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# Soy Industry Strategic Plan

August 2018

# Executive Summary

- Kenya's animal feed and foodstuffs industries consumed **~101K metric tons of soybean grain in 2017, with 2.0% annual growth** driven by expected growth to the livestock population through 2020
- Four factors drive **high unit cost of production** in Kenya, forcing soybean consumers to rely on imports for **94% of estimated demand**
  - Producers struggle to find **high quality, certified seed on time** at local market outlets
  - **Low yields** due to **lack of extension advice** and **small average plot sizes**
  - **High marketing and aggregation costs** for smallholder farmers further drive high unit cost of production
- The vision for Kenya's Industry Strategic Plan therefore has three goals: (1) increase **market access** for Kenya's current producers, (2) **stimulate demand for quality seed**, therefore bolstering reduction, and (3) **decrease Kenya's reliance on meal and grain imports**
- To achieve this vision, soy industry stakeholders can shift emphasis from direct smallholder farmer engagement and work with **"emerging farmers" to build end-to-end "agro-hubs**,"

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**Global Market Context**

*Kenya Markets Overview*

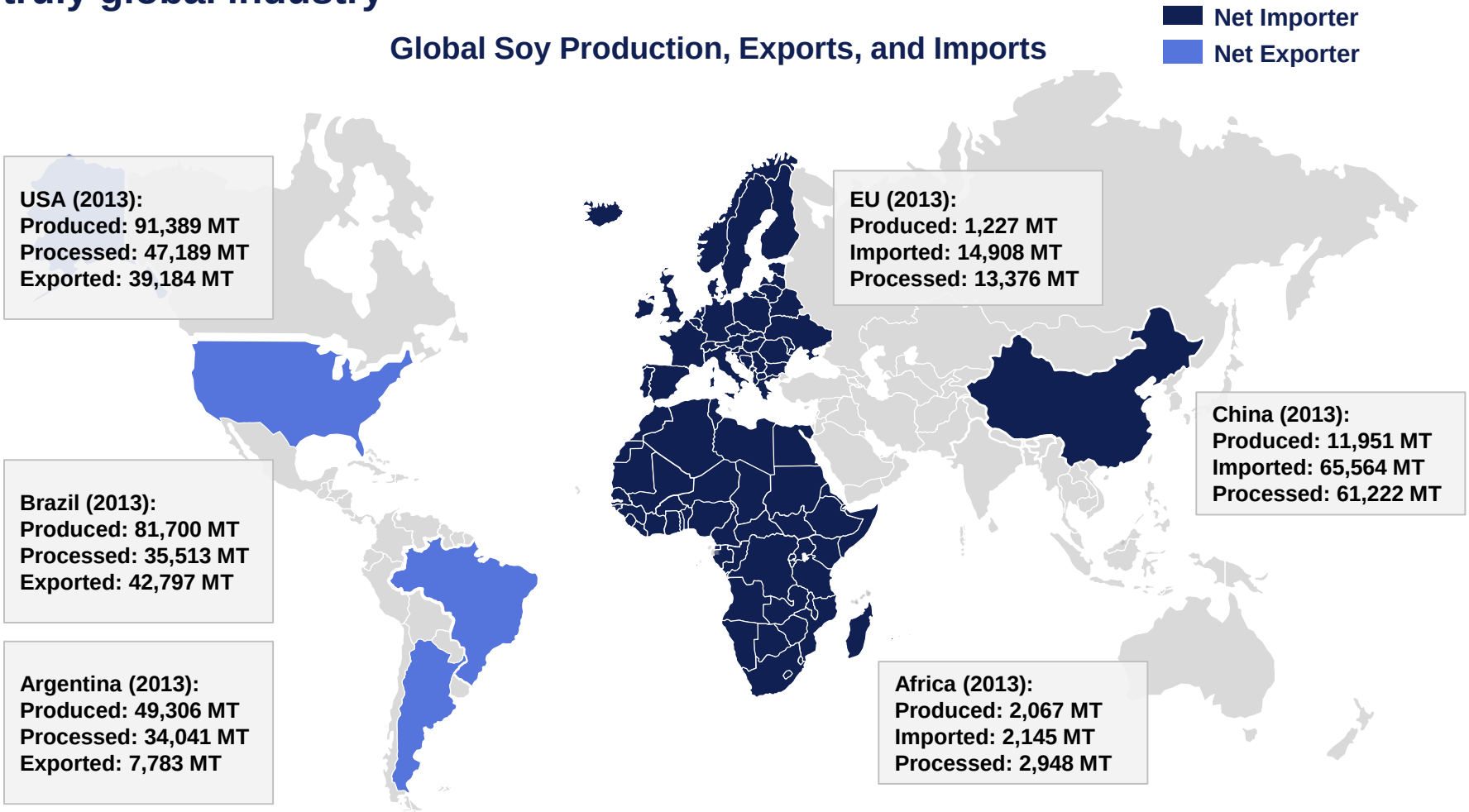
*Kenya Production: Challenges and Opportunities*

*Syngenta Foundation Seeds2B – Kenya Soybean Trials*

*Investment Opportunities & Partnership Assessment*

# Soybean production, processing, and trade comprise a massive and truly global industry

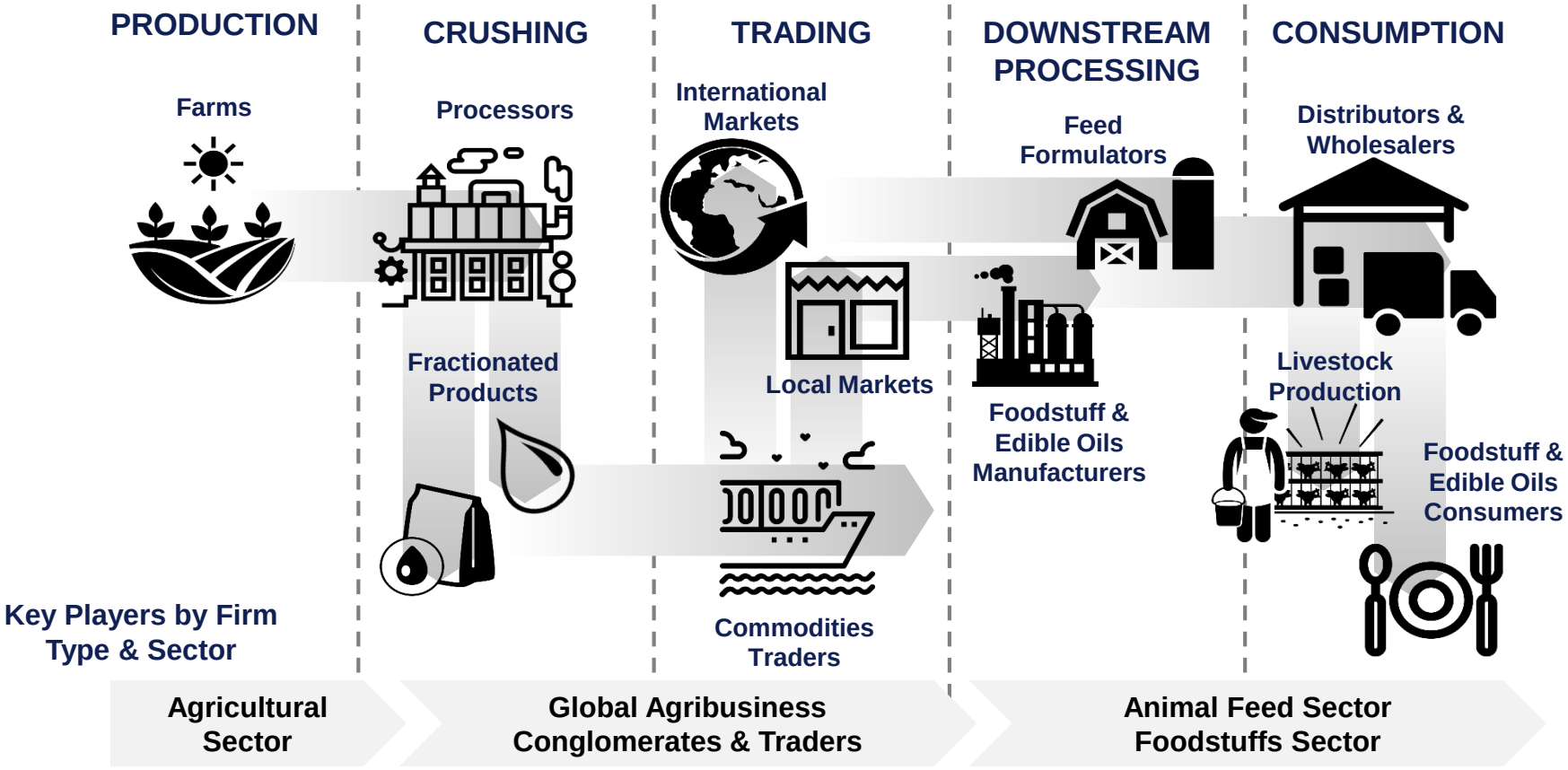
## Global Soy Production, Exports, and Imports



