



Food and Agriculture Organization  
of the United Nations



# Kenya's Investment Opportunities

Hand-in-Hand (HiH) Initiative | Rome,  
Italy | 15<sup>th</sup> to 17<sup>th</sup> October 2024



# HiH Milestones – Post 2023 Investment Forum

## Linked Resources

### Government Commitments to Medium Term Plan (MTPIV) 2023-2024

#### Planned Public Investments in the MTPIV 2023-2027 Cycle:

1. **US\$153.9M** Investments 200 Small Dams, 1000 Water Pans in ASALs
2. **US\$716.5M** investments in 1,150 irrigation water harvesting projects to provide 500M Cubic Meters of Water in ASAL & 200 Small dams, Water Pans & Boreholes
3. **US\$413.5M** Investments in harvesting 600M Cubic Meters of water from 18 'Laggahs' to irrigate 130,000HA of Land over 5-years
4. 300 Underground Climate Proof Underground Reservoirs in ASALs with a capacity of 1M Cubic Meters
5. **US\$64.7M** for cotton production (certified seeds, value addition & processing)
6. **US\$443M** for Leather & Leather Products Development
7. **US\$2.5M** for Livestock Identification & Traceability System (LITS)

## Resources Mobilized

### Private Sector

1. **US\$23M** Animal Feeds Processing Plant by De Heus in Machakos County
2. **US\$615,000** by De-Risking, Inclusion & Value Enhancement in Pastoral Economies (DRIVE Project) to Hay Farmer increase Production from 300,000 to 1M bales in Makueni County
3. Lucerne Pelleting Factory by Comfort Feeds Limited in Nakuru County

### Public Private Partnerships (PPP)

1. Maize Production for livestock by Cereal Growers Association (CGA)
2. **US\$400,000** land purchase for Beef processing facility by Earth Friendly Export EPZ Kiambu County

## Resources Being Negotiated

### Government & Private Sectors

1. Livestock Identification & Traceability System (LITS)– Cowtribe Technology Company Pilots
2. Bidding Rounds on Animal Feeds Production under the Land Commercialization Programme
3. Memorandums of Understanding between Kajiado County and Private Sector on Investments in Feedlots and Slaughterhouse for **US\$23M & US\$8.5M** Respectively

# Outline

## Objective:



Catalyzing investments in climate smart livestock interventions in Arid & Semi Arid Lands (ASALs) of Kenya

1. Hand-in-Hand Milestones
2. Macro-Economic Indicators
3. Macro-Economic Framework
4. Investment Climate - Why Kenya?
5. Kenya's HiH Investment Case:
  - a) Animal Feed Production
  - b) Warehousing
  - c) Agro-Industrialization

# Kenya's Macro-Economic Indicators

## Kenyan Economy

1. Economy – US\$25 billion
2. GDP Per Capita - US\$2,172
3. GDP Growth Rate – 5.6%
4. 3<sup>rd</sup> Largest Economy in Sub-Saharan Africa

Source: KNBS 2024

**Green Energy** – 94% Low carbon Development Path (Geothermal, Hydro, Wind & Solar, Hybrid Mini Grids etc.)

Source: KNBS 2024

## Trade & Investment

1. Free Market Economy
2. Liberal Financial & Capital Markets
3. Investor Facilitation – KenInvest
4. Locational Economies – EAC, COMESA, AFTA, Transport, logistic & technology hub, two ports

### Ease of Doing Business 2020:

- Rank - 56
- Score – 73.2% (2.2% Rise)

Source: World Bank Reports

## Other Demographics



51,500,000

Sources: KNBS, 2023



US\$111 Billion

Source: KNBS, 2024



35.1 %

Source: World Bank, 2024

POVERTY

**Non-Commercial Risk Guarantee:**  
Multi-lateral Investment Guarantee  
Agency Framework



# Macro- Economic Framework – Govt.’s Bottom-Up Economic Transformation Agenda 2023 - 2027

## Growth in New Jobs created & Growth in Incomes

### Agriculture

- Adequate quality and affordable food
- Reduction in food imports
- Increase in value of export
- Industrialization

1

### MSMEs

- Access and affordable credit
- Dignified working environment
- Dignify & Formalizing MSMEs

2

### Affordable Housing

- Structured supply of affordable and quality housing
- Reducing land fragmentation
- Job creation

3

### Digital & Creative Economy

- Access to government services
- Fighting corruption
- Digital jobs
- Entrepreneurship

4

### Health

- Primary healthcare
- Health Insurance Coverage
- Health Systems capacity
- Health Data Systems

5

**Cooperatives & Other Enablers**

# Macro-Economic Framework – Kenya’s Livestock Economy

## LIVESTOCK POPULATION IN KENYA



16.8 Million Beef  
5.1 Million Dairy



33.7 million Goats



22.4 million Sheep



4.4 Million Camels

- A** Livestock sector accounts for 80% of ASAL’s economy
- B** GDP size of USD 8.7 billion (KES 1.3 trillion) (12% of Kenya’s GDP)
- C** Employs 40% of the population in ASAL areas
- D** Accounts for 30% of the marketed agriculture value
- E** Accounts for 95% of most Pastoral family incomes

Meat Consumption: 553,200 MT US\$1.5 B/Yr.

Meat production: 154,968 MT US\$0.3 B/Yr.

← 398,232 MT Annual Deficit ←

### Beef, Leather & Leather Products - 5-Year MTPIV Investment Plan: US\$55,567M

Leather Aggregation Centers, Feedlots, Reseeding Rangelands, Water Pans, Small Dams & Boreholes, Livestock Export Zones, common user leather processing clusters, tanneries, Dispatch & cold storage facilities, Veterinary Labs, Feed production, Aggregation of 10,000 Hides & 70,000 Skins for supply to tanneries etc)

**Dairy Value Chain – US\$146M 5-Year MTPIV Public Investment Plan: US\$146M** - Feed production & feed centres, mechanization, cooling & processing equipment, Dairy Cooperatives, subsidized inputs, Dairy labs, export warehouses, Milk collection, cooling & processing facilities etc

**Projected Dairy Outcome:** Increased Annual Milk Production to 10.0Billion Litres by 2030, Creation of Decent Jobs, Increased value add & improved earnings by farmers, Increased dairy Exports & Export Earnings & **Development of Camel Milk Aggregation & Cooling Facilities (US\$14.6M); Camel Milk Processing Factory (US\$7.7M)**

