEED SECTOR SWOT (STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS) ANALYSIS

The achievement of the livestock industry's 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 county development in terms of improved 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 (Table 16).

*Table 16: SWOT Analysis*

| STRENGTHS |
|---|
| • Presence of trained personnel<br>• Readily available market (locally and in other counties)<br>• Available land especially in the low-lands<br>• Presence of partners within the county who are promoting fodder innovations e.g., ASDSP, KCSAP, CIAT, KCDMS, SNV Netherlands, FAO, KCIC, Red Cross, World Vi-sion, Hand in Hand, GIZ<br>• Political goodwill in the county<br>• Existing policies, legal and institutional framework<br>• Availability of water in niche areas such as Taveta<br>• High potential for rainwater harvesting<br>• Existing partnerships and collaboration with research and learning institutions<br>• Proximity to the Mombasa and Lamu ports<br>• Linkage to the northern transport corridor and other support infra-structure<br>• Existence of key feed value chain actors at various nodes<br>• Existence of organized ranches and an association (Taita Taveta Wildlife Conservancies Association)<br>• Existence of Bachuma Livestock Export and Processing Zone (LEPZ) and an Export Processing Zone (EPZ)<br>• Existence of freshwater lakes Chala and Jipe<br>• Availability of appropriate feed value chain technologies<br>• Promotion of feed production in the ranches |
| **WEAKNESSES** |
| • Low staffing levels (low staff farmer, ratio 1: 2,000)<br>• Inadequate resources to sup-port staff in their work<br>• Low budgetary allocation to-wards livestock development programs<br>• Low prioritization of feed value chain by farmers<br>• Weak co-ordination mechanism among the various stake-holders dealing with feed pro-grams<br>• Inadequate policies to address issues of feed production<br>• Lack of awareness of feed as a commercial enterprise among actors<br>• Low adoption of feed technologies<br>• Low feed productivity per unit area<br>• Little access to financial services in feed business<br>• Few producer organizations with low membership in the feed value chain<br>• Unfavourable tariffs/levies on feed transport and trade<br>• Poor enforcement and adherence to animal feed standards<br>• Inadequate mechanization in the feed value chain<br>• Low participation of women and youth in feed value chain |

## OPPORTUNITIES

- Collaboration with the State Department for Livestock and other agencies on programs supporting feed
- Partners willing to support investments in feed value chain
- Existence of appropriate feed value chain technologies
- Partnerships and linkages with research and academic institutions i.e., KALRO Bachuma, KEFRI Ngerenyi, KALRO Kiboko, KMFRI, ILRI, ICIPE, TTU and development partners
- Integration of feed value chains with land management practices e.g., apiculture
- Availability of alternative feed sources e.g. insect-based protein feeds
- Employment creation along the feed value chain
- Existence of financial institutions to provide low-interest credit facilities e.g., Women and Youth Enterprise funds
- Partnership with training institutions on agriculture related courses
- Potential to increase productivity per unit area
- Availability of water resources for irrigation and fish farming
- Availability of social and mass media platforms for marketing livestock feeds and livestock products
- Potential for rehabilitation of degraded rangelands
- Promotion of water harvesting technologies
- Potential for intensive fish farming technologies such as cage fish farming
- Increasing demand for livestock products

## THREATS

- Adverse effects of climate change
- Stringent control on land utilization for ranches under REDD+ project
- Land subdivision for human settlement leading to reduction in acreage under feed
- Competition of feed from wild animals due to proximity to the Tsavo National Park
- Influx of livestock from other counties
- Competition between crops for human food and livestock feed e.g., maize grain for human food and livestock feed
- High cost of input for feed production
- Natural disasters and risks such as floods and wild-fires

## 2.11 PESTEL ANALYSIS

A PESTEL (Political, Economic, Social, Technological, Environmental, and Legal) analysis was conducted to examine the external environment impacting on the feed industry in the county. This included examining the political, economic, social, technological, environmental and legal issues/trends in the county.

### POLITICAL ANALYSIS

The national Vision 2030 recognizes agricultural sector as a key economic pillar to development.

| | |
|---|---|
| POLITICAL ANALYSIS | • There is increased national focus on food security policy.<br>• Devolution has provided room for lobbying for fund allocation from the national government.<br>• Political stability exists in the nation.<br>• National budgetary provisionis inadequate to meet county needs.<br>• Weak co-ordination between national and county government is likely to hinder co-operation and implementation of the strategy |

### ECONOMIC ANALYSIS

| | |
|---|---|
| ECONOMIC ANALYSIS | • High cost of maintaining equipment and machinery<br>• High cost of input<br>• Low returns on investment due to low volumes in the feed business<br>• Expensive value addition tools and equipment<br>• Inadequate capital among the feed farmers<br>• High interest rates on loans and lack of collaterals<br>• Poor performance of the economy<br>• Weak national currency<br>• Lack of incentives to attract investment in the feed industry.<br>• Zero-rated agricultural machinery and equipment<br>• Incubation of agricultural businesses takes long to yield results. |

## SOCIAL-CULTURAL FACTORS

| SOCIO-CULTURAL FACTORS |
| --- |
| • Change in consumer tastes and preferences for animal source food.<br>• High population creating demand for animal source food.<br>• Increasing number of actors including the youth ready to take up feed production as a business.<br>• Existing government support for women and youth groups through credit facilities, co-operative societies, SACCOs, and subsidies for farm inputs.<br>• Increasing urbanization and land sub-division likely to hinder growth of animal production.<br>• Modernization and rural-urban migration causing youthful generation to shun and abandon farming.<br>• Low collective action among small-holder farmers leading to poor marketing and negotiations for better prices of their farm produce. |

## TECHNOLOGICAL FACTORS

| TECHNOLOGICAL FACTORS |
| --- |
| • Easy access to information and technology from the internet<br>• Availability of many technological advancements in fodder and feed production, conservation, and processing<br>• Integration of ICT tools in feed production, formulation, and processing, for example, soil fertility maps, and agro-weather forecasting, by, say, KALRO Agricultural Observatory Platform (KAOP)<br>• Increased research on feed by research institutions<br>• Existence of VTC for training artisans in mechanization of feed production<br>• Availability of technologies for water harvesting and conservation for fodder production<br>• Availability of climate smart agriculture and aquaculture technologies, information and management practices (TIMPS)<br>• Versatile Jua Kali technologies that can develop and fabricate feed production equipment.<br>• Weak research - extension liaison that needs to be strengthened. |

## ENVIRONMENTAL FACTORS

| ENVIRONMENTAL FACTORS | |
|---|---|
| | • Existence of institutions that regulate environmental issues e.g., NEMA, public health department and local authorities.<br>• Minimum environmental damage in pasture and fodder production<br>• Pasture and fodder production contribute to climate change mitigation by enhancing carbon sequestration.<br>• Invasive plant species which encroach on the pastures<br>• Emerging fish diseases and loss of aquatic biodiversity<br>• Sustainable farming practices through diversification and integration |

## LEGAL FACTORS

| LEGAL FACTORS | |
|---|---|
| | • Inadequate legal framework to guide the industry.<br>• Slow domestication of national policies in counties<br>• Too many legal requirements to operate processing plants.<br>• Existence of a Public-Private Partnerships Act |