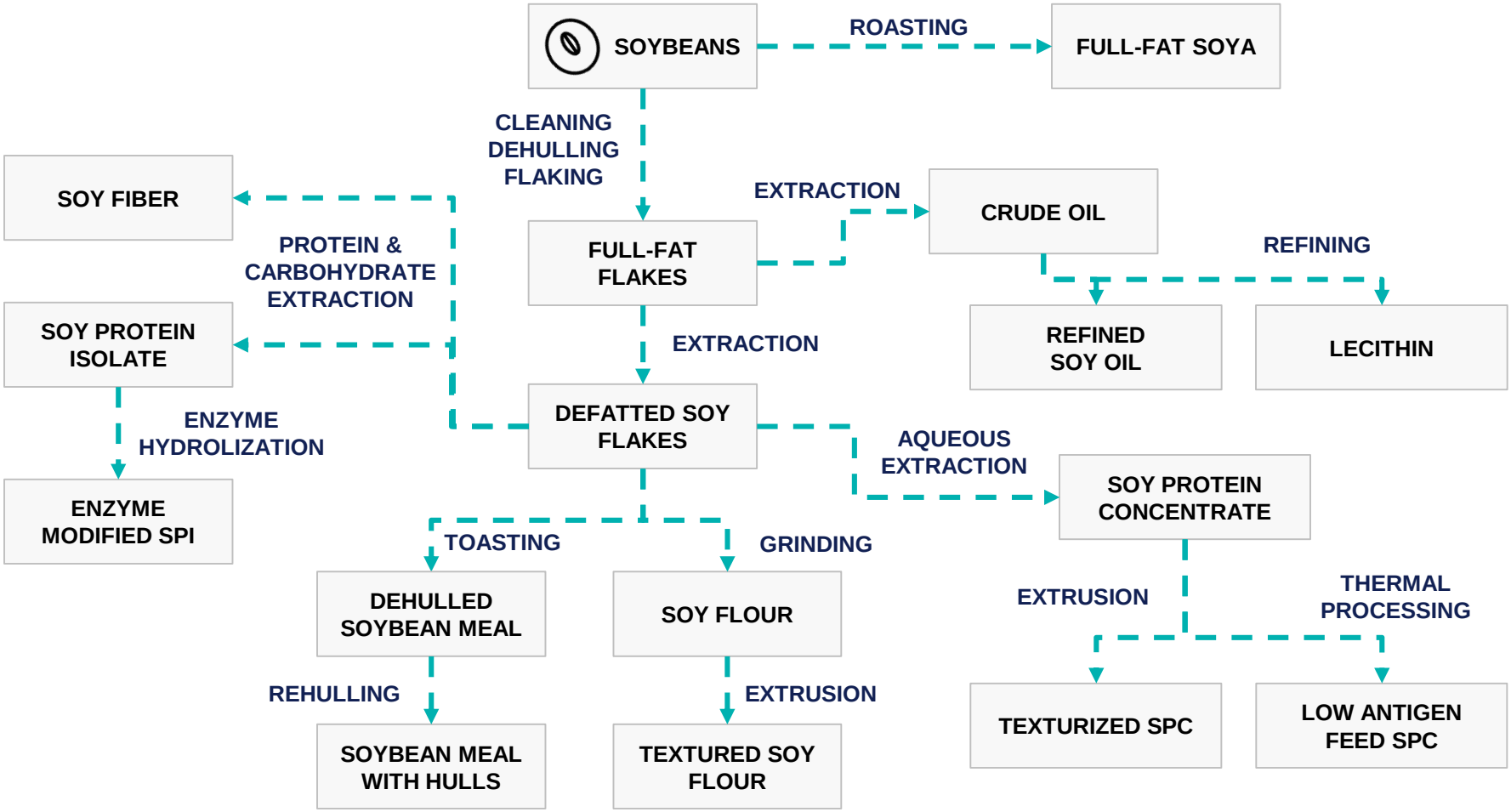

Source: FAOSTAT, April 2018; Note: FAOSTAT Food Balance Sheets' most current data dates back to 2013 (figures used here)

# The animal feeds, edible oils, and foodstuffs sectors drive global utilization of soybean and its fractionated products

## The Global Soybean Industry



# Soybean products are highly commoditized, traded widely, and utilized by diverse market actors

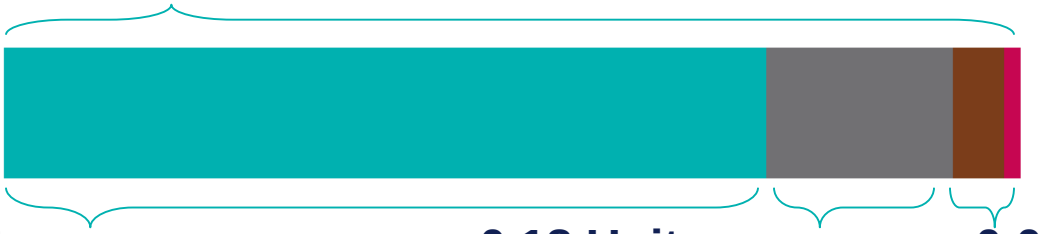


# The soybean crush complex roughly demonstrates the global scale of the soybean meal and soybean oil markets

SOYABEANS

## 1.00 Unit Raw Soybean Crush Yields:

*The soybean crush complex estimates meal and oil output per processed soy grain*



**0.78 Unit** — SOYBEAN MEAL

**0.18 Unit** — CRUDE SOY OIL

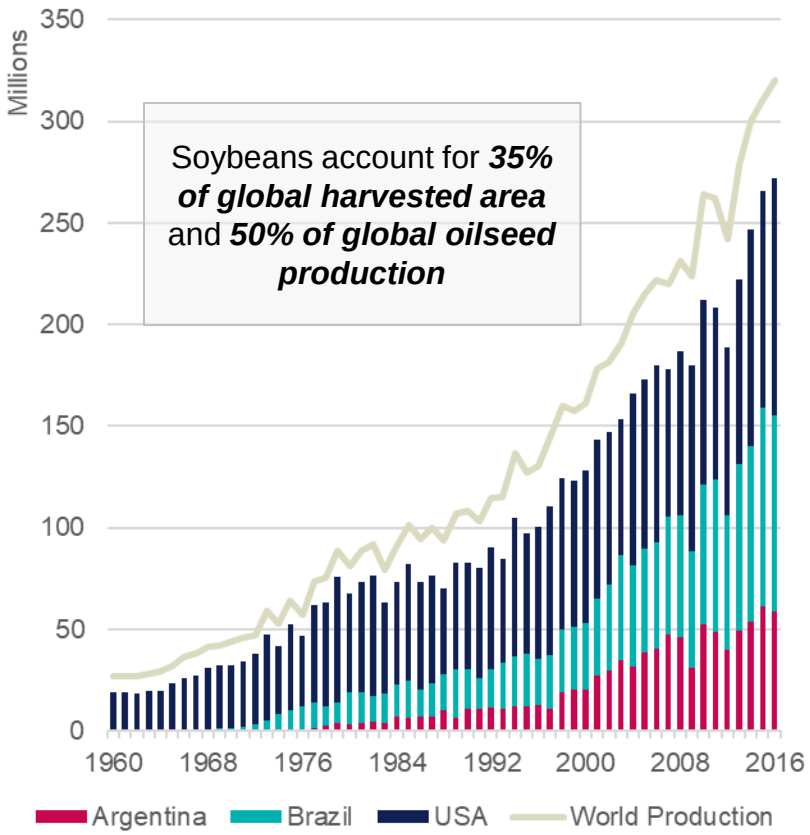
**0.04 Unit** — WASTAGE & HULLS

*Soybean Meal accounts for 65% of global protein meals & cakes market*

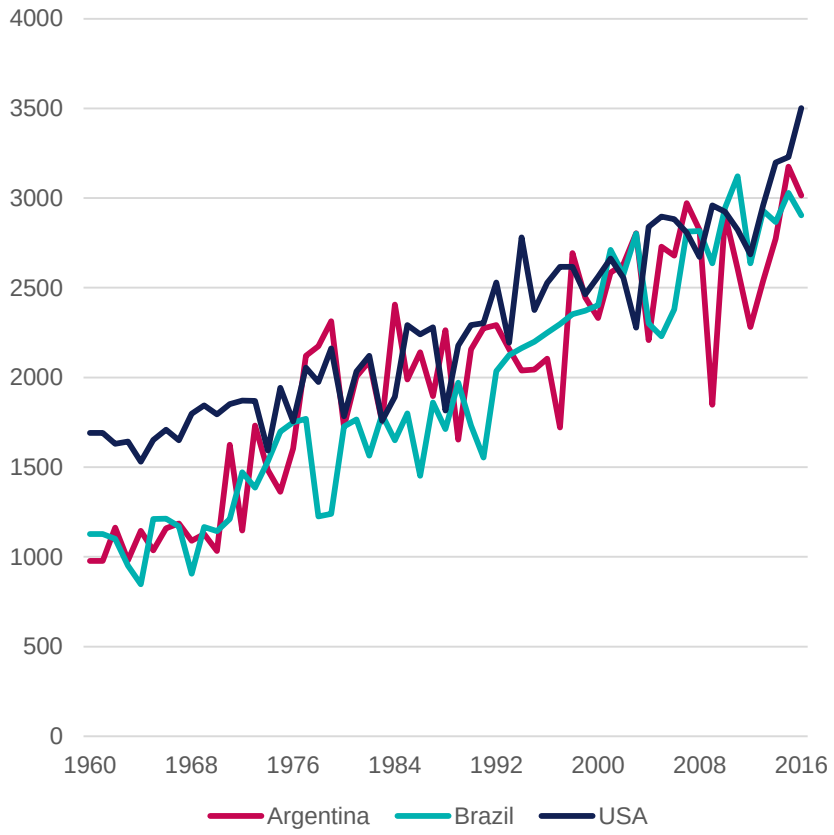
*Soy Oil accounts for 25% of global edible oils market*

# Production in US, Brazil, and Argentina has historically met 95% of global demand

### Global Soybean Production by Major Producers vs. ROW (MT) 1960 - 2016




### Average Yield (kg/hectare) by Major Producers 1960- 2016




Source: FAOSTAT, April 2018

# Soybean production systems and market dynamics vary considerably between the dominant producers and Rest of World (ROW)