Meat Production & Demand

Leather

Dairy

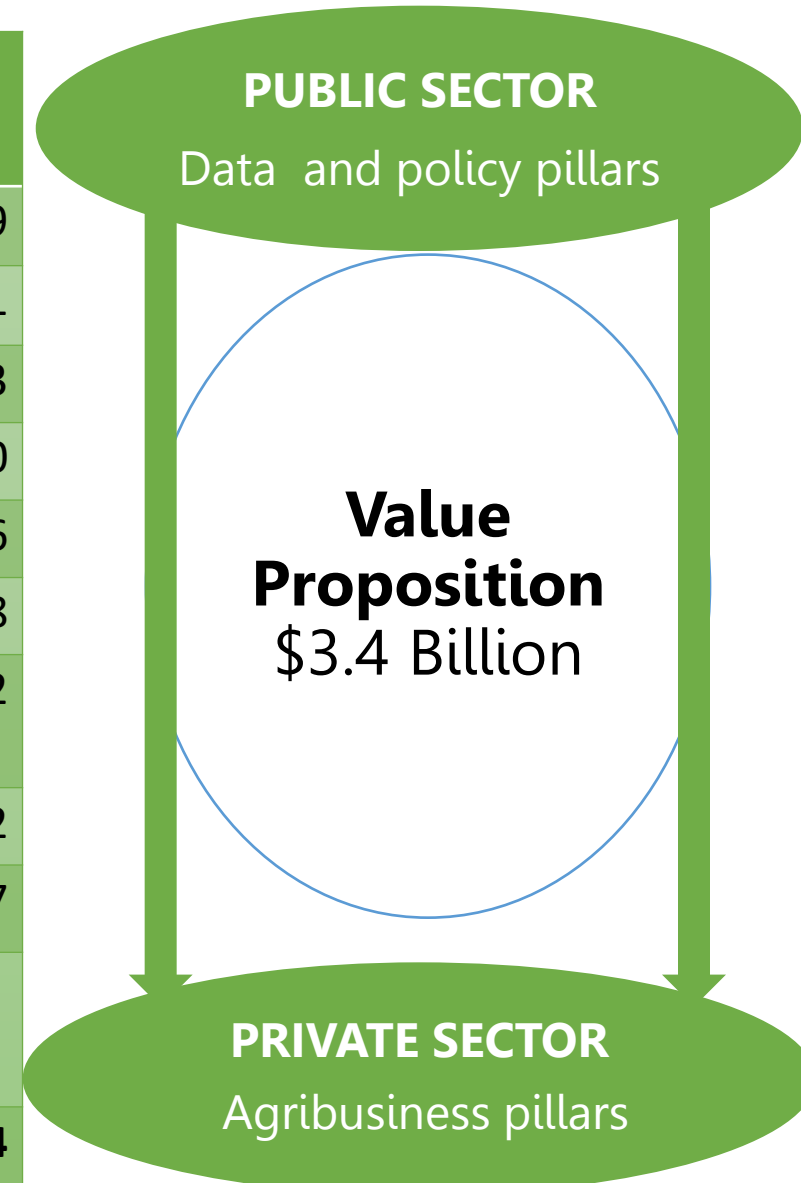
Investment Opportunities

# Strategic Animal Feeds Investment Planning for Kenya (2022 - 2032)

## Feed Industry Challenges

1. 60% Animal Feeds Deficit
2. 46% Animal Feeds Post Harvest Losses (2019 Animal Feeds Balance Sheet, Ministry of Agriculture & Livestock Development)
3. High Cost of Animal Feed inputs that account for 60 - 80% Animal Feeds Production Cost
4. Imported Inflation – Importation of Approx. 500,000MT/Year of Feed Ingredients
5. Animal Feeds Standards & Quality
6. Low Mechanization
8. Limited Pasture Storage Infrastructure
9. Low Value Addition & Processing Capacities
10. Limited Protein Sources

Feed resource	Metric Tons	Hectares (Ha)
<b>Hay</b>	447,504.6	233,989
<b>Silage</b>	4,193,366	524,171
<b>Maize</b>	3,123,852	462,793
<b>Sorghum</b>	896,717	199,270
<b>Cassava</b>	438,483	25,056
<b>Soya beans</b>	204,625	110,908
<b>Sunflower seed cake</b>	1,268,147	289,862
<b>Cotton seed Cake</b>	455,051	104,012
<b>Lucerne</b>	4,296,496	211,637
<b>Black Soldier Fly (BSF)</b>	151,840	1,626
<b>Total</b>	<b>15.5M</b>	<b>2,163,324</b>





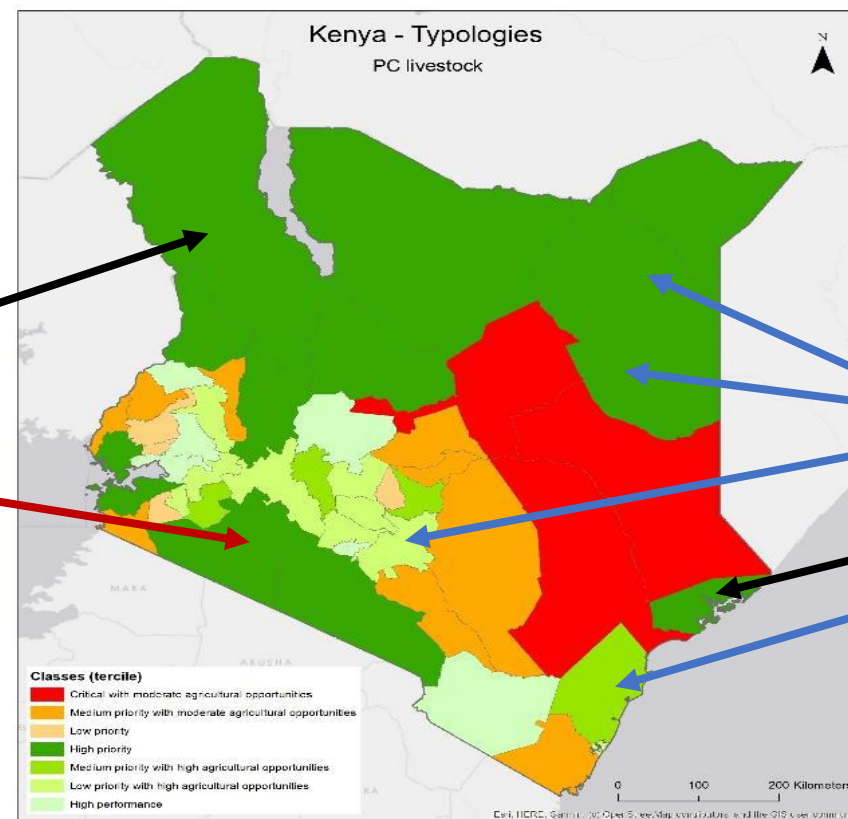
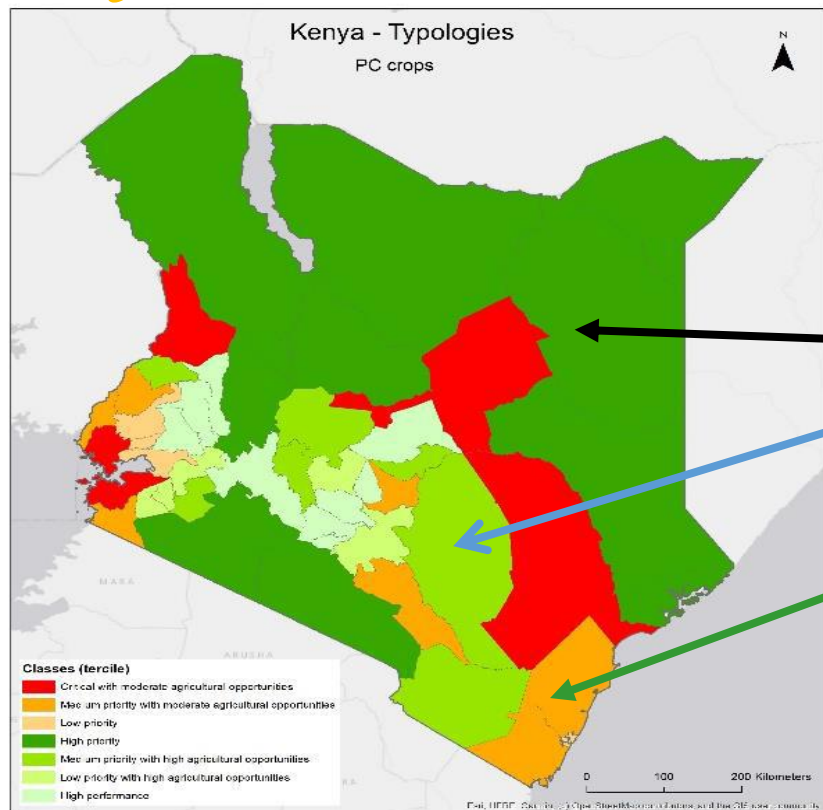
Kenya's Investment Climate – Incentives  
for Agriculture