## 2.12 STAKEHOLDER ANALYSIS

*Table 17: Stakeholder Analysis and Mapping along the Animal Feed Value Chain*

| | Stakeholder | Role/Responsibilities | Strength/Comparative Advantage |
|---|---|---|---|
| 1 | Forage seed producers and breeders e.g., Advanta Seed, Advantage crops, KALRO, Kenya Seed | Provision of quality seed | • Capacity to source, breed, multiply and distribute quality seed and other planting material.<br>• Ability to maintain the genetic pool bank |
| 2 | Input suppliers e.g., agrovet shops | Stocking of quality input such as feed, fodder seeds, drugs, feed premixes, | • Accessibility to the producers<br>• Enter credit arrangements with farmers |
| 3 | Financial institutions e.g., banks, SACCOs, MFIs, insurance companies | Provision of credit, insurance facilities and business skills | • Have adequate capital.<br>• Have a model of lending farmers and other actors in the value chain with the group being the guarantor.<br>• Pooling resources<br>• Information on financial management |
| 4 | Producers (forage farmers) | Production of fodder and marketing | • Embraced commercial fodder production |
| 5 | Feed manufacturers and processors e.g., millers, | • Manufacturing of high quality and safe feed<br>• Value addition to get feed products Marketing | • Possess expertise in feed production and can quickly adopt innovation e.g., pelleting.<br>• Significant investment in processing capacity<br>• Ability to add value to feed into feed products.<br>• Marketing networks |

| | Stakeholder | Role/Responsibilities | Strength/Comparative Advantage |
|---|---|---|---|
| 6 | Farmer organizations e.g., cooperative societies, conservancies, TTWCA, Beach Management Units (BMUs) | Lobbying for good working environment for farmers including financial services, prices, affordable input and markets and regulatory and policy framework | • Mobilization of resources (human and financial)<br>• Dissemination of new technologies through experiential learning<br>• Ability to push for agenda i.e., lobby on behalf of farmers. |
| 7 | Feed and feed transporters | Product delivery along the VC nodes | • Facilitate distribution of feed products |
| 8 | Extension service providers | • Linkage to input, services, and technology<br>• Provision of extension services<br>• Linkage to markets | • Have technical knowhow on feed production, conservation, processing, and quality.<br>• Utilizes ICT to disseminate knowledge.<br>• Likely to know actors in the feed value chains |
| 9 | Feed industry machinery and equipment providers (e.g., Muharata, Jua kali) | Import, assemble, fabricate, sell, lease feed industry machines and equipment. | • Locally available to farmers<br>• Produce affordable machinery and equipment |
| 10 | Feed traders | Trade in feed ingredients including, formulated feed concentrates, fodder, seed, minerals, multi-vitamins, and probiotics | • Provide feed information and influence on the prevailing market and market prices |

| | Stakeholder | Role/Responsibilities | Strength/Comparative Advantage |
|---|---|---|---|
| 11 | Development partners and NGOs, e.g., Red Cross, Hand in Hand Eastern Africa (HHEA) | • Provision of technical capacity building support and grants to value chain actors<br>• Articulate the concerns of the marginalized and vulnerable | • Own quick decision-making process<br>• Can easily access donor funding.<br>• Enjoy vast regional experience.<br>• Have existing network and partnerships |
| 12 | Training institutions: agricultural training institutes, universities, colleges, schools, and 4-K Clubs, VTCs e.g. CIT, TTI | • Provision of training to farmers and other value chain actors<br>• Training of technical experts<br>• Contribute to research and innovations.<br>• Multiplication and distribution of feed breeds | • Possess technical capacity/ land and infrastructure.<br>• Can develop and regulate training materials i.e., quality control in feed training. |
| 13 | Research institutions e.g., KALRO, ICIPE, ILRI, KMFRI | • Conduct research and disseminate TIMPS to support actors along the feed value chains in the industry.<br>• They are breeding feed crops with desirable traits | • Can access funds for research.<br>• Have an experienced pool of scientists, research equipment and breeding land.<br>• Possess ability to partner and share research findings with other organizations regionally and internationally |
| 14 | Consumers | • They buy and influence quality | • Encourage production of quality feed<br>• Have purchasing power of livestock products |

| | Stakeholder | Role/Responsibilities | Strength/Comparative Advantage |
|---|---|---|---|
| 15 | Ministry of Agriculture, Live-stock, Fisheries, and Irrigation and other Ministries, Departments and Agencies (MDAs) in county and national governments | • Regulation, policy advisory services and development planning of the feed industry<br>• Setting standards<br>• Developing trade policies | • They are the main source of technical personnel in animal health and livestock production.<br>• Play an advisory and policy formulation role.<br>• Appraise the feed industry and monitor and evaluate on-going feed activities.<br>• Support in enhancing technical capacities and infrastructure.<br>• Enforce enacted laws and regulations |
| 16 | Media | Create awareness to value chain actors on GAPS, GMPS, technologies, input, and services. | • Enhance effective communication.<br>• Enhance visibility of the feed industry |

# Chapter THREE

## STRATEGIC FRAMEWORK

### 3.1 OVERVIEW

The strategy is expected to direct the county feed industry in addressing the feed requirements of the current and projected livestock population in the next 10 years. This will be done through leverage on existing county structures, policies and regulations and employing innovations to enhance feed production and promote investment while sustainably managing land.

The strategy will address issues of feed production and productivity, knowledge and skills enhancement in fodder production, policy and legal framework for feed development, markets and marketing infrastructure, processing and value addition, feed conservation and preservation, and implementation arrangements including mobilization of finances, co-ordination, and effective communication among stakeholders. All these should be reflected in the county's vision, mission, goal, and strategic objectives as presented below:


## 3.5 STRATEGIC OBJECTIVES

i. To improve production and productivity of feed value chains
ii. To enhance animal feed quality
iii. To promote processing/value addition of animal feed
iv. To support marketing of feed to increase profitability
v. To conserve physical environment for sustainable production and climate change mitigation
vi. To support establishment of an enabling policy environment to support feed production

## 3.6 STRATEGIC FRAMEWORK FOR THE FEED VALUE CHAINS

The strategy is anchored on a new paradigm shift of developing feed strategies based on data. These data are derived from per capita consumption of animal source foods over the next 10 years, and the livestock types and numbers to meet those food demands. These livestock need feed that meet their nutrients requirements in terms of energy, protein, minerals, multi-vitamins, as well as water. To meet these feed requirements priority feed resources/value

chains have been identified in addition to the natural pastures that supply the bulk of the feed. To improve the feed supply, seven key strategic pillars have been identified, which will define the focus of all proposed interventions for the development of the feed resources. These seven pillars are:

i. Feed production and productivity,
ii. Animal feed quality,
iii. Feed processing/value addition,
iv. Feed marketing,
v. Profitability in feed value chains,
vi. Sustainable physical environment; and
vii. Enabling policy environment.

The following are the key feed value chains that have been identified to address the feed gap described in the strategy.

i. Grass hay
ii. Maize grain
iii. Forage grasses (Napier, Sugargraze, Brachiaria)
iv. Sorghum
v. Sunflower
vi. Legume fodder value chain (Dolichos, Mucuna, cowpeas, Crotolaria)
vii. Sweet potatoes vines
viii. Groundnuts
ix. Black Soldier Fly Larvae and
x. Natural pastures (free-range pasture and field-based)

The strategic frameworks for the feed value chains guided by the seven strategic pillars are presented here.

### 3.6.1 STRATEGIC FRAMEWORK FOR HAY

The hay enterprise in the county is mainly undertaken by small-holder producers, ranches and traders, who source hay from within and outside the county. A few farmers have seasonal “surplus” of natural grass they harvest and sell to neighbouring farms. Most of the hay traded within the county is harvested from natural grasses. African Foxtail/Buffel grass and Maasai love grass are gaining popularity in the lowlands for commercial hay production.

Ranches produce hay for sale to the small-holder dairy farms on the foot of and in the Taita Hills. However, some of the hay sold (e.g., Rhodes grass hay) in the county comes from as far as Nakuru, Trans Nzoia and Narok counties. The price varies depending on season, demand, and supply. A bale of hay weighing 13-15 kg sells for between KES 200 and KES 350.

Transport costs and several county levies along the way contribute to the high prices. The county has constructed 44 hay stores in the four sub counties with a storage capacity of about 100,000 hay bales (Table 18).

*Table 18: Current Hay Infrastructure*

| Sub-County | No. of Hay Stores | Storage Capacity (Total No. of Bales) | Average Weight per Bale (kg) |
|---|---|---|---|
| Voi | 12 | 25,000 | 12 |
| Mwatate | 16 | 24,000 | 12 |
| Taveta | 9 | 50,000 | 15 |
| Taita | 7 | 2,000 | 15 |

The current hay production is 66,285 MT and it is projected to increase to 459,916 MT by 2032 (Table 4).

**Challenges**

Common challenges in hay production are low-yielding grass species, land degradation/soil erosion, small land sizes in the upper zones, climate change and vulnerabilities, low adoption of improved grass species, production, conservation and preservation technologies, and high cost of establishing grass fields.

The details of the hay strategic development framework are presented in Table 19.