## Soybean Production Trends & Market Dynamics by Producer Type

### USA, Argentina, Brazil (95% Global Output)

**Price Sensitivity:** Highly competitive and mature market, characterized by strong price competition and high levels of market concentration

**Private Sector Consolidation**: High investment costs involved in soybean cultivation, storage, and marketing have fostered vertical integration within sectors and horizontal operations across commodity sectors and companies

**Commercial Farming**: At the farm household level, the bulk of the world's soybean production comes from medium-to-large size farms characterized by capital intensive production methods and high levels of mechanization

**Limited On-Farm Storage, Processing**: Considerable value addition occurs in the downstream stages of the production and processing chain, with almost no on-farm storage and/or processing

### ROW (5% Global Output)

**Small Scale Farming:** Production by small-scale farm enterprises, with limited mech. and intensive labor

**On-Farm, Local Processing:** Reliance on on-farm storage and SME processing

**Domestic Consumption**: Greater consumption of harvest at per-farm household

# Therefore, countries outside of the Americas face common market barriers to developing competitive local soybean production industries

## ROW Market Barriers

**Import Competition:** Almost every country globally has easy access to high quality imported soybeans, soybean meal, and soy oil, disincentivizing customers from seeking out local products

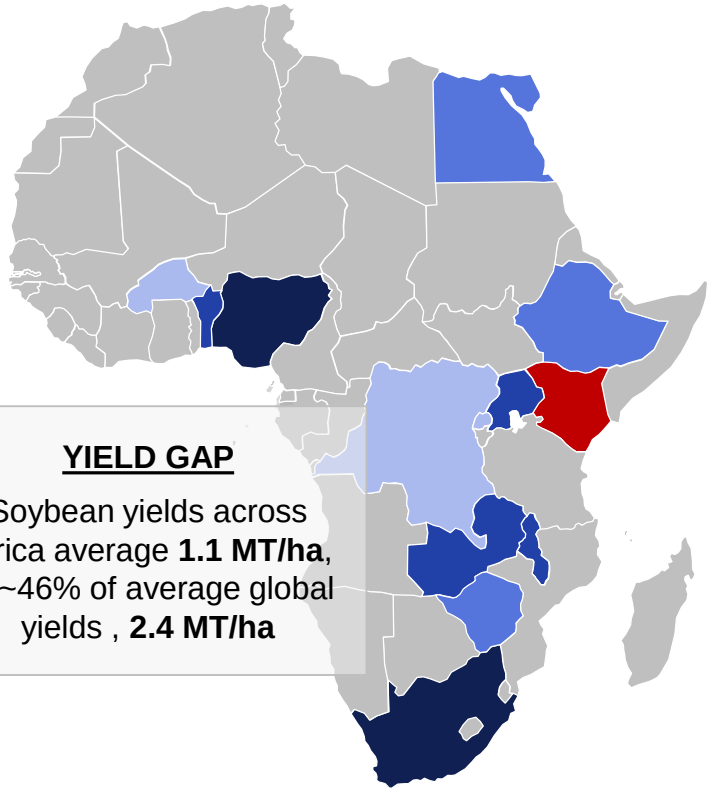
**Price Competition:** Price competition is therefore intense and felt at rural market levels, lowering farmers' incentives to produce soybeans

**Low Private Sector Investment**: The private sector demonstrates limited appetite to invest in R&D efforts for locally adapted soybean varieties without a strong, growing production base

**Limited Government Subsidies**: Governments tend prioritize widely adopted crops (e.g. maize, wheat) and hesitate to implement import protection measures for soy products

# Owing to these factors, Africa's soy sector has historically lagged behind in global production (<1%) and consumption (<0.5%)

## Mean Annual Soy Production (MT), 2011-2016



**YIELD GAP**

Soybean yields across Africa average **1.1 MT/ha**, or ~46% of average global yields , **2.4 MT/ha**

<20,000 MT >500,000 MT

| Country | Mean Annual Production (MT) |
|---|---|
| **South Africa** | 838,900 |
| **Nigeria** | 593,699 |
| **Zambia** | 186,270 |
| **Malawi** | 120,824 |
| **Uganda** | 113,659 |
| **Benin** | 108,589 |
| **Ethiopia** | 73,530 |
| **Zimbabwe** | 65,392 |
| **Egypt** | 36,094 |
| **Rwanda** | 20,992 |
| **DRC** | 20,886 |
| **Burkina Faso** | 20,226 |
| ***Kenya*** | 6,400 |

Source: FAO (April 2018), TNS Analysis

# Yet, Nigeria's soy industry demonstrates how African countries can overcome challenges by focusing on *local markets*

**Nigeria expanded soybean production nearly tenfold from 1980 to 2016 – from ~60 MT to ~600 MT p.a. – by promoting *local production* and *local utilization* simultaneously**

| Inputs | Soybean Production | Soybean Marketing | Soybean Crushing | Processing | End Products |
|---|---|---|---|---|---|
| **Research & Development** to support **improved varieties** adapted to a wide range of agro-climatic zones specific to country<br><br>Promotion of benefits of **inoculant use** and development of **inoculant market** | **Government promotion of soybean production** to substitute imports<br><br>**Training of technical and extension staff** on best soybean agronomic practices | **Training of local farmers, village leaders** on business practices, soybean marketing | Development of **home-level and cottage industry soybean processing technologies**<br><br>Facilitated dissemination of **food processing technologies** | Willingness of **local manufacturers** to prioritize soybean use, particularly in **baby foods, edible oils,** and **animals feeds** | Development of **recipes that substitute or incorporate soybeans into traditional foods**<br><br>Institutional uptake of soybean products **hospitals, schools, and local gov't entities** |

**ENABLING ENVIRONMENT**

Nigeria's success required a high degree of coordination between **public sector actors, private sector companies, universities, research and development institutes**, **donor agencies,** and **NGOS**

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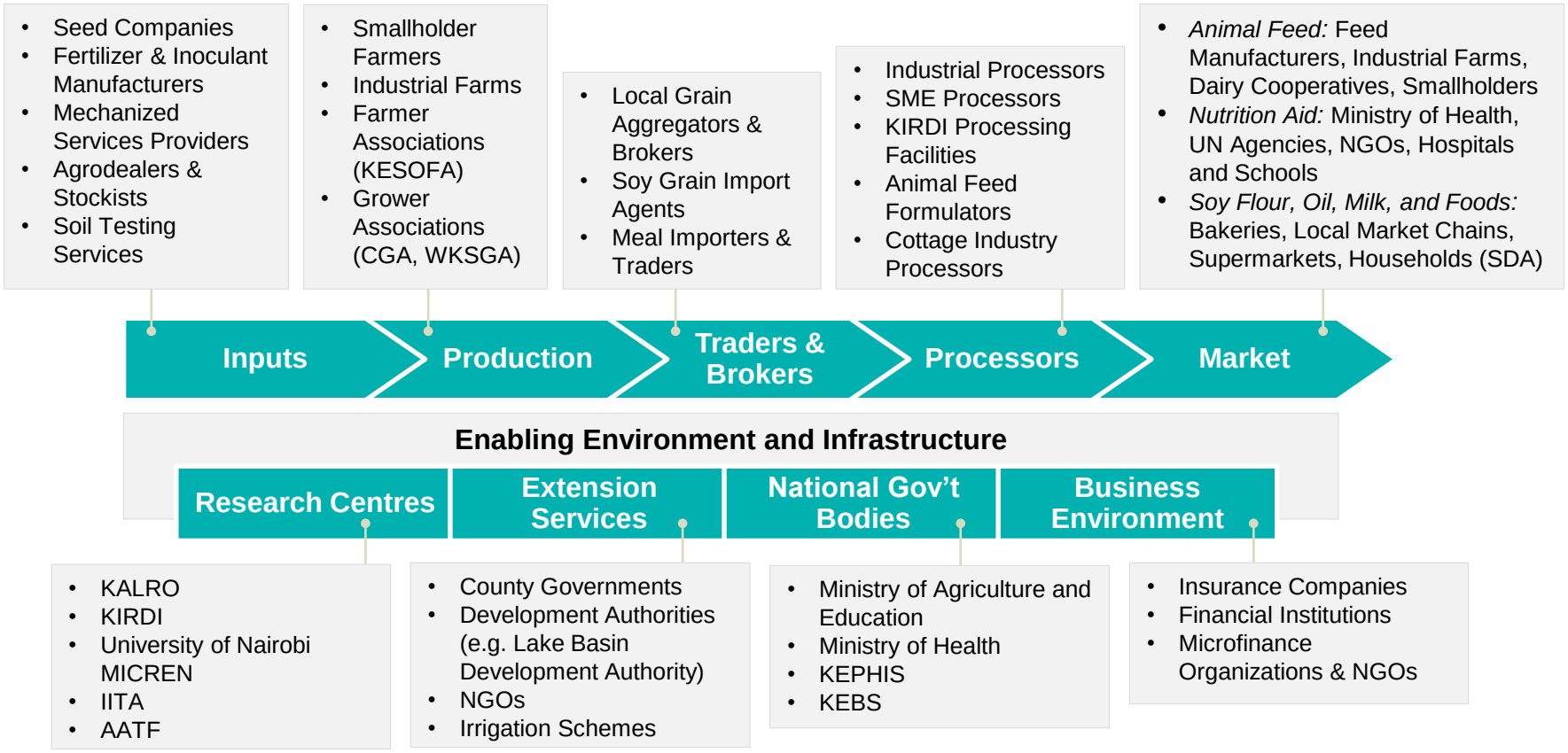
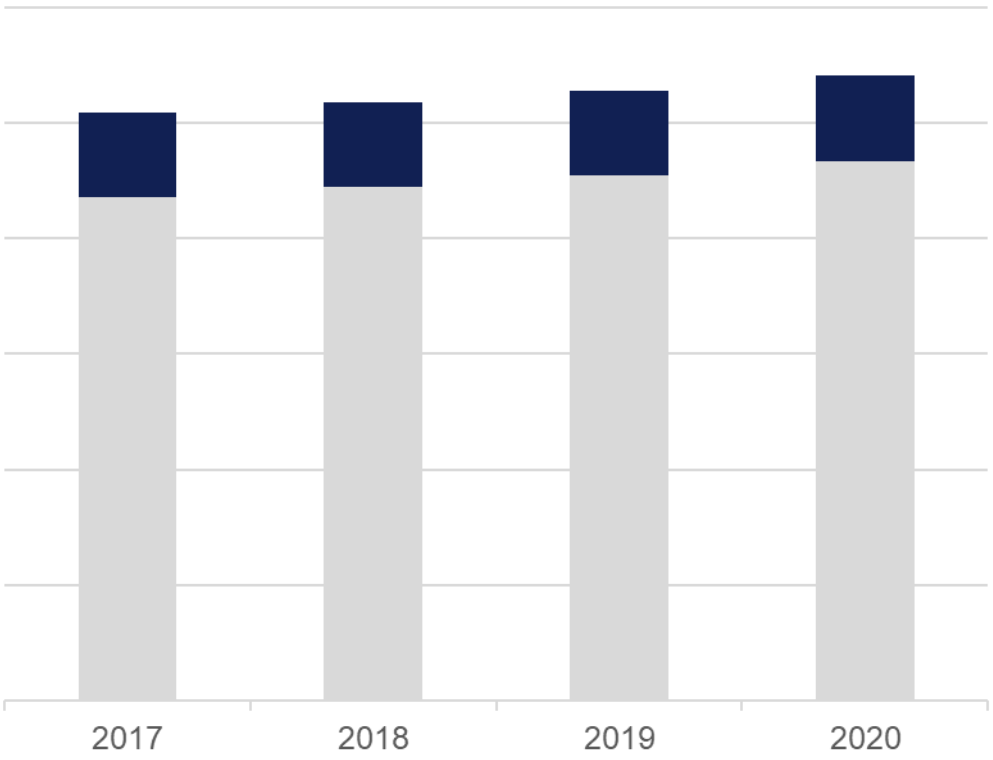
# Kenya's Soy Value Chain: Many players, but minimal coordination limits production despite high demand