Item	Income Tax Incentives (Investment Allowance <sup>1</sup> & Exemptions from Income Tax	Deduction & Exemptions from	Import Duty & VAT Incentives (Exempted/Zero-rated)
Farm Works <sup>2</sup>	100% Investment allowance <sup>1</sup> on expenditure on buildings and machinery	deduction on capital expenditure on buildings and machinery	
Agricultural pest control products			Zero-rate
Raw materials for manufacture of agriculture pest control products and fertilizers			Zero-rated
Input of raw materials locally purchased or imported for the manufacture of animal feeds			Zero-rated
Importation of Agriculture Equipment			Import Duty Exempt

1. The rate of capital allowances has been rationalized to a maximum of 100%. Minimum investment should be US\$1.9M (outside Nairobi and Mombasa) in that year of income
2. Farmhouses, fences, dips, water & electricity supply works and other works necessary for the proper operation of the farm



# Crops-Livestock System HiH Typology Maps



Irrigated  
 Maize  
 Grain &  
 Silage;  
 Assorted  
 Legumes;  
 & Cotton  
 Seeds

Pasture  
 Storage,  
 Cotton  
 Ginneries  
 & BSF

## Integration of Enterprise Suitability Maps & HiH typologies

Value Chains: Assorted Forage & Cotton Seeds, Maize Grain & Silage, Cotton Ginning & Cake Milling, Pasture Storage & Black Soldier Flies



# Investment Cases



## *Integrated Crop - Livestock Production System*

**Water**

**Feed  
Production**

**Ware Housing**  
*(Storage and Conservation  
facilities)*

**Agro-  
Industrialization**

## National water situation

Kenya's Territory 582,646 km<sup>2</sup>, where:

About 490,000 km<sup>2</sup> (>80%) is classified as Arid and Semi-arid Land (ASAL)

Annual Water resources - renewable sources,

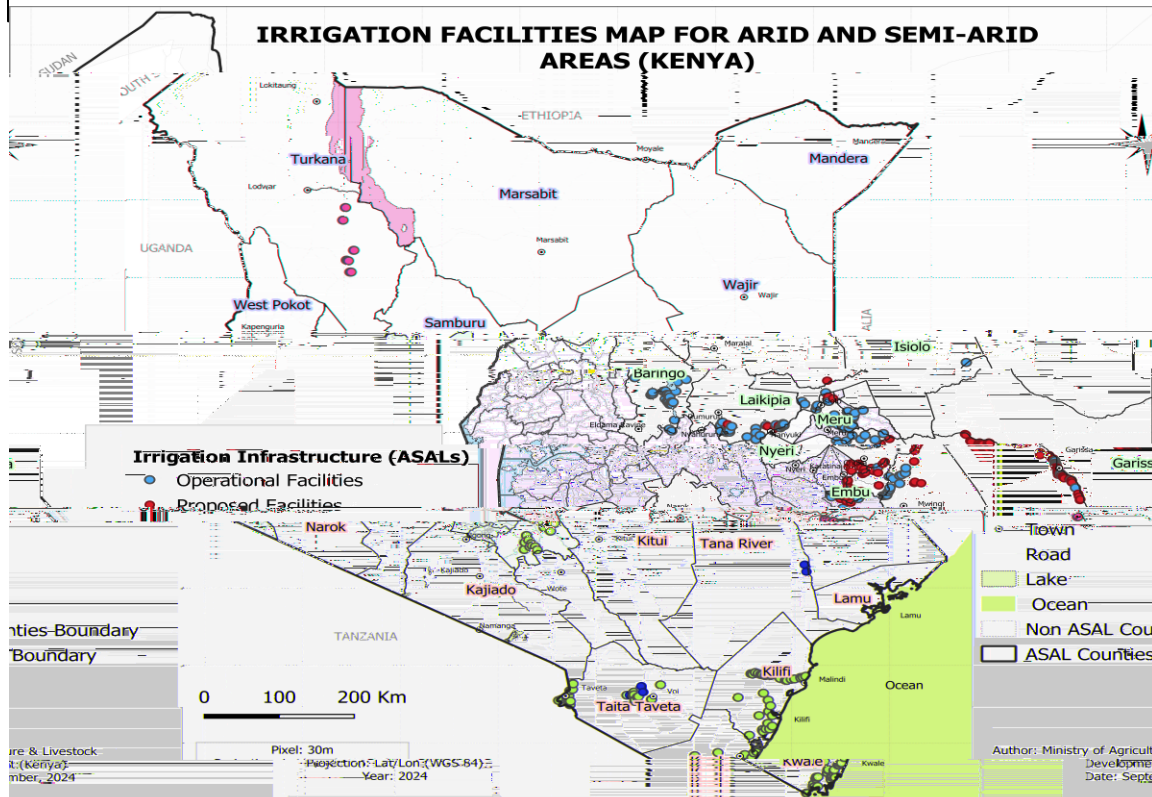
Surface water runoffs = 11,230 km<sup>2</sup>

Underground recharge = 571,416 km<sup>2</sup>

Projected Competition for Water by 2030 – 84% (21,468M M<sup>3</sup>) for irrigation & 2.3% for Livestock