*Table 19: Strategic Framework for Hay*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Low production/productivity | To increase hay production from the current 66,285 MT to 459,916 MT by 2032 | • Build capacity of producers on the technology, information and management practices (TIMPS) of hay production.<br>• Increase acreage under hay production.<br>• Enhance mechanization of hay production<br>• Facilitate access to certified seeds.<br>• Facilitate access to improved varieties.<br>• Promote irrigation technologies.<br>• Facilitate access to other input. |
| | Inadequate extension services | To strengthen provision of exten-sion services | • Establish synergies with private service providers.<br>• Promote common interest group extension approach.<br>• Lobby for increased number of extension workers |
| Quality | Low quality of hay | To ensure 80% of marketed hay meets the national standard | • Capacity build hay value chain actors on feed quality and standardization.<br>• Sensitize community on production of quality hay.<br>• Establish county feed quality assurance unit.<br>• Enhance surveillance on marketed hay to ensure adherence to quality standard |
| Value Addition and Processing | Low value addition on hay | To promote hay value addition to 50% of hay produced by 2032 | • Capacity build hay producers on value addition techniques.<br>• Facilitate access to mechanisation for processing and value addition |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Marketing | Low volumes of traded hay | To increase annual volume of hay traded from 200,000 to 1,000,000 bales | • Diversification of products (e.g., pelleting hay, rounded, rectangular etc.).<br>• Facilitate creation of strategic aggregation and storage facilities.<br>• Promote commercialization of hay.<br>• Facilitate access to transport services. |
| Profitability | Low returns on investment on hay enterprise | To improve profits in hay enter-prise | • Match production with market demand to avoid losses.<br>• Promote proper handling, packaging, storage, and transportation techniques.<br>• Promote appropriate storage facilities and aggregation centres.<br>• Capacity build stakeholders on post-harvest management.<br>• Establish a stakeholder forum for hay value chain actors |
| Physical Environment | High losses due to soil degradation, erosion, and climate change | To enhance adoption of climate smart technologies by 20% in 2032 | • Promote agroforestry and planting of fodder trees in the county.<br>• Promote soil and water conservation.<br>• Promote adoption of climate-smart technologies and practices.<br>• Enhance water harvesting practices.<br>• Promote use of sustainable land use plans e.g., grazing plans |
| Policy Environment | Inadequate policy on hay production and utilization | To develop a Taita Taveta Coun-ty hay strategy by 2025 | • Develop a strategy on hay production and utilization.<br>• Develop a policy on subsidies in the agricultural sector.<br>• Review existing policies e.g., ranching, and grazing management policy and land use plans. |

### 3.6.2 STRATEGIC FRAMEWORK FOR MAIZE GRAIN VALUE CHAIN

Maize (Zea mays) is an important food, which is consumed mainly in form of grains, flour, and fodder. The crop is grown in all agro-ecological zones in the county. It is the staple food in the county and only about 1% is used as feed for livestock. Maize stover is also used to feed free-range and zero-grazed livestock. Some of the major varieties grown are the six series for high altitude, Pioneer for medium-altitude, and Sungura DH Series and Duma for low-altitude areas. Total acreage for maize is 18,082 acres producing 16,609 MT. The projected acreage on maize production is 95,830 acres to yield 203,671 MT by 2032

**Challenges**

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

The details of the maize grain value chain strategic development framework are presented in Table 20 below.

*Table 20: Strategic Framework for Maize Grain Value Chain*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Low production/productivity | To increase maize grain production from 16,609 MT to 203,671 MT by 2032 | • Increase capacity of all stakeholders on maize production for feed.<br>• Enhance mechanization along the maize value chain.<br>• Enhance access to certified high yielding maize seeds.<br>• Promote maize production under irrigation.<br>• Map out areas suitable for maize grain production. |
| Quality | Low quality of maize grain | To increase farmers' access to high-quality maize grain by 10% by 2027 | • Control maize diseases and pests.<br>• Capacity build on pre-harvest and post-harvest handling of the maize crop.<br>• Store maize grain at the recommended moisture content.<br>• Improve storage facilities including use of hermetic bags. |
| Value Addition and Processing | Inadequate value addition and processing of maize gain | To improve knowledge and skills on value addition and processing of maize grain for livestock feed from 10,000 to 30,000 farmers by 2032 | • Capacity build farmers on feed processing and value addition.<br>• Promote value addition of maize grain at aggregation centres |
| Marketing | Information asymmetry among various maize grain value chain actors | To develop one county livestock feed information system by 2027 | • Establish and maintain a data collection, analysis, storage, and dissemination system.<br>• Promote aggregation centres for maize marketing.<br>• Enhance interactive access to market information. |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Profitability | High post-harvest losses | To reduce post-harvest losses along the maize grain value chain from 30% to 5% by 2032 | • Capacity build on post-harvest management<br>• Promote proper handling, packaging, and transportation techniques |
| | Inadequate knowledge on entrepreneurship | To ensure 90% of farmers are equipped with knowledge and skills on entrepreneurship by 2027 | • Train producers on entrepreneurial skills<br>• Promote aggregation of produce for better price negotiation |
| Physical Environment | High losses due to soil degradation, erosion, and climate change | Reduce the soil degradation and erosion from 50% to 25% by the year 2032 | • Train farmers on soil conservation technologies, innovations, and management practices<br>• Promote soil health maintenance and restoration.<br>• Promote farm water harvesting technologies |
| Policy Environment | Inadequate policy on maize grain production and utilization | Develop two appropriate policy, legal and regulation frameworks on maize grain production, utilization, and marketing by 2025 | • Develop a policy framework on maize grains production, utilization, and marketing.<br>• Develop a policy on subsidies in the agricultural sector.<br>• Develop human-wildlife conflict resolution systems |

### 3.6.3 STRATEGIC FRAMEWORK FOR FORAGE GRASSES (NAPIER, SUGAR GRAZE, BRACHIARIA)

The fodder grasses mainly grown in the county are Napier, Sugargraze and maize. Natural grasses are harvested in the lowlands of Mwatate, Taveta, Voi and Kishushe in Taita Sub-County. In the highlands, fodder grasses are grown in small scale because of limited land sizes. In the lower lands, fodder is composed of high-producing perennial species occurring as open or bushed grassland that grow fast with the onset of rains. Fodder quantity and quality greatly fluctuates from one season to another due to climate change and poor utilization practices.

The current acreage for fodder grasses grown in the county is 2,463.6 acres giving an output of 19,885.5 MT. The projection for 2032 is estimated to be 12,033.5 acres to yield 80,641.6 MT (Table 4).

**Challenges**

- Common challenges under fodder grasses include;
- Scarcity of fodder,
- Land degradation/soil erosion,
- Small land sizes in the upper zones,
- Climate change and vulnerabilities,
- Low adoption to technology on fodder grasses production, conservation and preservation,
- High cost of planting and materials for forage conservation.

The details of the forage grasses value chain strategic development framework are presented in Table 21.