# In Kenya, fragmented customers across the animal feed and foodstuffs industries drive soybean consumption (~101K MT in 2017)

## Kenya Soybean Consumption (MT), 2017-2020

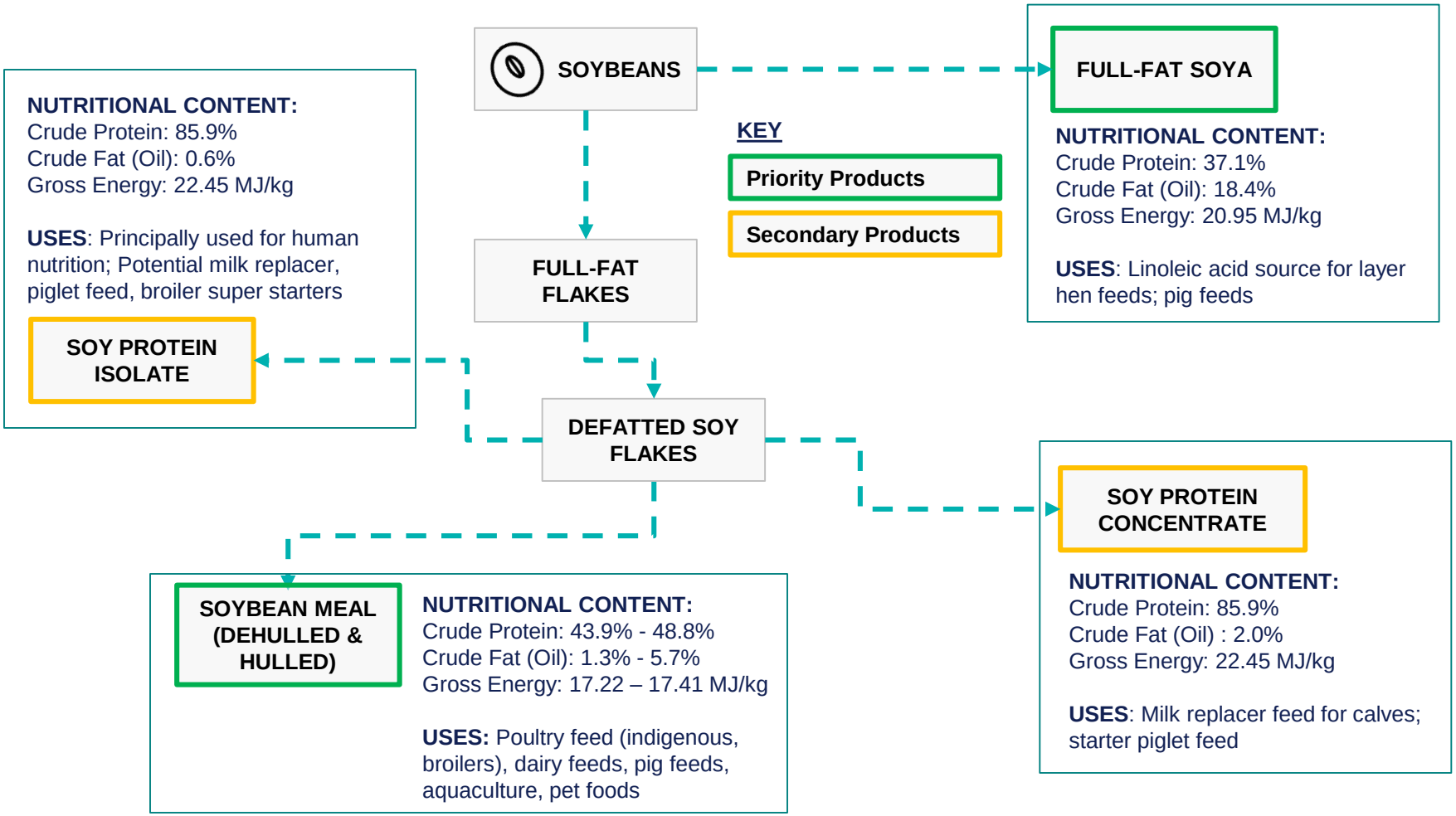



### Foodstuffs
2017 Utilization: 14.4K
2017-2020 CAGR: 0.7%

### Animal Feeds
2017 Utilization: 87.1K
2017-2020 CAGR: 2.3%

Source: FAOSTAT, April 2018; 2017 Nutrimix Report; 2018 MOA Kenya Report; TNS Interviews & Analysis

# **Animal Feeds Industry:** Kenya's animal feed industry demand full-fat soya and soybean meal as a key protein source in milled feeds



# **Animal Feeds Industry:** Layer, broiler, and pig feeds require the highest quantities of soya ingredients per 70 kg unit (~12-14 kg per unit)

## Feed Industry Products by Soy Ingredient Utilization

NOTE: Meal composition per feed type sourced from KALRO recommended animal feed recipes

| LIVESTOCK | PRODUCT | UNIT | PRICE | SOY MEAL (KG) | NON-SOY MEAL (KG) |
|---|---|---|---|---|---|
| Layers | Chick Starter | 70 kg | 3200 | *Not Recommended* | 16.8 kg Sunflower Cake<br>1.5 kg Omena Meal |
| | Growers Mash | 70 kg | 3000 | 3.4 kg Full Fat Soya | 6 kg Cottonseed Cake<br>5 kg Sunflower Cake<br>3 kg Omena Meal |
| | Layers Mash | 70 kg | 3100 | 12 kg Full Fat Soya | 8 kg Omena Meal |
| Broilers | Broiler Starter | 70 kg | 3400 – 3600 | 14 kg Soybean Meal | 12 kg Omena Meal |
| | Broiler Finisher | 70 kg | 3500 | 2.4 kg Soybean Meal | 6 kg Cotton Seed Cake<br>4.7 kg Sunflower Cake<br>3 kg Omenameal |
| Kienyeji | Kienyeji Feed | 70 kg | 3000 | 5.4 kg Soybean Meal | 4.3 kg Omena Meal |
| Dairy | Dairy Meal | 70 kg | 2100 – 2800 | 4.2 kg Soya Meal | *Not Recommended* |
| Pigs | Pig Finisher | 50 kg | 2000 | 12.5 kg Soybean Meal | 7.5 lg Omena Meal |

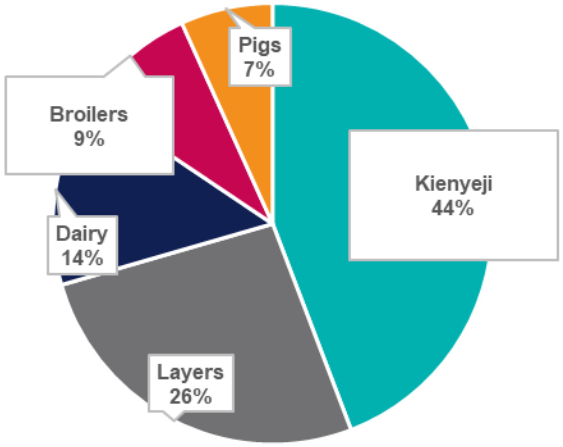
**PRODUCT SUBSTITUTES**

Omena Meal serves as a direct product substitute for Soybean meal in all poultry feeds