Future Irrigation Outlook – 1.2M Ha under Irrigation by 2030

Water Sources – Ground Water, Conservation & Harvest



## Policy Objective: Strategic Water availability Access & Utilization in the ASALs

Cluster	Type of Dams	No. of Dams	Dam Capacity (million M <sup>3</sup> )	Population	Ha for irrigation	Approximate cost (Million US\$)
Pastoral North-West	Large	4	357.5	127,000	18,863	214.54
	Small	26	14.4	367,000	1,819	19.85
Pastoral North-East	Large	5	419	303,000	87,723	560.00
	Small	43	22.8	987,900	2,881	31.54
Agro-Pastoral	Large	5	183.65	429,088	17,951	385.38
	Small	24	10.45	714,656	1,324	14.38
South-Eastern Marginal Cluster	Large	8	184	1530000	28,023	763.08
	Small	21	12.97	853,200	1,513	20.38
Coastal Marginal Agriculture	Large	1	13.4	18000	850	74.62
	Small	4	6.9	68000	872	9.62
<b>Total</b>		<b>141</b>	<b>1,225.07</b>	<b>5,397,844</b>	<b>161,819</b>	<b>2,223.38</b>



# Feed Production (a) Forage & Cotton Seed Security System

**Policy Objective:** To facilitate feeds inputs supply chain

## Background information

- Annual assorted forage seeds shortage = 30,000MT
- Annually Cotton seed shortage = 420,000 MT

## Interventions

- Certified seed multiplication for ASAL adapted grasses and legumes
- Multiplication of certified cotton seeds for open pollinated and other hybrid varieties.

## Key Investment Information

Investment Outlay US\$	Operating Margin US\$	IRR	NPV US\$
444,444	6,301	23%	15,736

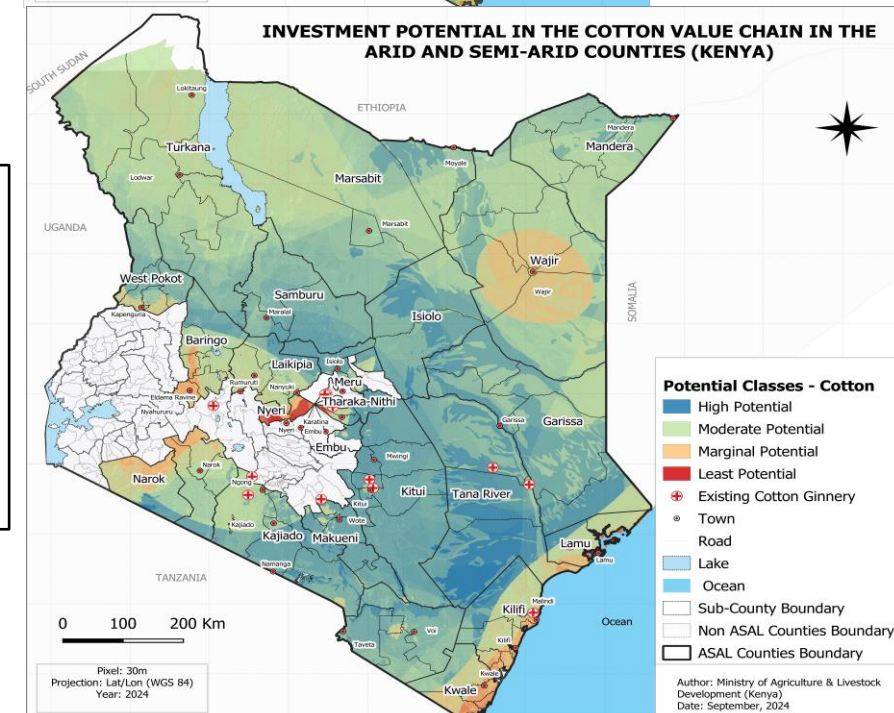
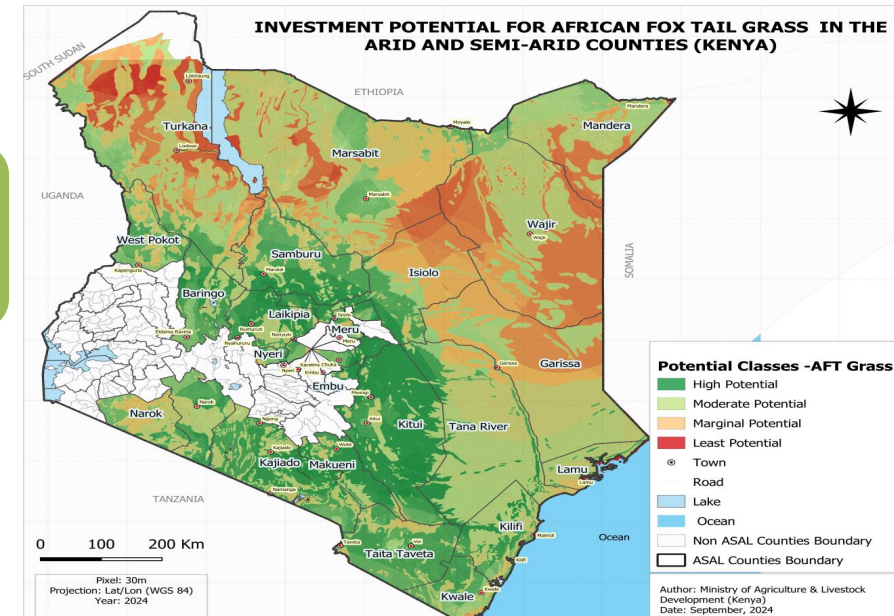
Beneficiaries	
Direct Beneficiaries	93,000
Indirect Beneficiaries	558,000

Per Capital Income Increase - US\$3,160

### Business model and returns

1. Role of Government
  - Create conducive environment
2. Role of firms
  - Hiring land and water development
  - Contract KALRO

**EX-Act Carbon balance:**  
**Total emissions, tCO<sub>2</sub>-e -2,911**





# Feed Production (Seeds, Maize, Silage & Black Soldier Fly)

## Bottlenecks

1. Dependence on rain fed production
2. Lack of availability of large land parcels with irrigation infrastructure on attractive commercial terms
3. Limited availability of quality pasture seeds to meet national demand
4. Limited capacity of local private sector to commercially produce pasture seeds
5. Lack of access to and cost of certified maize seeds & quality inputs and low silage conservation
6. Limited awareness on black soldier fly

## Key Investment

1. Leasing of land on (long-term lease – over 25 years) with some irrigation Infrastructure for large scale production of animal feed ingredients for Animal Feeds Industry (Private Sector) – Establish 10 Maize production 10 Hubs of 800HA Each at a cost of US\$66.7M (Private Sector)
2. Invest US\$1.6M in Maize Production for Silage
3. Invest US\$444,440 in assorted pasture and cotton seed production hubs
4. Invest US\$17.5M in 200 Black Soldier Fly Production Hubs