*Table 21: Strategic Framework for Forage Grasses Value Chain*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Low fodder grasses production in Taita Taveta | To increase production of fodder from 19,886 MT in 2022 to 80,642 MT by 2032 through increasing acreage under production from the current 2,463.6 acres to 12,033.5 acres. | • Capacity build on knowledge and skills on fodder grasses production<br>• Enhance access to certified high yielding fodder planting materials.<br>• Promote fodder production under irrigation.<br>• Mechanize fodder grasses production and conservation |
| | Inadequate extension services | To strengthen provision of extension services | • Establish synergies with private service providers.<br>• Promote common interest group extension approach.<br>• Lobby for increased number of extension workers |
| | Inadequate access to water for fodder grass production | To increase water available for forage production by 30% by 2032 | • Promote water harvesting and conservation.<br>• Promote PPP engagement in water for fodder grasses production.<br>• Partnership with WRUA in management of water resources for fodder grasses production<br>• Capacity build WRUAs and WUA on management of water resources |
| | Human-wildlife conflict | To reduce human-wildlife conflict cases by 25% | • Promote innovative solution to fencing<br>• Encourage hands- on approach by the KWS<br>• Capacity build farmers on human-wildlife interaction through partnership- TTWCA, AWF<br>• Encourage farming of wildlife deterring crops such as Chilies |
| | Low investment in live-stock fodder sector | Enhance capital investments in the fodder enterprise by 15% | • Increase budgetary allocation to livestock sector by 20%<br>• Incentivize investments in livestock feeds enterprises with other developmental partners |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Quality | Low quality of fodder produced. | To improve the quality of fodder produced by 30% by 2032 | • Capacity build farmers with knowledge and skills on production of quality fodder<br>• Facilitate access to certified fodder planting materials.<br>• Strengthen partnerships with quality control and regulatory bodies |
| Value Addition and Processing | Inadequate processing and value addition of fodder grasses | Promote value addition of fodder grasses by enhancing access and adoption of fodder technologies by 40% by 2032 | • Impart knowledge and skills on value addition technologies (e.g. fortification) of fodder grasses.<br>• Facilitate access to processing and value addition machinery and equipment |
| Marketing | Low volumes of fodder grasses traded. | To increase the volumes of fodder grasses being traded by targeting 25% of the total acreage under fodder production for sale by 2032. | • Diversification of fodder products to be marketed.<br>• Provision of strategic bulking and aggregation facilities<br>• Promote commercialization of fodder grasses<br>• Capacity build on entrepreneurship<br>• Encourage contractual fodder production |
| | Poor roads to access fodder-growing areas | Increase access to conserved forage grasses by 30% | • Construction of feeder roads |
| Profitability | Low returns on investment on fodder grass production | To increase the profit margin by 50% by 2032. | • Match production with market demand to avoid losses.<br>• Promote value addition of fodder at aggregation centres.<br>• Promote proper handling, packaging, storage, and transportation techniques |
| | High post-harvest loss-es | To reduce post-harvest losses along the fodder value chain by 50% by 2032 | • Capacity build on post-harvest management<br>• Promote appropriate storage facilities |
| | Inadequate knowledge on entrepreneurship | To improve entrepreneurship and business development skills of feed actors by 30% by 2032 | • Support business development services for MSMEs<br>• Hold feed entrepreneurial clinics |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Physical Environment | Adverse climate change effects | To reduce adverse effects of climate change by en-hancing access and adoption of climate smart agri-cultural technologies and practices by 30% by 2032 | • Promote agroforestry practices.<br>• Adopt soil and water conservation techniques by using climate smart technologies and practices.<br>• Promote water harvesting practices |
| Policy Environ-ment | Inadequate policy on fodder production and utilization | To provide an enabling policy environment for fod-der value chain by developing five policy docu-ments by 2027 | • Develop an umbrella feed policy to anchor fodder policy.<br>• Develop policy on subsidies in fodder value chain.<br>• Review existing policies e.g., ranching, and grazing management policy |

### 3.6.4 STRATEGIC FRAMEWORK FOR SORGHUM GRAIN

Sorghum (*Sorghum bicolor*) is a cereal crop used as human food, livestock fodder, manufacture of feeds and production of biofuels and alcoholic drinks. It is established from seeds and has various varieties for seed and fodder. It does best on deep, fertile, well-drained loamy soils and is tolerant to shallow soils and drought conditions.

The crop is often intercropped with pulses such as pigeon peas, beans, cowpeas, and green grams. Grain sorghum has an extensive root system and is tolerant to soils with a shallow hardpan. In the Taita Taveta County, sorghum is grown in the lower zones and some parts of the upper zones. The common varieties grown are Seredo (red variety) and Gadam (white variety). Production is about 567.6 MT and the yield is targeted to rise to an average of 34,493 MT by 2032.

**Challenges**

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

The details of the sorghum value chain strategic development framework are presented in Table 22.

*Table 22: Strategic Framework for Sorghum Value Chain*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Low production and productivity | To increase sorghum grain production from 567.6 MT to 34493 MT by 2032. | • Build capacity of all stakeholders in sorghum production practice and techniques<br>• Enhance access to quality certified seeds.<br>• Enhance mechanization.<br>• Increase acreage under sorghum production.<br>• Soil health management<br>• Communal synchronized planting to curb birds attack |
| Quality | Low quality of harvest-ed sorghum grain | To improve the quality of harvested sorghum grains by 30% by 2027. | • Promote proper handling, packaging, and transportation techniques.<br>• Provide pest and disease control technologies.<br>• Engage research institutions to provide technologies for producing and marketing quality seeds.<br>• Conduct periodic and regular on-farm visits |
| Processing and Value Addition | Inadequate value addition and processing of sorghum grain | To enhance knowledge and skills on value addition of sorghum grain for livestock feed to 5,000 farmers annually. | • Capacity build farmers on processing and value addition of sorghum for livestock feed.<br>• Facilitate access to value addition equipment |
| | High post-harvest loss-es | To reduce post-harvest losses along the sorghum grain value chain to 5% by 2032 | • Capacity build farmers on post-harvest management.<br>• Promote appropriate storage facilities |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Marketing | Information asymmetry among various sorghum grain value chain actors | To develop a one-county sorghum grain management information system by 2025 | • Establish and maintain a data collection, analysis, storage, and dissemination system.<br>• Promote access to market information.<br>• Establish aggregation centres<br>• Encourage contractual farming |
| Profitability | Inadequate knowledge on entrepreneurship | To ensure 90% of farmers are equipped with knowledge on entrepreneurship by 2025 | • Build capacity of value chain actors on entrepreneurial skills to enhance profits<br>• Adoption of conservation agriculture to reduce on production costs |
| Physical Environment | Adverse effects of climate change | Reduce negative impacts of climate change by 50% by the year 2032 | • Promote drought tolerant sorghum varieties.<br>• Introduce agroforestry practices.<br>• Promote conservation agriculture. |
| Policy Environment | Lack of policy regulating sorghum grain production and utilization | To develop one appropriate policy, legal and regulation framework on sorghum grain production, utilization, and marketing by 2025 | • Develop a policy framework on sorghum grain production, storage, utilization, and marketing.<br>• Develop a policy on subsidies in the agricultural sector. |

### 3.6.5 STRATEGIC FRAMEWORK FOR SUNFLOWER

Sunflower (*Helianthus annus*) does well in a wide range of soils, but it does best in fertile, loamy soils. The plant has a deep taproot, which makes it grow even in areas with very little amounts of rainfall. An average of 500-750mm of rainfall per annum is adequate for sunflower production. It can be grown from sea level to an altitude of 2,600 metres above sea level. Therefore, it can do well in Taita Taveta County.

Sunflower provides high quality feed for livestock and produces healthy cooking oil for people. After pressing, 3.5 kg of sunflower yield 1 litre of oil and 2.5 kg of seed cake. Sunflower cake is one of the major protein sources in livestock feed, especially dairy cattle, chickens and even pigs and rabbits.

It has a high protein content of between 29% and 30%, crude fibre of 27-31%, lignin 9-12% and lysine 3.5%. Besides, sunflower cake is a good source of calcium, phosphorus, and B vitamins.

The county has several opportunities for production of sunflower. They include availability of land for its promotion and a ready market for both seed and forage. Production in the county is about 15,427 MT per annum and it is projected to increase to 55,919 MT by 2032.

**Challenges**

- Poor seed quality and over-reliance on imported seeds
- Inadequate technical knowledge for production of sunflower
- Limited research on local sunflower eco-types to promote adoption by producers
- Limited local capacity on value addition of sunflower
- Pests and diseases incidences

The details of the sorghum value chain strategic development framework are presented in Table 23.