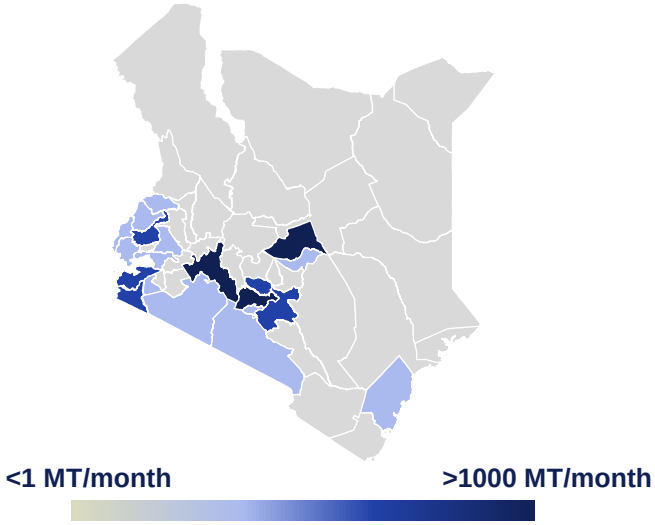
Cotton Seed, Canola seed, and Sunflower seed cakes are also commonly used as Soybean meal substitutes

# **Animal Feeds Industry:** Kenya's poultry industry, concentrated around urban centers, drives soy ingredient purchasing by volume

**Soybean Utilization for Feed by Livestock Type, 2017**




**Soy Ingredient Demand by Feed Customer by County (MT), 2017**




**Kienyeji, layer, and broiler feeds comprise ~80% of all soybean ingredient demand from the animal feed industry; Yet, Kenya's poultry industry remains highly informal**

**90% of Feed Customers are concentrated in Nairobi industrial suburbs, Thika, Nakuru, Eldoret, and Kisumu, clustered around commercial poultry, dairy operations**

# **Animal Feeds Industry:** Feed customers are highly fragmented, with processing capacity as the main determinant of purchasing needs

| | Customer Type | Monthly Feed Production | Market Role & Customers |
|---|---|---|---|
| 1 | **Commercial Feed Manufacturers** | Urban-based processors with monthly processing capacity of **1,000 – 13,000 MT** per month | A handful of companies produce **60% of total feed output**; suppliers to industrial livestock operations; bring niche products to market |
| 2 | **SME Feed Millers** | Urban & rural based processors with monthly processing capacity of **500-1000 MT** per month | **SMEs** comprise **90% of all market players**, yet **~30% of total feed output** |
| 3 | **Joint SME Ingredient Suppliers & Millers** | Urban & rural based processors with monthly capacity of **500-1000 MT** per month and ingredient sourcing capabilities | Ingredient suppliers are opening feed mills due to low barrier to entry (typically purchase of hammer mill) |
| 4 | **Dairy Cooperatives & On-Farm Formulators** | Cooperative with **300-1000 MT** monthly capacity per month | Represents **~10%** of total feed output; growing share of market due to concerns over high price, low quality of processed feed products |
| 5 | **Raw Ingredient Suppliers & Formulators** | Traders specializing in raw ingredient supply, feed formulation with no processing capacity | Supplier to all four customer types; highly informal, little to no national data collected on all businesses |

# **Animal Feeds Industry**: Buying behavior – preferred prices, volumes, buying schedules – vary considerably across customer segments

| | Customer Type | Price Points (ksh/kg) | | Buying Behaviors |
|---|---|---|---|---|
| | | GRAIN | MEAL & FULL-FAT SOYA | |
| 1 | **Commercial Feed Manufacturers** | **30 – 40** | **50 – 70** | High volumes, **min. 1000 MT/month**; Ability to store high volumes<br>Preference for fractionated products over grains<br>Relies principally on imports from India, COMESA |
| 2 | **SME Feed Millers** | **30 – 40** | **50 – 70** | Highly variable purchasing, **1 – 100 MT/month** depending on needs<br>Cost sensitive, preferable to seek out lowest price feed ingredients<br>Relies principally on imports from India, COMESA – supply chains typically long, complex |
| 3 | **Joint SME Ingredient Suppliers & Millers** | **30 – 40** | **50 – 70** | |
| 4 | **Dairy Cooperatives & On-Farm Formulators** | **50 – 80** | **50 – 80** | Low volume purchasing, average **<1 MT/month**<br>Quality concerns, limited access to urban-based traders lead to willingness to pay higher costs |
| 5 | **Raw Ingredient Suppliers & Formulators** | **30 - 40** | **50 – 70** | Owns and operates warehouses<br>Seeks to purchase high volume at low price to drive profit margins; heavily riles on Asian, COMESA imports |

# **Animal Feeds Industry**: Despite large scale, many challenges prevent Kenya's soy farmers from easily accessing feed industry customers

## OPPORTUNITIES

**Industry Size:** Forecasted consumption of soybeans, soybean meal, and full-fat soya will surpass 90,000 MT annually by 2020

**Poultry Population Growth:** Poultry production, while informal in Kenya, appears to be healthy and growing moderately through the forecast period, therefore sustaining demand for feeds

**Increased Dairy Cooperative Formulation:** Interviews with soy farmers indicated that dairy cooperatives are willing to acquire soy grains locally for quality control, even if at higher prices

- However, dairy cooperatives are estimated to account for <10% of total feed output, shrinking the addressable market size

## CONSTRAINTS

**Soybean Meal Imports**: Customers source a minimum of **75% of all soybean meal** from India, EU, and increasingly, other COMESA players

**Soybean Grain Imports:** Producers must recognize that the majority of customers (estimated to produce ~90% of Kenya's feed) expect to purchase soy grains at **30 – 40 ksh/kg** (depending on seasonality)

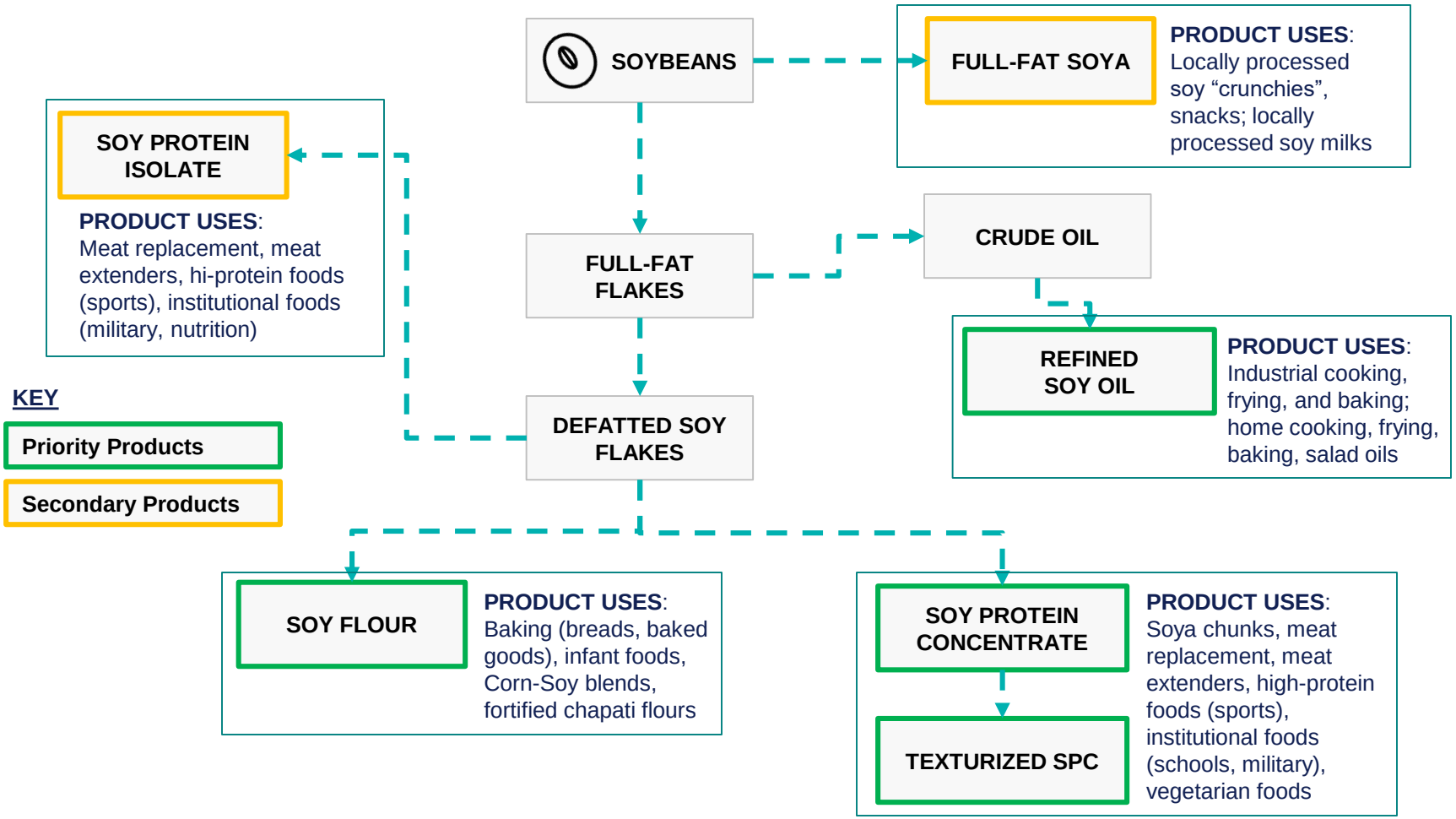
**Product Substitutes:** Omena Meal, Canola, Cotton Seed Meal, and Sunflower Seed are all readily available product substitutes – in the event of soy price increases, many feed purchasers replace soybean meal with another protein source

**Fragmentation**: Customer fragmentation drives up marketing prices for local producers

**Limited Market Information:** No national database of feed mills, raw ingredient suppliers, creating long, complex supply chains and challenges in gathering market data