## Risks

1. Water shortages in ASALs & inherent competition for water between human & Livestock
2. Sustainability of demand for certified seed to support the business model
3. Competition from low-cost seeds available in the market
4. Volatility in maize market & prices
5. Strong Competition from imports from the region under the Common Market protocol
6. High Capital Cost of irrigation infrastructure where none exists
7. High Capital Cost of irrigation infrastructure where none exists

## Mitigation

1. Support Access to public land under the land commercialization programme. Establish linkage if investment to irrigation infrastructures on public lands held by public in ASALs under land commercialization plan i.e National Youth Service, Kenya Meat Commission etc
2. Execution of binding and stable commercial contracts with animal feeds industry for off-take of locally produced animal feed ingredients on predictable commercial terms.
3. Implementation of Large Scale, more efficient animal feed Production Approach to harness economies of scale
4. Link Investments to planned public investments in water supply and irrigation systems in ASALs
5. Development of BSF standards and code of practice
6. Provision of public incentives for production of animal feed commodities – e-voucher subsidy schemes & fiscal incentives on agriculture



# Feed Production (b) Maize Grain & Silage Production

**Policy Objective: To address 60% Animal Feed Shortage**

### Business model and returns

1. Role of Government
  - Create conducive environment
  - Avail Land under Land Commercialization
2. Role of firms
  - Undertaking the Investments – leasing land, water devt
  - Contract KALRO and Kenya Seeds

### Grain for Grain & Milling

- Livestock feeds require a supply of 1.6 million MT

Projected to increase up to 3.0 million MT by the year 2025

### Interventions

- Large Scale Maize Production
- Promote mechanization in production & Processing
- Supply Maize Grain to Feed Millers

### Silage For Livestock Producers/Cooperatives

- Demand is 12,133,583 MT
- Production of 6,552,135 MT
- Facing 50 % shortage

### Interventions

- Innovations/technology
- Feed Business Centres/aggregations
- Contracting models link silage producers Dairy Cooperative/offtakers (feedlot)

### Key Investment Information

Investment Outlay US\$	Operating Margin \$/year	IRR	NPV US\$
66.7 M	1,780,114	20%	3,275,832

### Beneficiaries

Direct Beneficiaries: 1,680  
Indirect Beneficiaries: 5,040

### EX-Act Carbon balance:

Total emissions, tCO2-e -44,802

Per Capita Income Increase – US\$2,264

### Key Investment Information

Investment Outlay US\$	Operating Margin \$/year	IRR	NPV US\$
1,592,593	1,345,785	28%	3,463,873

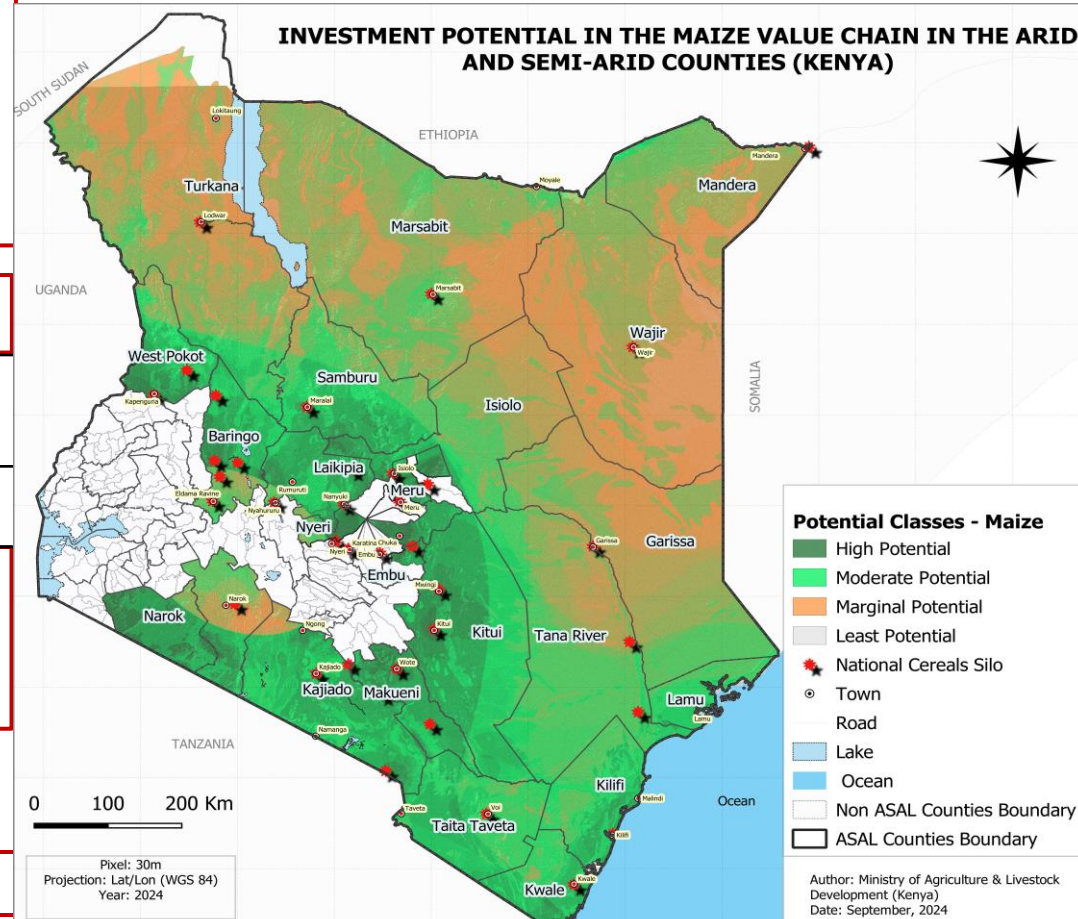
### Beneficiaries

Direct Beneficiaries: 356  
Indirect Beneficiaries: 2,136

### EX-Act Carbon balance:

Total emissions, tCO2-e TBD

Income Per Capita Increase – US\$989





# Animal Feed Production (c) Black Soldier Fly (BSF)

## Policy Objective: To diversify & enhance protein sources

- Situation analysis**
1. Target livestock population (Non Ruminats ) 61 Million
  2. Annual protein requirements = 403,000 MT/Year
  3. Annual protein supply = 40 % availability
  4. Annual protein = 60 % (241,800 MT) shortage

- Interventions**
5. Set up 24000 BSF production units
  6. Total land required = 1626 Ha
  7. Projected annual yield = 151,840 MT (63% production)
  8. Contract farmers for BSF multiplication farming
- Justification**
1. High crude protein (30 – 66%), fat (14 – 40%), essential amino acids, vitamins, and minerals.
  2. **Seamlessly integration of BSF Meal** into various livestock feed formulations
  3. Does not bioaccumulate aflatoxins, *E. Coli* and *Salmonella spp.* (safe)
  4. **Circularity** – BSF transform biowaste into useful biomass and derived products (frass, oil, chitin & chitosan) -
  5. **Less demand for land, water, and feed & other resource-intensive inputs - lower carbon footprint**
  6. Ample scientific evidence & published works on efficacy of BSF as sustainable & climate-smart protein source