*Table 23: Strategic Framework for Sunflower Value Chain*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production/ Productivity | Low production and productivity | To increase sunflower production per annum from 15,427 MT to 55,919 MT by 2032 | • Increase acreage under sunflower production<br>• Improve access to certified seeds<br>• Build capacity of value chain actors on sunflower production and management practises<br>• Enhance agricultural mechanisation along the sunflower value chain.<br>• Adopt irrigation technologies.<br>• Establish a sunflower value chain stakeholder forum/platform. |
| Quality | Low quality of sunflower cake | To produce and maintain quality sunflower 32% CP content by 2032. | • Capacity build farmers on sunflower conservation and preservation technologies<br>• Promote construction of standardized storage facilities<br>• Promote public-private partnerships on sunflower value addition, processing and standardization.<br>• Facilitate access to quality equipment and machinery. |
| Processing/Value Addition | Low processing of sun-flower | To enhance utilization of sunflower by 10% yearly | • Capacity build value chain actors on value addition technologies<br>• Link farmers to feed processing and value addition equipment suppliers |
| Marketing | Low volumes of traded sunflower cake | To facilitate trading of 11,975 MT of sunflower seed cake annu-ally | • Diversify products (e.g., seed cake, sunflower meal)<br>• Provide strategic aggregation facilities<br>• Promote commercialization of sunflower seed cake.<br>• Create a market information system.<br>• Strengthen animal feed market linkages in the county<br>• Improve road network infrastructure |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Profitability | Inadequate supply of sun-flower seed cake | To enhance aggregation of sun-flower seed by 10% annually | • Match production with market demand to avoid loss.<br>• Promote proper handling, packaging and transportation techniques of sunflower seed cake and sunflower meal<br>• Enhance entrepreneurial skills of the value chain actors. |
| Physical Environment | Adverse climate change effects. | To enhance adoption of climate smart technologies by 20% in 2027. | • Promote agroforestry<br>• Conserve soil and water using climate-smart technologies and practices<br>• Promote drought-tolerant varieties |
| Policy Environment | Inadequate policy on fodder production and utilization | To develop Sunflower strategy by 2025 | • Develop a sunflower strategy |

### 3.6.6 STRATEGIC FRAMEWORK FOR LEGUME FODDER VALUE CHAIN

The legume forages mainly grown in the county are *Desmodium*, cowpeas and Dolichos. Others being introduced are Mucunaand *Crotalaria. Desmodium* is a trailing or climbing perennial legume with small leaves and deep roots, which, in favourable conditions, form very dense ground cover. It is popular in cut-and-carry systems.

There are numerous varieties of Desmodium but the two most common are the green-leafed and the silver-leafed ones. Cowpea is an annual leguminous crop grown for its seeds and leaves, and its residues can be used as livestock fodder. It can withstand drought, has a short growing period and its multi-purpose use makes it an attractive crop for farmers in marginal, drought-prone low-rainfall areas.

Cowpeas do well in the lower zones of Taita Taveta, which include, Mwatate, Sagalla, Bura, Wumingu Kishushe and Taveta. Dolichos is a versatile sub-tropical and tropical nitrogen-fixing legume, which can potentially be used for human consumption, animal fodder and forage. The legume is grown in the upper zones of the county onsmall scale due to limited land sizes.

The total acreage of legume fodders grown in the county is 1,388.4 acres with current yields standing at 2,651.4MT. The projected acreage under the legume fodders by 2032 is 3,380 acres and is expectedto yield 6,440 MT.

**Challenges**

- Pests and diseases,
- Low adoption of legume fodder as livestock feed
- Inadequate access to certified seeds
- Limited land sizes in upper zones
- Unreliable rainfall
- Inadequate storage structures/facilities
- Inadequate skills on post-harvest management
- High cost of planting materials

The details of the legume fodder value chain strategic development framework are presented in Table 24.

*Table 24: Strategic Framework for Forage Legumes Crops*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Low production and productivity | To increase legume fodder production from 2,651 MT to 6,440 MT by 2032. | • Creating awareness on adoption of legume fodder as livestock feed<br>• Increase capacity of all stakeholders on good agricultural practicesin feed production<br>• Increase acreage under legume fodder production.<br>• Promote mechanisation.<br>• Enhance access to quality certified forage legume seeds.<br>• Adopt soil and water conservation technologies in forage production<br>• Strengthen the existing and newly formed farmers groups to work in conjunction with the county agricultural officers. |
| Quality | Low quality of legume fodder | To increase access to safe and high-quality legume fodder feed for livestock to 2,000 farmers by 2027 | • Capacity build on quality legume fodder production<br>• Adopt feeding standards for legume fodder.<br>• Promote appropriate storage of legume fodder |
| Value Addition and Processing | Low value addition and processing of legume fodder | To improve knowledge and skills on value addition and processing of legume fodder for livestock feed to 2,000 farmers by 2032 | • Capacity build farmers on legume fodder value addition and processing as a livestock feed |
| Marketing | Information asymmetry among various legume fodder value chain actors | • To develop one county livestock feed management information system by 2032<br>• Promote linkage of four cooperative societies to value chain actors by 2032 | • Establish and maintain a data collection, analysis, storage, and dissemination system.<br>• Support establishment of cooperative societies for fodder production<br>• Promote stakeholder access to livestock feed market information system. |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Profitability | Inadequate knowledge on entrepreneurship | To improve capacity of 20,000 farmers organisations on business development skills by 2032 | • Promote commercialization and contract farming of legume fodder<br>• Support business development services for MSMEs |
| | High post-harvest losses | To reduce post-harvest losses along the feed value chain from 30% to 5% by 2032 | • Capacity build on post-harvest management<br>• Promote good handling and storage practises |
| Physical Environment | Increased soil degradation and erosion during establishment of legume fodder | Reduce soil degradation and erosion by 25% by 2032 | • Promote cover cropping using fodder legumes.<br>• Capacity build farmers on soil conservation technologies, innovation, and management practices |
| Policy Environment | Inadequate policy on fodder production and utilization | To develop two appropriate policy, legal and regulation frameworks on legume fodder production, utilization and marketing by 2025 | • Develop one policy framework on legume fodder.<br>• Develop one policy on subsidies in the agricultural sector |

### 3.6.7 STRATEGIC FRAMEWORK FOR SWEET POTATO VINES

Sweet potato (Ipomoea batatas) is a tuberous-rooted perennial plant mainly grown for its tubers as a source of food for humans while its vines and leaves are a good source of animal feed. Some communities also consume sweet potato leaves as food. The forage contains about 15-30% CP making it a good source of proteins for livestock. Sweet potato vines are easy to grow, cheap and beneficial because they are rich in essential proteins, vitamins and a good source of energy. Sweet potato production is practiced in both the higher and the lower zones of the county. However, it does better in the higher zones. Farmers in these regions grow sweet potatoes on small scale mainly for subsistence.

Common sweet potato varieties grown in the county include Kambonge, which is a food variety, Wagabolige for fodder, and Marooko, a dual-purpose variety. There is a big opportunity to venture into improved high-yielding varieties for fodder including Ex- Mukurweini and Mucinya varieties, which are good for food and fodder and have short maturity periods of about 2.5 to 4 months.

The total acreage under sweet potato vines in the county is 262.3 acres with the current yields standing at 2,651.4 MT. However, there is an opportunity to increase acreage under sweet potato vines to 1,811.4 by 2032 with a projected increase in yields to 13,720.3 MT (Table 4). Sweet potato in the county is mainly utilized as fresh vines, where it is fed with other fodder or separately. There is an opportunity to use it in silage making thus increasing profitability in the value chain.

**Challenges**

- Inadequate access to high yielding/certified sweet potato varieties leading to low yields and poor-quality produce.
- Value addition opportunities are not exploited leading to low profitability
- Lack of proper post-harvest handling and storage knowledge and skills
- High cost of input
- Pests and diseases - e.g., sweet potato virus causing dwarfing of the plants, yellowing of vines in young leaves and excessive branching
- Inadequate access to mechanization in sweet potato production
- Unreliable rainfall patterns leading to crop failure
- Inadequate knowledge on GAPs (Good Agricultural Practices)

Details of the sweet potato value chain strategic development framework is presented in Table 25.