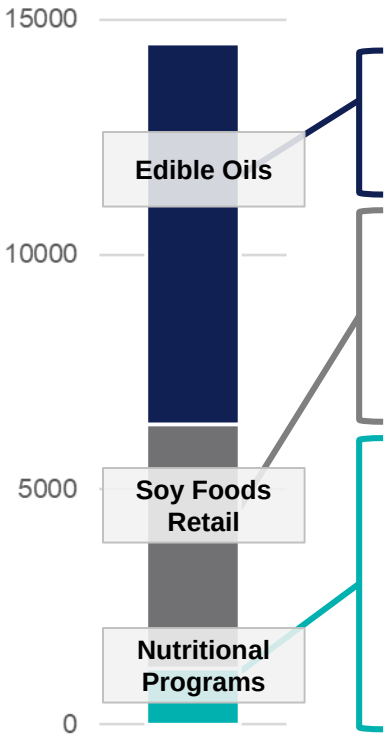
**Quality Concerns:** Some feed formulators, millers unwilling to source locally due to quality concerns of trypsin content in processed soybean meal

# **Foodstuffs Industry:** Soy Oil, soy protein concentrate (e.g. “soya chunks”) and soy flours drive soy product purchasing in the foodstuffs industry



# **Foodstuffs Industry:** Key market actors – edible oils refineries, soy food processors – struggle to locally source grain at competitive prices, volumes

**Utilization by Segment (MT), 2017**




**Segment Overview by Grain Customer Type, Buying Behavior**

| Segment | Example Players | Products | Soy Grain Buying Behavior |
|---|---|---|---|
| **Edible Oils Refineries** | BIDCO | Refined Soy Oil for home consumption, industrial cooking | Historic willingness to source locally at prices up to **50-55 ksh/kg**, seasonal purchasing at **30-40 ksh/kg** |
| **Soy Food Processors** | Promasidor, Proctor & Allen, Classic Foods, Equatorial Nuts | Soy Protein Concentrate (SPC) foods (e.g. vegetarian, soy drinks), | Historic willingness to source locally at prices up to **50-55 ksh/kg**, seasonal purchasing at **30-40 ksh/kg** |
| **SME Crush Enterprises** | Soy Afric, ProSoya | Fortified Corn-Soy Blends; Baby foods | Regional sourcing from COMESA neighbors, **32-40 ksh/kg** |
| **International Donor Organizations** | World Food Program | Fortified Corn-Soy Blends | No grain sourcing – typically imports processed foritied soy foods from European partners |
| **Local Nutritional Programs** | GOK School Feeding Program | Fortified Corn-Soy Blends | Typically purchases processed soy foods from local SMEs, limited to no grain purchasing |

# **Foodstuffs Industry**: Despite processors' willingness to source local grain, domestic soy food consumption remains low owing to competitor products

## OPPORTUNITIES

**Nutritional Benefits:** Processed soy foods and fortified corn-soy blends deliver are the most cost effective protein source per unit when compared to animal proteins, other vegetable protein sources

**Willingness to Locally Source:** Major edible oils, processed soy food manufacturers have demonstrated a high willingness to procure locally despite past challenges

## CONSTRAINTS

**Industry Size & Limited Growth:** Soy-based food consumption remains low, with limited forecasted growth prospects

**Product Substitutes:** Multiple products compete with soy food for human consumption, including:

- **Palm Oil:** Palm Oil competes directly with Soy oil as an industrial cooking oil; Palm Oil import prices are currently lower than domestic refined soy oil prices
- **Dairy Milk:** Kenya's thriving dairy milk market crowds out demand for soy-based milk, yoghurt, as customers have strong preferences for dairy
- **Common Beans:** Farm households prefer growing common beans to soy, owing to greater ease of domestic consumption

**Low Soy Home Utilization:** Limited integration of soy into household recipes

**Foreign Nutritional Program Sourcing:** Some major nutritional programs, e.g. WFP, historically source soy-based products from European Corn-Soy Blend Manufacturers

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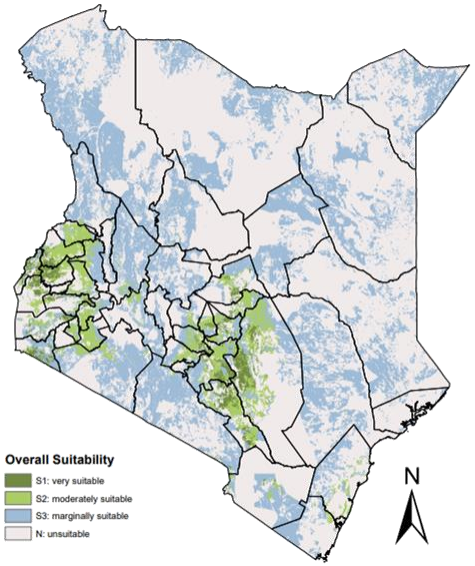
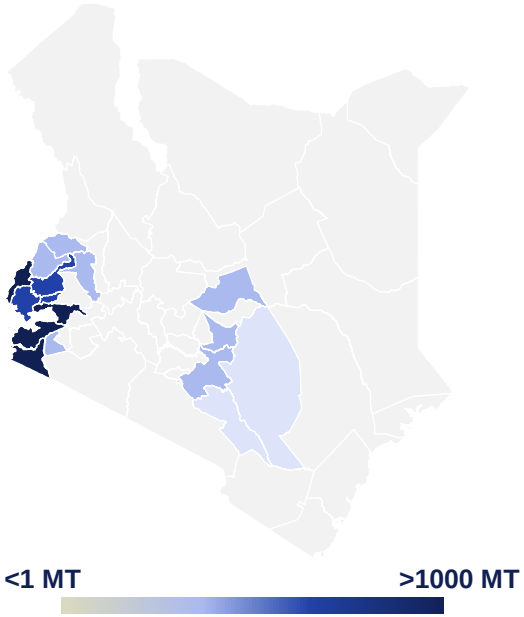
# In 2017, Kenya produced ~6.4K MT of soybean grain, with production concentrated around the Western and Nyanza regions

**Soybean Production Suitability Assessment, CONSUS, 2017**




**Estimated Annual Production by County, 2017**

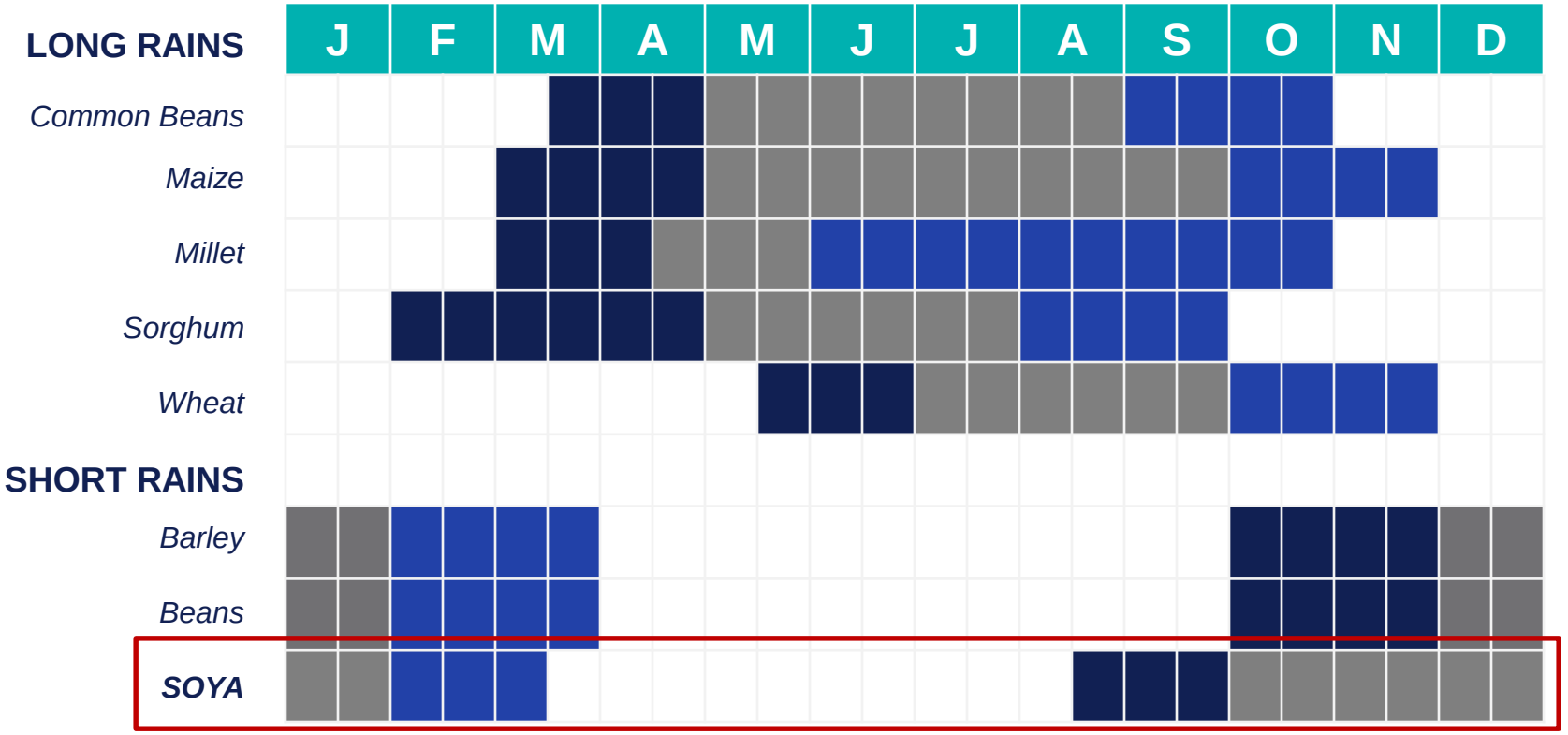



**Analysis of climate, soil, and landscape factors indicate Western, Nyanza, North Rift, and Eastern are most suitable for soy production**