- Business model**
- Establishment of 200 modular and scalable BSF production units to produce larva and organic fertilizer/ manure (Frass)

- Role of firms**
- Invest in BSF production units using cost
  - Establish sustainable substrate delivery, sorting, grading and processing
  - Establish other ancillary facilities for incubation, drying, grading

- Role of governments**
- Provide a stable and predictable policy environment for BSF production
  - Create awareness on BSF as an, safe and nutritious source protein ingredient for livestock production
  - Facilitate for policy instruments - BSF standards

**Carbon Dioxide Accounting -48,000**

**Key Investment Information**

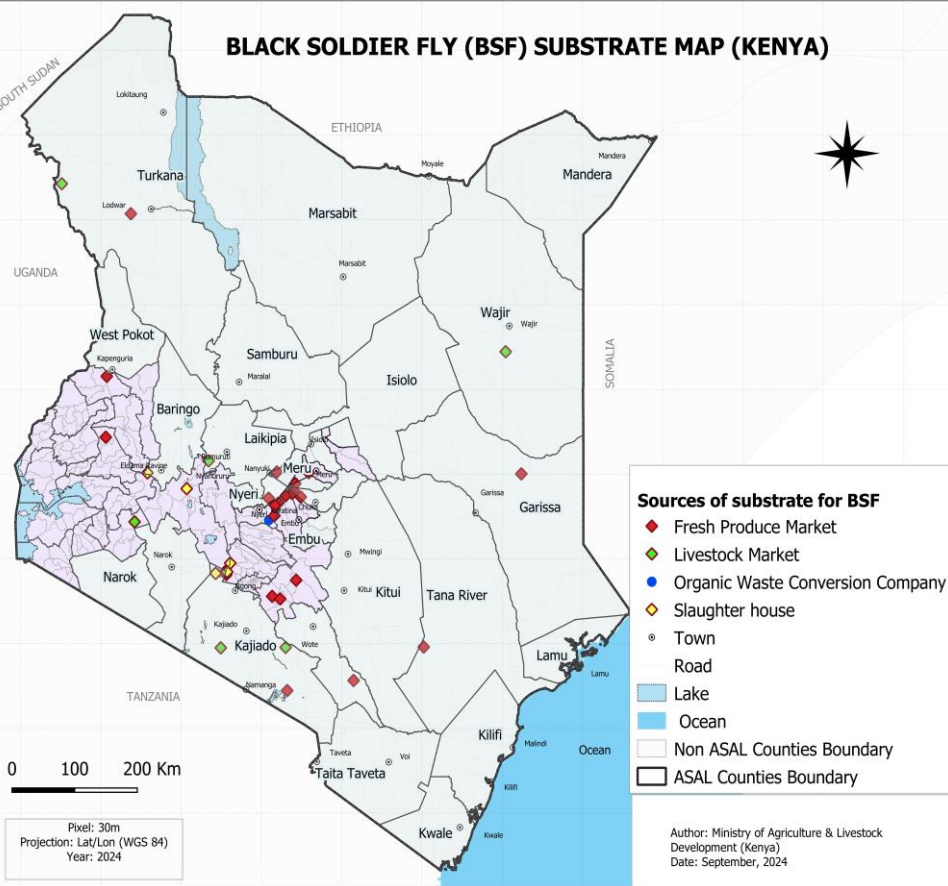
Investment Outlay US\$	Operating Margin US\$	IRR	NPV US\$
23.2 Million	32,022	23%	50,788

**Beneficiaries**

Direct Beneficiaries:	1,000
Indirect Beneficiaries:	2,000
<b>Total Beneficiaries:</b>	<b>3,000</b>

- Climate Smart Benefits**
1. Organic Manure/Frass
  2. Reduced Stress on land & other environmental assets

**Per Capita Income Increase- US\$1,076**





# Warehousing (Storage & Conseravtion)

## Pasture (Hay)

**Bottleneck, Investment,  
Risks & Mitigation**

### Bottlenecks

1. Inadequate storage facilities for hay in medium to long term
2. Weak and undeveloped commodity trading and marketing systems for animal feed commodities such as hay
3. Weak linkages bewteen feed (Fodder) producers and end users (Off takers)

### Key Investment

1. Based on successful pilots, Investment of **US\$109.8M** in 3.121 units of hay storage barns each with total installed storage capacity of 85,000 bales – **Private Sector/cooperatives**
2. Incubating pasture commodity trading systems – pasture (hay) off-take by cooperatives and other entrepreneurs; and upstream supply and distribution of animal feeds to retailers & farmers

### Risks

1. Ability and Willingness to pay for storage infrastructures and/or storage services
2. Sustainability of Market Demand to sustain the cash flows of the enterprise

### Mitigation

1. Upscaling pilot micro-Hay Storage Barns in Taita Taveta County – Successful Farmers’ cooperative off-take
2. Leveraging on locally available & low-cost appropriate construction technologies/materials



## Policy Objective: To address 46% Animal Feed Post Harvest Losses

Beneficiaries	
Direct	16,000
Indirect	84,000
<b>Total</b>	<b>100,000</b>

EX-Act Carbon balance:  
Total emissions, tCO<sub>2</sub>-e **-TBD**

**Per Capita Income Increase – US\$996**

**Background Information**

- Total annual forage production = 44 Million MT
- Total annual required storage capacity = 34,400 facilities @ 100,000 bales
- Currently storage facilities few, small and inadequate = 10,000 Bales
- Experiencing high feed post harvest losses = 46.35% pasture/hay produced

**Interventions**

- Investment in pasture storage facilities by the private sector
- Provide Storage Services to Farmers & Cooperatives/Off takers