*Table 25: Strategic Framework for Sweet Potato Vines*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Low production of sweet potato vines for livestock feed | To increase sweet potato vines production from 2,651.4 MT in 2022 to 13,720 MT by 2032 | • Capacity build farmers with knowledge and skills for production<br>• Promote mechanization.<br>• Avail certified and adequate quality planting materials.<br>• Promote irrigation technologies<br>• Strengthen the existing and newly formed farmers groups to work in conjunction with the county agricultural officers. |
| Quality | Low quality of sweet potato fodder | To improve access to safe and high-quality sweet potato fodder by 30% by 2032 | • Capacity build on producing quality sweet potato fodder.<br>• Promote high protein content varieties.<br>• Promote certification and quality assurance of sweet potato vines through linkages to KEPHIS |
| Value Addition and Processing | Low value addition of sweet potato vines | To improve knowledge and skills on value addition and processing of sweet potato fodder for live-stock feed to 2,000 farmers by 2032 | • Capacity build on value addition and processing<br>• Facilitate access to machinery and other input i.e., silage bags for processing and value addition |
| Profitability | Low volumes of traded sweet potato vines | To increase the volumes of sweet potato vines traded by 25% by 2032. | • Provide strategic bulking and aggregation facilities.<br>• Promote commercialization of sweet potato vines |
| | Inadequate knowledge on entrepreneurship | To ensure 90% of farmers are equipped with knowledge on entrepreneurship. | • Support business development services for MSMEs |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Physical Environment | Adverse climate change effects | To reduce adverse effects of climate change | • Promote agroforestry through intercropping with fodder trees.<br>• Conserve soil and water using climate-smart technologies and practices.<br>• Promote sustainable water harvesting practices for irrigation. |
| Policy Environment | Weak regulatory framework on sweet potato production and utilization | To provide an enabling policy environment for fodder value chain | • Formulate a sweet potato strategy policy to be anchored in feed policy. |

### 3.6.8 STRATEGIC FRAMEWORK FOR GROUNDNUTS VALUE CHAIN

Groundnut (Arachis hypogaea) is grown for its edible nuts and oil. Groundnut seed may be consumed raw (non-heated), cooked and additionally used to make confections. The nuts are a good source of health fats, protein, and fibre. In addition, they contain a high level of potassium, phosphorus, magnesium, and B vitamins. The groundnut cake is a rich source of protein, containing 44.8% crude protein and is a high-quality livestock feed.

The common varieties grown are runner types (Manipita) and bunch type (red Valencia). The runner varieties are higher yielding than the bunch variety, producing 2.4 MT compared to 1.6 MT per acre, respectively. Groundnut production in the county has not been widely adopted because of little effort to popularize the value chain as an alternative cash crop. In recent years, however, some effort by the Directorate of Agriculture, through ICRISAT project, has marginally increased adoption of Ndovu, Mwangaza and Dove varieties. In this strategy, the aim is to increase production levels of groundnuts from 21 MT in 2022 to 2,763 MT by 2032.

**Challenges**

- Limited research on local groundnut eco-types to promote adoption by producers.
- Limited local capacity on value addition of groundnuts into cake
- Poor seed quality and over-reliance on imported seeds
- Pests and diseases
- Unreliable and erratic rainfall patterns leading to crop failure

The details of the groundnut value chain strategic development framework are presented in Table 26.

*Table 26: Strategic Framework for Groundnuts*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Low production/ productivity | To increase groundnuts production from 21MT to 2,764 MT by 2032. | • Improve access to certified seeds.<br>• Increase acreage under groundnuts production.<br>• Build capacity of value chain actors on groundnut production and management practises<br>• Promote agricultural mechanization.<br>• Promote use of fertiliser (organic and inorganic)<br>• Improve water access in the farms (on-farm- contours water pans and boreholes)<br>• Enhance frequent capacity building at different stages of crop growth to promote uptake of the technology<br>• Introduce good farming practices |
| Quality | Low quality of groundnut cake | To achieve 90% safe and nutritive groundnut cake by 2032 | • Capacity build farmers on groundnuts harvesting and post-harvest handling techniques.<br>• Establish aggregation centres with standard storage facilities.<br>• Promote public-private partnership on groundnuts value addition, processing, and standardization.<br>• Enhance close monitoring of farm activities by extension workers.<br>• Assess quality raw materials to promote quality cakes |
| Processing/ Value Addition | Limited processing of ground-nuts into cake | To increase the volumes of processed/ pressed groundnuts to 70% of produce by 2032 | • Capacity build value chain actors on homemade feed formulation technologies<br>• Support eight (8) producer organizations to process and add value to groundnuts.<br>• Form sensitization forums to encourage more farmers to embrace this crop production |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Marketing | Low volumes of traded groundnut cake | To increase the amount of groundnuts traded to 110.5 MT of groundnut seed cake annually | • Promote groundnut seed cake for animal feeding.<br>• Establish strategic distribution/aggregation facilities.<br>• Promote commercialization of groundnut seed cake<br>• Capacity build on marketing strategies<br>• Introduce policy on marketing to regulate supply and price |
| Profitability | Low returns on investments | Enhance entrepreneurial skills of 70% of groundnut farmers by 2032 | • Enhance entrepreneurial skills of the value chain actors.<br>• Promote proper handling, packaging, storage and transportation techniques of groundnuts and groundnuts products.<br>• Improve infrastructure (road network, electricity) in the value chains grow areas to minimize losses |
| Physical Environment | Adverse climate change effects | To mitigate against unfavoura-ble climate change conditions e.g., drought | • Promote agroforestry through intercropping with fodder trees<br>• Promote soil and water conservation by using climate-smart technologies and practices<br>• Enhance timely updates on weather forecasts to value chain actors<br>• Embrace Indigenous Technical Knowledge (ITK) |
| Policy Environment | Inadequate policy on fodder production and utilization | To develop policy on ground-nut production, utilization, and marketing | • Develop a fodder policy to anchor a sub-policy on groundnut production.<br>• Introduce law enforcement strategies |

### 3.6.9 STRATEGIC FRAMEWORK FOR BLACK SOLDIER FLY ((BSF) VALUE CHAIN

The Black Soldier Fly (Hermeti illucens) is a common and widespread fly of the family Stratiomyidae. It is presently the most farmed insect in the world. The insect is ideally suited for food and feed production due to its rapid reproduction cycle and high concentration of protein that can be used in animal feed especially for fish, poultry and pigs. The larvae have voracious appetite and can be used for composting household food scraps and agricultural waste products.

Under culture systems, BSF eggs are laid in the decomposing matter so that the emerging larvae can immediately access food sources. With warm (about 270C) and moist conditions (of 30-70% humidity) an adult female lays 206-639 eggs. During the production phase, temperature, humidity, and food supply are carefully controlled and optimized for the growth of larvae, which reach their maximum body mass in only six days. In this period, the larvae rapidly consume nutrients from the organic waste to prepare themselves for the following stage of their life as adult flies. When they are ready to be harvested, the larvae consist of 40 to 65% protein. They are dried and then processed to provide an insect meal which is used in feed formulation.

It takes, on average, about 9.35 MT of food scrap (wet weight) to produce 1 MT (wet weight) of BSFL and it takes 18.7 MT of scrap food to produce 1 MT of dried BSFL. The production of BSFL in an area of 5M by 10 M yields 2 MT fresh BSFL per annum.

There are no farms culturing BSF in Taita Taveta currently and, therefore, there is a great opportunity for investing in this venture, especially because there is readily available food waste to be recycled.

**Challenges in Black Soldier Fly farming**

- Low skills in BSFL production.
- Inadequate access to certified and quality brood stock.
- Lack of market linkages between producers and consumers in BSFL farming
- Lack of processing and value addition of BSFL products
- Lack of access to high quality organic waste
- Low community awareness of insect farming and opportunities therein
- Lack of policy on the insect farming

Details of the BSFL value chain strategic development framework are presented in Table 27.

*Table 27: Strategic Framework for Protein Sources of Animal Origin (Black Soldier Fly)*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Expensive protein source ingredients for fish feed formulation. | • To promote BSFL farming as an alternative protein source and achieve an average annual production of 89.92 tonnes by 2032.<br>• To establish eight model insect farming outlets | • Capacity-build farmers and groups on insect farming<br>• Capacity build extension staff on BSFL<br>• Form eight BSFL farmer clusters and construct BSF demonstration farm<br>• Upscale BSFL production through establishment of eight BSFL farms<br>• Procure simple cost-effective farming equipment for BSFL rearing<br>• Enhance access to machinery, equipment, and necessary input for BSFL farming<br>• Train fish farmers on BSFL farming techniques |
| Feed quality and standardization | Lack of certified BSF nurseries in the county | To introduce 40 kg of BSFL brood stock in Taita Taveta by 2025 | • Identification of BSFL certified farms in Kenya<br>• Capacity build on good BSFL farming practices. |
| Value Addition and Processing | Lack of BSFL processing and value addition sites in the county | Establish eight processing and value addition BSFL units | • Establish processing units and rearing centres<br>• Facilitate access to machinery and input necessary for BSFL processing and value addition.<br>• Capacity build the VCAs and service providers<br>• Train farmers on techniques for BSFL defatting<br>• To promote the use of locally available techniques in BSFL farming (simple hatchery tools and sun-drying in BSFL farming)<br>• Promote technologies such as sun drying to reduce post-harvest losses |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Marketing | Lack of market linkages between producers and consumers of BSFL | To facilitate market linkage of four farmer co-operative societies by 2027 | • Formation of four farmers' co-operative societies<br>• Training on entrepreneurial skills<br>• Promote formulation, standard packaging, and branding of BSFL formulated feeds. |
| Profitability | Low entrepreneurship skills in BSFL farming | Enhance entrepreneurship skills in 70% of BSFL producers by 2032 | • Train on entrepreneurship skills in the production of BSFL<br>• Commercialize the BSFL and brood stock<br>• Promote feed formulation using BSFL |
| Physical Environment | Lack of high-quality organic waste materials and poor disposal | Promote recycling of organic waste materials and disposal | • Map damping sites<br>• Establish collection and aggregation points for organic waste<br>• Train technical staff and farmers on waste handling procedures<br>• Formation of linkage forums and training sessions for value chain players in BSFL production<br>• Community dialogues on separation and handling of waste |
| Policy Environment | Lack of policy on insect farming | To develop a county insect farming and management policy | • Develop a county insect farming policy |