**Historic Soybean production has been concentrated in Western and Nyanza, with expanding investments in Eastern**

# Kenya's farmers prefer early-maturing soybean varieties for short rains season production, typically grown in rotation with long rains maize

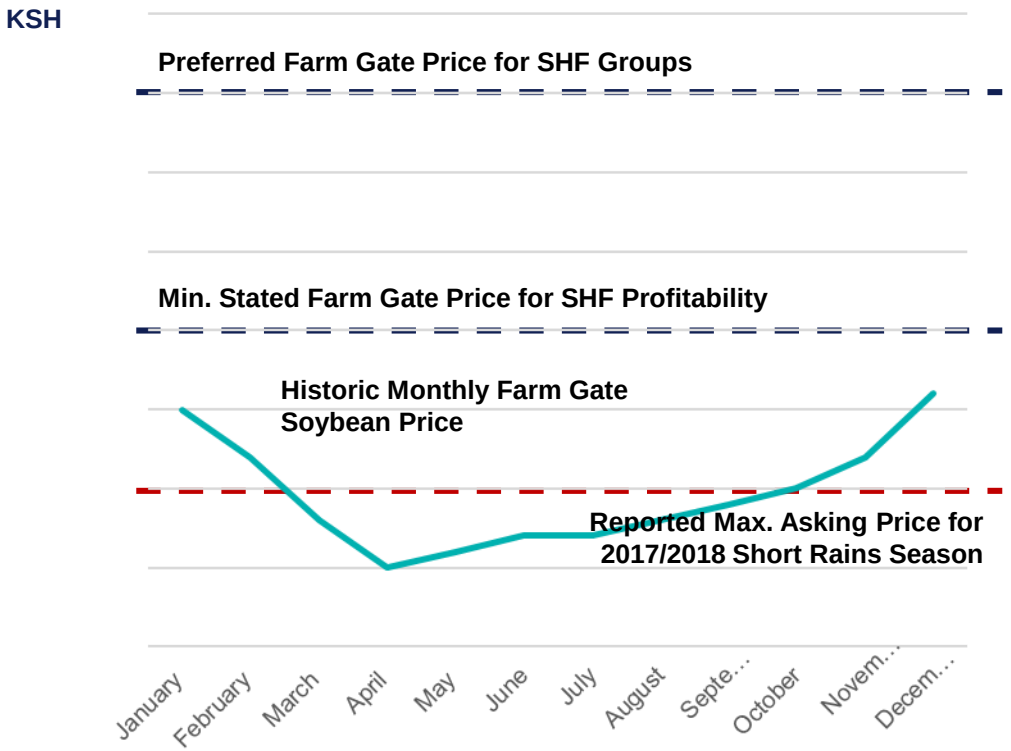
## Kenya Crop Calendar by Month – Long Rains vs. Short Rains Major Crops




Soybean days to maturity range from **120 days – 164 days** depending on varietal type – most current Kenyan producers **prefer early maturing varieties**

# A dramatic gap exists between customers' farm-gate asking prices and producers' price points, illuminating high local unit cost of production

## Monthly Soybean Grain Farm Gate Purchasing Prices



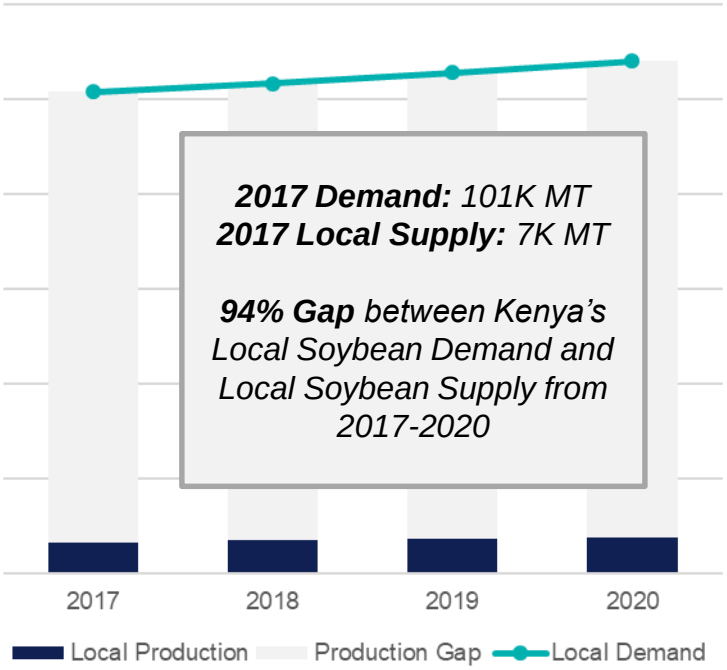

During April 2018 Interviews, Soy farmer groups demanded minimum **50 ksh/kg** for farm gate grain sales, with a preferred cost of **>65 ksh/kg**

Historically, farm gate prices for soy grain hover between **35-45 ksh/kg** depending on seasonality

Soy farmer groups stated that the highest asking price from buyers for the 2017/2018 short rains was **40 ksh/kg –** therefore, by April 2018, most of the harvest remained in storage at farmer cooperative offices

# Three factors drive high unit cost of production and increasing local farm-gate prices, pushing consumers to rely heavily on imports

**Kenya Soybean Production vs Demand (MT), 2017-2020**




**Factors Driving High Un\it Cost of Production**

**A** **Low Seed Availability at Local Market Outlets**

**B** **Low Yields, Limited Extension Services**

**C** **Marketing Issues due to Small Volumes**

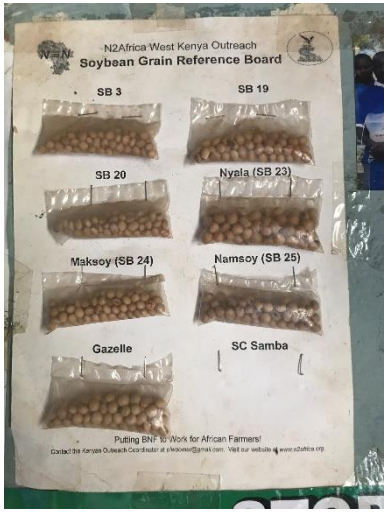
Source: FAOSTAT, April 2018; 2017 Nutrimix Report; TNS Interviews & Analysis

# A +98% use of recycled seeds leads to declining seed viability and inability for new entrants to acquire seed on time for planting

## Kenya Soy Seed Consumption by Sales Channel (%) 2017

| | |
|---|---|
| ***98%*** | Recycled Seed Usage |
| ***1%*** | Community Based Seed Production |
| ***0.5%*** | KALRO |
| ***0.5%*** | Private Sector |

*Clockwise from Left:* SB-19, SB Squire, and SB SAGA Packaging at an agrodealer in Vihiga; Soybean marketing materials from N2Africa, an NGO; Grain storage at a farmer collective in Kakamega



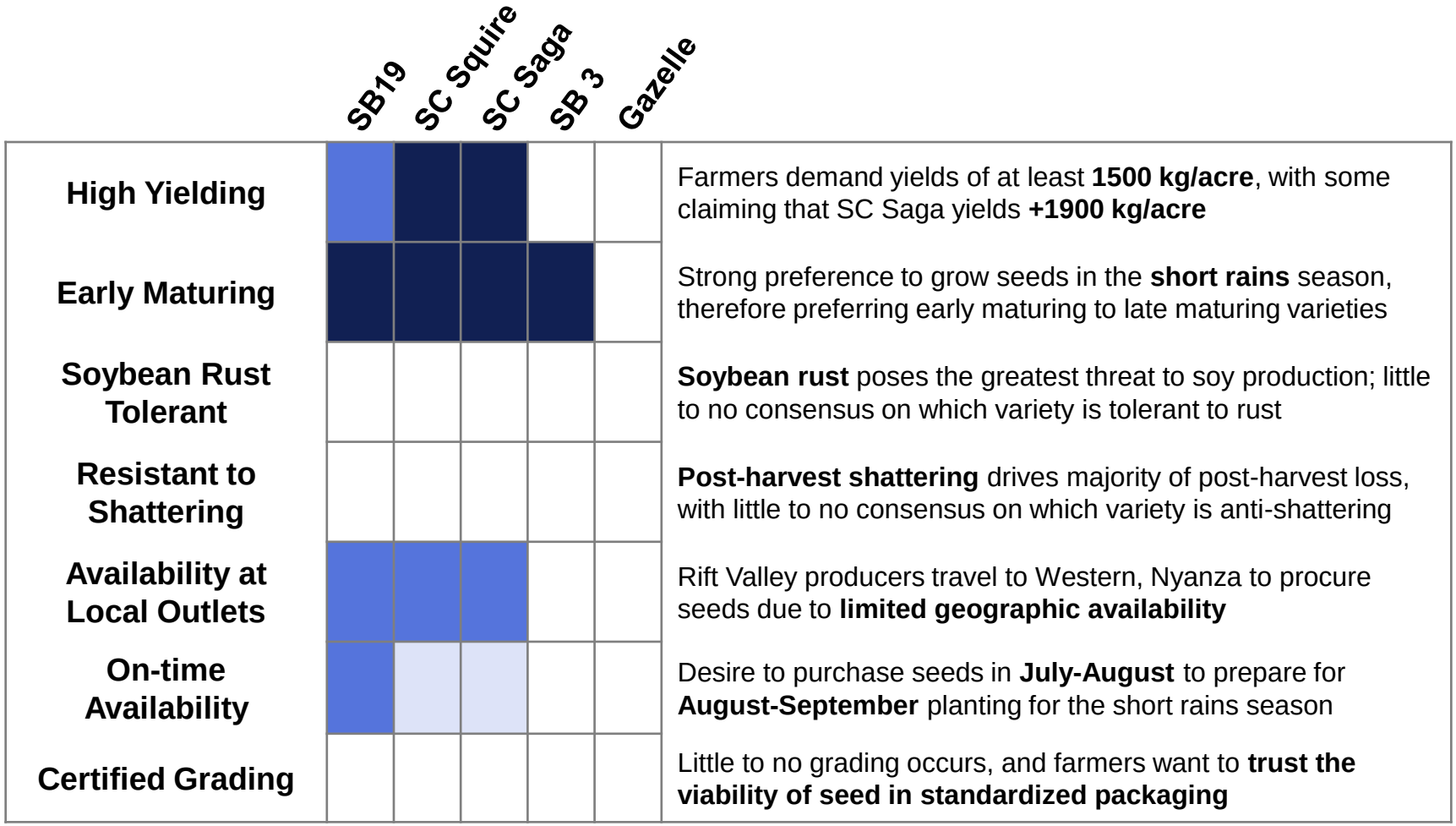

Source: TNS Interviews & Analysis

# A Only ~2% of seed is acquired through market channels, characterized by highly variable pricing and limited quality assurance