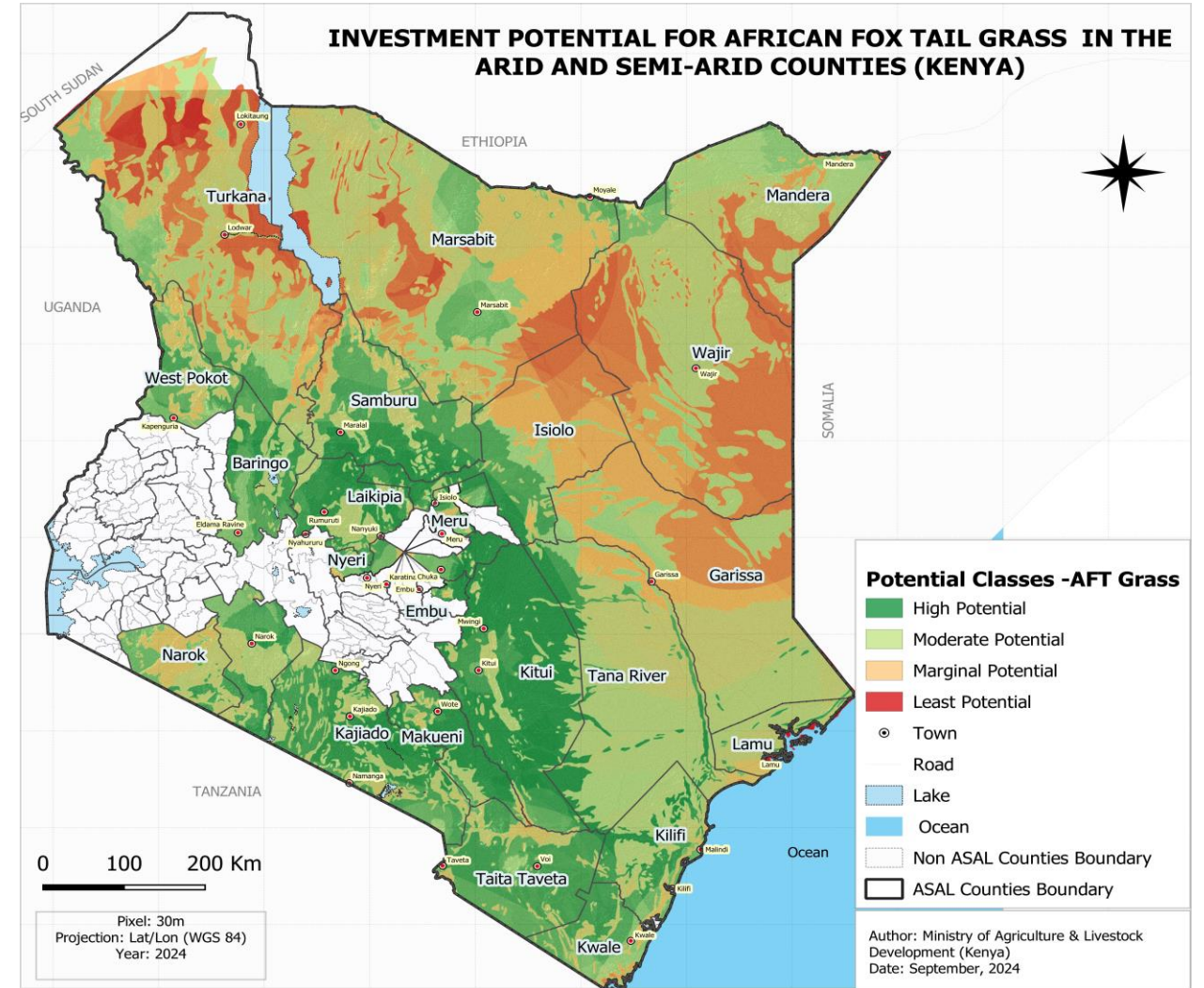
**Business model and returns**

**Role of Firm**

- upstream supply and distribution of animal feeds to retailers & farmers.
- Store harvested Hay and value add

**Role of government**

- Technical support and services to farmers



## Key Investment Information

Investment Outlay US\$	Operating Margin US\$	IRR	NPV US\$
109.8M	11,680	25%	34,880

# Agro - Industrialization

## Integrated Cotton Ginning, Oil Production & Cake Milling

### Bottlenecks

1. Lack of integrated cotton ginning and Milling in the country
2. Limited Market Linkages between cotton for textile industry & essential byproducts including cake for livestock and cooking oil

### Key Investments

1. Investment in an integrated Cotton Ginning & Cotton Milling Processing Plant – **Private sector** linked to other public investments and incentives
  - Invest **US\$79.6M** in 50 Units of Cotton Ginneries each with a processing capacity of 4,000MT of Seed Cotton Per annum to Produce 1,600MT of cotton seed – Private Sector
  - Establish 50 units of cotton cake milling & Oil Production facilities, each with a processing capacity of 1,600MT of cotton seed per annum to produce 1,400MT of cotton cake and 192Metric Tons of Oil
2. Supply cotton lint to textile industry, cake to animal feed processors & cooking oil to the cooking oil Processors - Private

### Risks

1. Affordability of and sustainable access to cotton seeds
2. Supply-side vulnerabilities of cotton production & supply by Small holder farmers
3. Predictability & sustainability of Government funded cotton seeds & input subsidy programme for small holder farmers
4. Competition from textile & Apparel products from other cotton producing jurisdictions

### Mitigation

1. Link to implementation of large-scale cotton production in many counties under Government land commercialization programme
2. Link to Public Investments in Cotton Seeds Propagation and multiplication by local agriculture research organizations
3. Public incentives on cottage cotton cake milling & oil pressing – duty waivers on imported agricultural machinery
4. Preferential market access for textile & leather products in USA under Africa Growth Opportunity Act (AGOA) & EU under Economic Partnership Agreement (EPA)

Bottlenecks, Investment, Risks & Mitigation

# Integrated Cotton Ginning, Oil Production & Cake Milling

## Policy Objective: Value Addition & Processing Capacities

EX-Act Carbon balance:  
Total emissions, tCO<sub>2</sub>-e -1.594

Per Capita Incomes – US\$960

### Background information

- Total annual livestock protein requirements = 16.903 Million MT
- Cotton accounts for 30 % = 5,070,900 MT/Year
- Demand for cotton seedcake stands = 20 Billion MT/Year
- Equivalent to CottonSeed = 45 Billion MT annually
- Lint demand is 12,000M against 4,000MT production

### Interventions

- Establish 50 single units of milling and pressing with a capacity of 4000 MT/Year Seed cotton and 1600 MT cotton seed at a unit cost is USD 1,592,593
- Investment outputs: cotton cake 1408 MT/Year
- Cotton oil 192MT/year