### 3.6.10 STRATEGIC FRAMEWORK FOR FIELD-BASED FEED (PASTORAL/ RANGELAND/ FREE-RANGE)

In Taita Taveta County, natural or uncultivated pastures take up 90% of grazing pastures. This is significant animal feed, which is mostly utilized as field-based feed where the animals are allowed to graze. Currently, 10 acres of uncultivated pasture can support an average of 1 TLU (250kg livestock body weight per unit).

To meet the county demand for livestock products, the county needs to improve the carrying capacity to 1 TLU per six acres by 2032 with a mid-term goal of eight acres per TLU. The low-carrying capacity is brought about by poor biomass cover due to soil degradation, overstocking, invasive species of obnoxious weeds and extinction of some nutritive indigenous species of grasses and browse.

**Common challenges**

- Limited knowledge on pasture and integrated landscape management
- Poor grazing plans leading to overstocking on natural pastures
- Low quality pasture and encroachment by invasive weed species
- Human-wildlife conflict
- Climate change and vulnerabilities
- Environmental degradation
- Canopy encroachment

**Opportunities**

- Reseeding of the degraded lands
- Natural pasture improvement and management
- Availability of land for pasture establishment
- Commercialization of hay and seed production and conservation
- Establishment of grazing reserves

*Table 28: Strategic Framework for Field-Based Forages*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production/ Productivity | Low production/productivity | To improve the annual carrying capacity of natural pastures from 10 acres per TLU (each 250 kg) to 8 acres per TLU by 2027 and to 6 acres per TLU by 2032 | • Reseed the degraded rangeland with high yielding pasture species.<br>• Use enclosures to allow natural forage regeneration.<br>• Practice mobile boma technology to fertilize and reseed with a broad spectrum of species.<br>• Promote holistic and integrated landscape management practices.<br>• Support ranches to develop land use and grazing plans<br>• Promote pasture production in ranches and community |
| Quality | Low quality natural pasture | To improve the quality of 80% of natural pastures by 2032 | • Facilitate removal of unpalatable and invasive species<br>• Facilitate the development of grazing plans |
| Processing and Value Addition | Low value addition on natural pasture | To enhance value addition of natural pastures by introducing 3 legume species in 50% of natural pastures by 2032 | • Evaluate 5 legume species and select 3 promising ones by 2025<br>• Bulk 3 tonnes of seeds of the selected legumes by 2027<br>• Integrate/intercrop the legumes in natural pastures by 2032 |
| Physical Environment | Degraded rangelands | To conserve the environment by arresting soil erosion in 70% of natural pastures | • Promote agroforestry in ranches using fodder trees<br>• Capacity build ranchers on pasture and fodder technologies, innovation, and management practices<br>• Establish water harvesting structures to arrest erosion and degradation<br>• Control invasion of rangelands by invasive plant species<br>• Develop grazing management plans |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Policy Environment | Inadequate policy on range land management | To develop policy on rangeland management | • Review and implement the ranching and grazing management policy 2019 |
| | Uncoordinated communication approaches | To promote co-ordination and communication in the livestock feed sub-sector | • Establish a multi-sectoral stakeholder forum for ranches commercializing pasture production.<br>• Establish joint monitoring and evaluation by all stakeholders |

## 3.7 OTHER STRATEGIC INTERVENTIONS

Strategic investments in pasture and fodder production and conservation through a value- chain approach will ensure that livestock productivity is increased and maintained even in the wake of droughts. This strategy focuses on key priority value chains that will achieve this. However, there are global interventions that will create a good enabling environment for the industry. These interventions are geared toward establishing an appropriate framework for spurring growth of the industry and are presented in Table 29.

*Table 29: Other Strategic Interventions*

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Production and Productivity | Inadequate extension services | To increase extension to farmer ratio from the current 1: 2,000 to the FAO recommended 1: 400 | • Recruit additional extension officers<br>• Promote public-private partnerships (PPPs) on extension services.<br>• Set up an E-extension system.<br>• Facilitate mobility of extension service providers.<br>• Establish farmers field schools |
| | Low access to mechanization services | To improve provision of mechanization services in feed production from 5% to 25% | • Strengthen AMS in the county structure.<br>• Incentivize private sector investment in animal feed mechanization.<br>• Establish and strengthen a mechanization service provider network.<br>• Link farmers to funding opportunities for mechanization investment.<br>• Public private partnership on mechanization investment<br>• Enact a county policy on mechanization |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| | Inadequate access to water for feed production | Increase access to water for feed production by 30% | • Promote water harvesting and conservation.<br>• Facilitate equipping of water harvesting infrastructure at small and large scale levels<br>• Incentivize private sector investment in water for feed production.<br>• Construct and/or rehabilitate 100 water sources for animal feed production |
| | High level of land-scape degradation | To rehabilitate 500,000 acres by 2032 | • Initiate a rangeland rehabilitation and reseeding program.<br>• To set up a range management directorate in the county<br>• Support actors to develop land use plans and spatial plans<br>• Strengthen the implementation of Taita Taveta Ranching and Grazing Management policy |
| | Low storage capacity | Increase the feed storage capacity from 1,500 tonnes/year to 15,000 tonnes /year | • To establish 4 strategic feed reserves in the county<br>• To construct and operationalize 20 hay barns across the county.<br>• To promote aggregation programs |
| | High incidences of pests and diseases in the county | To reduce pest and disease incidences by 80% by 2032 | • Strengthen pest and disease surveillance systems.<br>• Promote integrated pest and disease management practices<br>• Promote good agricultural practices |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Quality | High levels of mycotoxins in animal feed | Reduce incidences of feed losses through mycotoxins contamination by 10% | • Capacity build actors on feed safety and control measures<br>• Establish a feed safety surveillance system in the county.<br>• Facilitate access to testing equipment.<br>• Liaise with regulatory agencies for surveillance, certification and testing |
| Financing | Low investment in livestock feed sector | To increase the budgetary allocation to livestock sector to 10% of the annual budget | • Lobby and advocacy for meetings.<br>• Advocate for increased investments in livestock feed enterprises by private and public entities.<br>• Incentivize investments in livestock feeds enterprises.<br>• Promote index-based livestock insurance to de-risk farmers in animal feed production business<br>• Sensitize policy formulators on importance of livestock feed financing. |
| | | Improve access to financial services to livestock feeds VCA by 10% | • Establish a livestock enterprise fund to stimulate farmers in animal feed production business.<br>• Partner with financial institutions to create packages (products) specifically for livestock feed value chain development. |
| | | Increase climate finance invest-ments in the county from USD100,000 to USD500,000 by 2032 | • Promote public-private partnerships on feed value addition and processing.<br>• Support formation of a Taita Taveta association of animal feed producers and manufacturers<br>• Capacity build extension personnel and livestock feed producers on livestock feed value addition and processing |

| Strategic Pillars | Strategic Issues | Strategic Objectives | Strategic Interventions |
|---|---|---|---|
| Marketing | Information asymmetry among various feed VCA | To develop an animal feed market information system | • Develop a county livestock feed information system, for marketing. |
| | Inadequate live-stock feed marketing infrastructure | To rehabilitate and expand 20 feed business centres | • Rehabilitate/establish animal feed business centres.<br>• Lobby for a Taita Taveta County management of the Bachuma livestock holding zone |
| Profitability | High cost of input | To establish a county animal feed subsidies program | • Establish a county livestock enterprise fund to subsidize livestock feed inputs.<br>• Establish a county animal feed access program |
| Policy Environment | Inadequate policy, legal and institutional framework | To domesticate five policies and/or regulations on animal feed | • Review the county Livestock Movement and Produce Act.<br>• Develop guidelines on land-carrying capacity.<br>• Develop guidelines on ranch management plans.<br>• Develop livestock identification and traceability guidelines.<br>• Develop a PPP framework on feed |

# Chapter FOUR

## IMPLEMENTATION ARRANGEMENTS

The implementation of the strategy should be in partnership with the national government and development partners. National government and county government should provide the necessary enabling environment for the county to develop own priorities and specific context such as agro-ecological zones and farming systems. The implementation of the strategy will be driven by the county department responsible for livestock development, involving all actors along the various livestock feed value chains, including producers, processors, marketers, researchers, input suppliers and their associations.