### Business model and returns

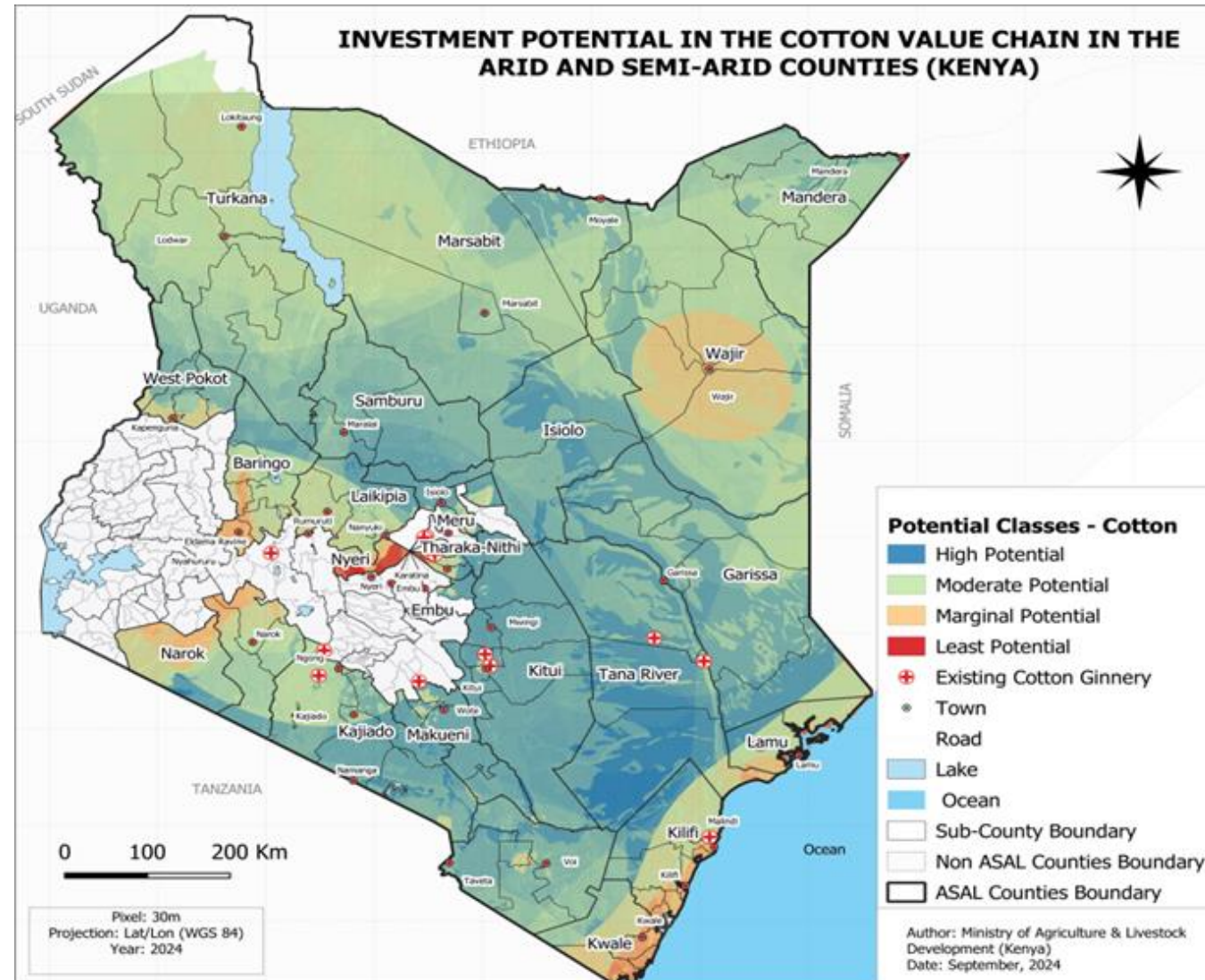
1. Role of Government
  - Technical support to farmers and Land provision.
2. Role of firms
  - Establish ginning and pressing plants collect produced cotton and process lint, oil and seed cake

### Key Investment Information

Investment Outlay US\$	Operating margin US\$	IRR	NPV US\$
79.6M	405,572	21%	965,199

### Beneficiaries

Direct	1,904
Indirect	19,040



# Next Steps for Animal Feeds Investments in Kenya (2022 - 2032)

## HIH Contribution

**Feed as Dry Matter**  
(Cultivated pasture, fodder  
& concentrates)

**\$164 M + \$281 M = \$445 M**

**5+8 = 13 %  
Contribution**

**Annual Feed Demand  
55M MT of Dry Matter**

## Country Level 10 year Targets

**15.5M MT of Dry Matter**  
(Cultivated pasture, fodder  
& concentrates)

**\$3.4 Billion**

**100 %  
Contribution**

**Annual Feed  
Shortage 60%**

**Annual Feed Post-  
Harvest Losses 46%**

# Kenya Investment Plan: Summary



**Total Investment US\$281.3M**

**Govt Commitment – Water & other Public Goods**

**22.4%**  
Overall Average IRR

**113,740**  
Total Direct Beneficiaries

**669,816**  
Total Indirect Beneficiaries

**US\$ 9,845**  
Income Increase

**-97,307 tCO2.e**  
Emission Reduction

**Investment Gap US\$281.3M**

## 1. Animal Feed Production

### A. Assorted Forage & Cotton Seeds

**Total Investment: US\$444,440**

IRR: 22%

NPV: US\$39,708

**Sustainability Benefits:**

- Direct Beneficiaries – 93,000
- Indirect Beneficiaries – 558,000
- Total Beneficiaries – 651,000
- Per Capital Income Increase – US\$3,160

• **EX-Act Carbon balance:**

Total emissions, tCO2-e -2,911

### B. Maize Grain & Silage

#### A. Maize Grain

**Total Investment: US\$68.7M**

IRR: 19%

NPV: US\$2,669,903

**Sustainability Benefits:**

- A. Direct Beneficiaries – 1,680
- B. Indirect Beneficiaries – 5,040
- C. Total Beneficiaries – 6,720
- D. Per Capita Income Increase – 2,664

• **EX-Act Carbon balance:**

Total emissions, tCO2-e -44,802

#### B. Silage

**Total Investment: US\$1.6M**

IRR: 28%

NPV: 3,463,873

**Sustainability Benefits**

- Direct Beneficiaries: 356
- Indirect Beneficiaries: 2,136
- Total Beneficiaries: 2,492
- **Per Capita Income Increase: US\$ 989**

**EX-ACT Carbon Balance: TBD**

### C. Black Soldier Flies

**Total Investment: US\$23.2M**

IRR: 23%

NPV: US\$50,788

**Sustainability Benefits:**

- Direct Beneficiaries – 1000
- Indirect Beneficiaries – 2,000
- Total Beneficiaries – 3,000
- Per Capita Income Increase – 1,076
- EX-ACT Carbon Balance: TBD

## 2. Warehousing

### Pasture (Hay) Warehousing & Storage

**Total Investment: US\$19.8M**

IRR: 25%

NPV: US\$ 35,380

**Sustainability Benefits:**

- Direct Beneficiaries – 16,000
- Indirect Beneficiaries – 84,000
- Total Beneficiaries – 100,000
- Per Capita Income Increase - 996
- EX-ACT Carbon Balance: TBD

## 3. Agro-Industrialization

### A. Cotton Ginning, Cake Milling & Oil Production

**Total Investment: US\$79.6M**

IRR: 21%

NPV: US\$965,199

**Sustainability Benefits:**

- Direct Beneficiaries – 1,904
- Indirect Beneficiaries – 19,040
- Total Beneficiaries – 20,944
- Per Capita Income Increase – US\$960

• **EX-Act Carbon balance:**

Total emissions, tCO2-e -1,594