To move from the strategic statements to the outcome level, operational plans with specific indicators will need to be developed to generate activities, outputs and outcomes that will contribute to the achievement of the goals stated in the strategy. Flagship projects will be developed out of the operational plans and prioritized for implementation. The flagship projects will be aligned with the county integrated development plans.

## 4.1 CO-ORDINATION MECHANISMS

The county department responsible for livestock and fisheries will co-ordinate implementation of the animal feed strategy. The County Chief Officer (CCO) responsible for livestock shall convene a county steering committee to approve decisions of technical committees for animal feed. The CCO, in consultation with technical directorates, will appoint technical members of respective technical committees and shall approve implementation programs, projectproposals and plans prepared by the technical directorates.

## 4.2 IMPLEMENTATION PLAN

The strategy aims to achieve all the objectives outlined in the strategy as summarized in Table 30. The strategy will use drivers such as programs, projects, and annual development plans to implement strategic interventions. A detailed matrix for each value chain will be attached in the annex and a summary outlining the objectives, activities, outputs, indicators of performance and timeframe described.

*Table 30: Implementation Plan*

| Strategic Pillars | Strategic Objectives | Indicator | Targets | | Responsibility |
|---|---|---|---|---|---|
| | | | 2027 | 2032 | |
| Production/ Productivity | To increase animal feed availability from two million tonnes to 5.5 million tonnes by 2032 | Number of MT produced | 3.4 Million | 5.5 Million | CGTT, GOK, NGOs |
| Quality | To improve feed safety and quality in the county | Number of value chain actors sensitized | 30,000 | 50,000 | • Regulatory Bodies (KEPHIS, KEBS, DVS)<br>• Researchers<br>• Training institutions |
| Value Addition and Processing | To improve value addition and processing of feed in the county | Number of feed processing hubs established | 10 | 20 | CGTT, GOK, NGOs, private sector |
| Marketing | To establish animal feed market information system | Number of market info systems established | 2 | 4 | CGTT, GoK NGOs, private sector |
| Profitability | To increase profitability by reduction of post-harvest losses from 57% | % reduction of loss | 10 | 20 | CGTT, GoK, NGOs, private sector , re-search institutions |
| Policy Environment | To strengthen policy, legal and institutional capacity | No of policies developed and implemented | 3 | 9 | CGTT, GoK, NGOs, private sector, researcher institutions |

*Source: Strategic Plan Team 2022*

## 4.3 FINANCIAL PLAN

Approximately KES 3.56 billion will be requiredto fully implement this Taita Taveta County Animal Feed Strategy over the 10-year period (Table 31). The Chief Officer shall prepare financial plans to mobilize resources for the strategy. The developed plans shall be used to secure and apply the required financing, and there will also be preparation of a medium-term expenditure framework for the animal feed. The detailed implementation plans for the priority value chain are annexed.

*Table 31: Resource Requirements for the Period Financial Year 2023/24 to FY 2031/32*

| PILLAR \ YEAR | Resource Requirements (Million KES) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | Total |
| Production & Productivity | 178 | 198 | 269 | 162 | 103 | 109 | 105 | 59 | 48 | 24 | 1,255 |
| Quality | 41 | 59 | 34 | 30 | 16 | 23 | 21 | 20 | 17 | 11 | 272 |
| Value Addition and Processing | 42 | 58 | 64 | 21 | 21 | 21 | 21 | 21 | 21 | 4 | 294 |
| Marketing | 17 | 84 | 98 | 33 | 33 | 83 | 15 | 12 | 15 | 6 | 396 |
| Profitability | 13 | 23 | 15 | 12 | 10 | 14 | 10 | 14 | 6 | 4 | 121 |
| Physical Environment | 28 | 40 | 32 | 21 | 19 | 27 | 22 | 22 | 13 | 6 | 230 |
| Policy Environment | 64 | 34 | 24 | 9 | 4 | 56 | 4 | 2 | 3 | 1 | 201 |
| **Total** | **383** | **496** | **536** | **288** | **206** | **333** | **198** | **150** | **123** | **56** | **2,769** |

## 4.4 INVESTMENTS PLANS

These are plans that are generated to demonstrate cost-benefit analysis of the county feed value chains in terms of land to be utilized, feed quantities to be produced, income to be earned and products for fodder and pasture and further show how many jobs are created upon full implementation of the strategy (Table 32).

*Table 32: Feed Commodity Cost-Benefit Analysis and Value Proposition to Investors*

| Value chains | Input Analysis | | | Output Analysis | |
|---|---|---|---|---|---|
| | Acres | Metric Tonnes | Total cost (Million KES) | Annual Net Income (Million KES) | Job Creation[1] |
| **Energy Sources** | | | | | |
| Hay | 340,602 | 459,916.1 | 11,100 | 2,220 | 793 |
| Maize Grain | 95,831 | 203,671 | 3,830 | 766 | 274 |
| Forage Grasses | 12,033 | 80,641 | 1,211 | 242 | 87 |
| Sorghum Grain | 6,899 | 3,449 | 278 | 56 | 20 |
| **Protein Sources** | | | | | |
| Sunflower Seed Cake | 199,714 | 199,714 | 9,737 | 10,711 | 3,825 |
| Legume Fodder | 3,380 | 6,490 | 173 | 305 | 109 |
| Sweet Potato Vines | 13,720 | 164,640 | 1,659 | 332 | 118 |
| Groundnuts | 3,505 | 1,647 | 140 | 28 | 10 |
| **Animal Protein Sources** | | | | | |
| Black Soldier Fly | 4.5 | 135 | 8 | 28 | 10 |
| **Natural Pastures** | | | | | |
| Natural Pastures | 1,481,865 | 4,622,221 | 8,581 | 2,574 | 919 |
| **Total** | **2,157,553.5** | **5,742,524.1** | **36,709** | **17,262** | **6,165** |

[1]*It is assumed 30% of net income is used for job creation at an annual salary of KES 840,000 per job created.*

## 4.5 COMMUNICATION PLAN

The communication plan will be guided by the communication strategy on fodder innovation technologies of 2020 developed by the county department of agriculture, livestock, and fisheries. The strategy outlines the flow of information among the stakeholders within the national government, between national and county governments, among the county governments, between the government and the private sector, farmers, the public, professionals, and other stakeholders.

The key messages to be communicated will focus on the topics of innovations in forage production, livestock husbandry, landscape restoration, grazing management, feeding strategies during drought, value addition, climate smart innovative technologies, marketing and policies. This will ensure harmonized and targeted messages will be shared with communities.

## 4.6 MONITORING, EVALUATION, LEARNING AND ACCOUNTABILITY

The overall goal of monitoring and evaluation is to track and demonstrate realization of results emanating from implementation of the strategic plan. It will also provide feedback to the leadership and stakeholders on its performance. Monitoring and evaluation will be based on a framework, which involves various strategic pillars.

The framework will include definition of responsibilities, tracking of indicators, adoption of monitoring and evaluation mechanisms, reporting process, report dissemination process, timeliness, and financing. Tracking of the Strategic Plan targets will be done regularly, and its output will form part of the department's quarterly and annual performance reports. This will, in turn, lead to critical assessment of attainment of departmental objectives.

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