| | Market Share | ksh/kg Low | ksh/kg High | Recycled | CBO | KALRO | Private Sector |
|---|---|---|---|---|---|---|---|
| SB 19 | *85%* | 80 | 250 | ■ | ■ | ■ | ■ |
| SB 132 – Squire | *5%* | 80 | 200 | ■ | ■ | | ■ |
| SB 134 – Saga* | *5%* | 200 | 200 | ■ | ■ | | ■ |
| SB 3 | *3%* | 80 | 100 | ■ | | | |
| Gazelle | *2%* | 80 | 100 | ■ | | | |
| SB 20 | *Little to no usage or demand for these varieties amongst Kenya's existing soy producers* | | | | | | |
| SB 23 | | | | | | | |
| SB 24 – Maksoy | | | | | | | |
| SB 25 – Namsoy | | | | | | | |

Source: TNS Interviews & Analysis; *Saga is currently unregistered, leading to legal issues limiting distribution

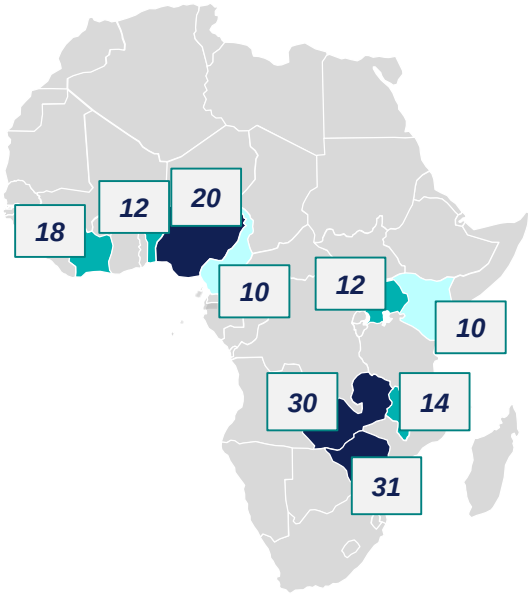
# A SB19, SC Squire, and SC Saga meet some producers needs – yet quality-assured products are difficult to find on-time at retail outlets




Source: TNS Interviews & Analysis

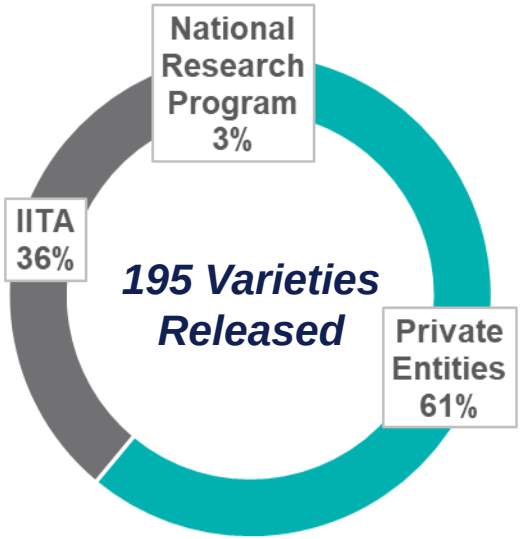
# A Additionally, Kenya historically lags behind in number of varietal releases in comparison to neighboring producers

## Number of Soybean Varietal Releases by Country, 1970 - 2011




Zimbabwe, Zambia lead Sub-Saharan Africa in soy varietal releases, yet potential to import seed limited due to viability concerns

## Releases by Research Entity across Africa, 1970 - 2011




Private companies lead varietal releases for soy, yet IITA has played an outsized role across Africa in bolstering soy seed systems

# B According to historic trials in Western & Nyanza, quality seed and inoculant use leads to potential yields ranging from 2.0 – 4.0 MT/ha

## 2013/2014 Short Rains Season Trial Results, N2Africa Project

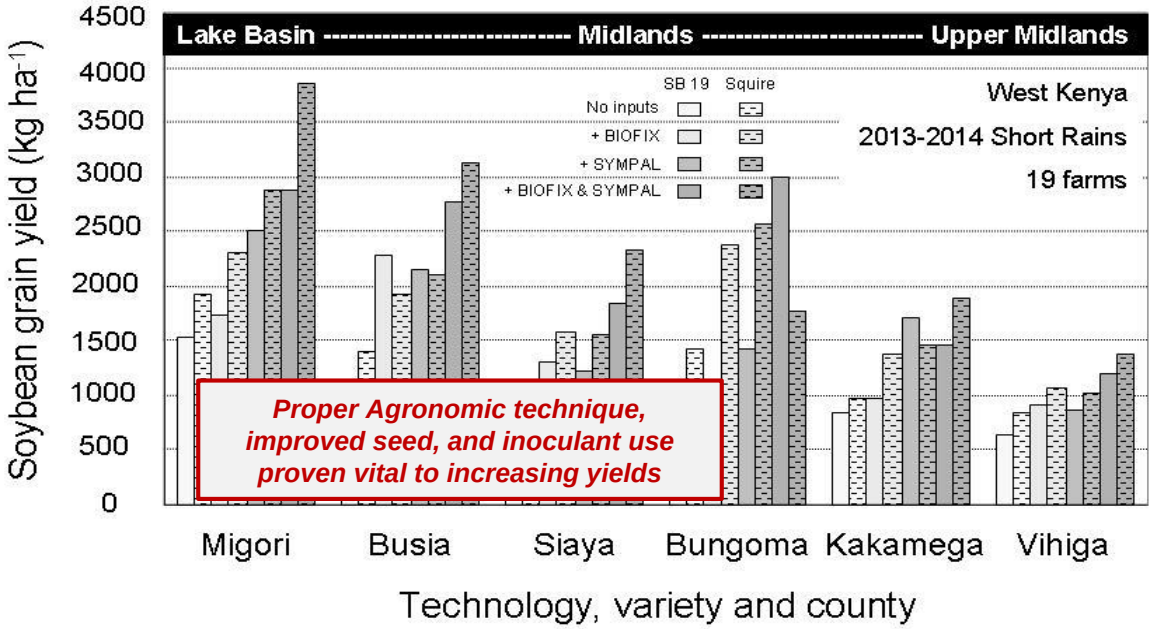


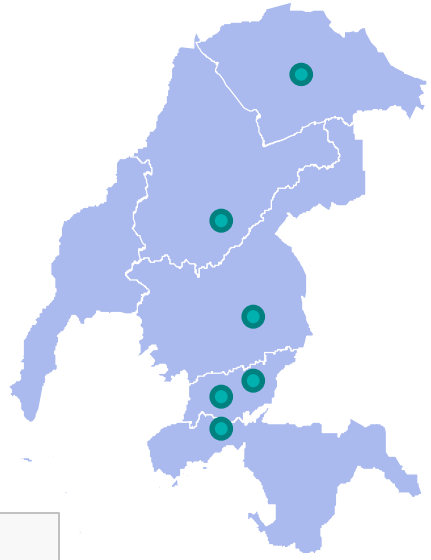

Figure 2. Yield of two soybean varieties receiving BIOFIX inoculant and or SYMPAL fertilizer in three agro-ecological zones and five counties of west Kenya during the 2013-2014 short rains growing season.

# B Yet, 2018 interviews demonstrate considerable yield variance due to lack of geographically distributed extension advice

**KAKAMEGA**
"Our farmers typically produce **1000 kg/acre**, but yields could likely be higher with higher quality seeds."
*-KESOFA Manager*

**VIHIGA**
"Our farmers typically do not use. They are only able to achieve about **500 kg/acre**, and some have yields as low as **250 kg/acre**."
*-SOF-DI Project Manager*

**VIHIGA**
"I applied for a bank loan to harvest 3 acres of soybean and used a yield of **1500 kg/acre** to calculate my expected returns."
*- MFAGRO Manager*



**BUNGOMA & TRANS NZOIA**
"Our farmers average **1200 kg/acre.** However, I sold inputs to a commercial farm in Kitale who harvested **1900 kg/acre** during the 2017/2018 short rains.
-
A youth program in Bungoma failed to provide recruited farmers with the correct input packages, and many participants only saw yields of **90 kg/acre**."
-UNIGENT, *MANAGER*

**KISUMU**
"On average, farmers achieve **800 kg/acre.** With great management, a farmer can achieve **1500 kg/acre**, and managed poorly, a farmer will only see **400 kg/acre.**"
*- CIAT Maseno*

Source: TNS Interviews & Analysis

# B Without proper agronomic techniques & quality inputs, SHF soybean production appears profitable only on a cash-cost basis

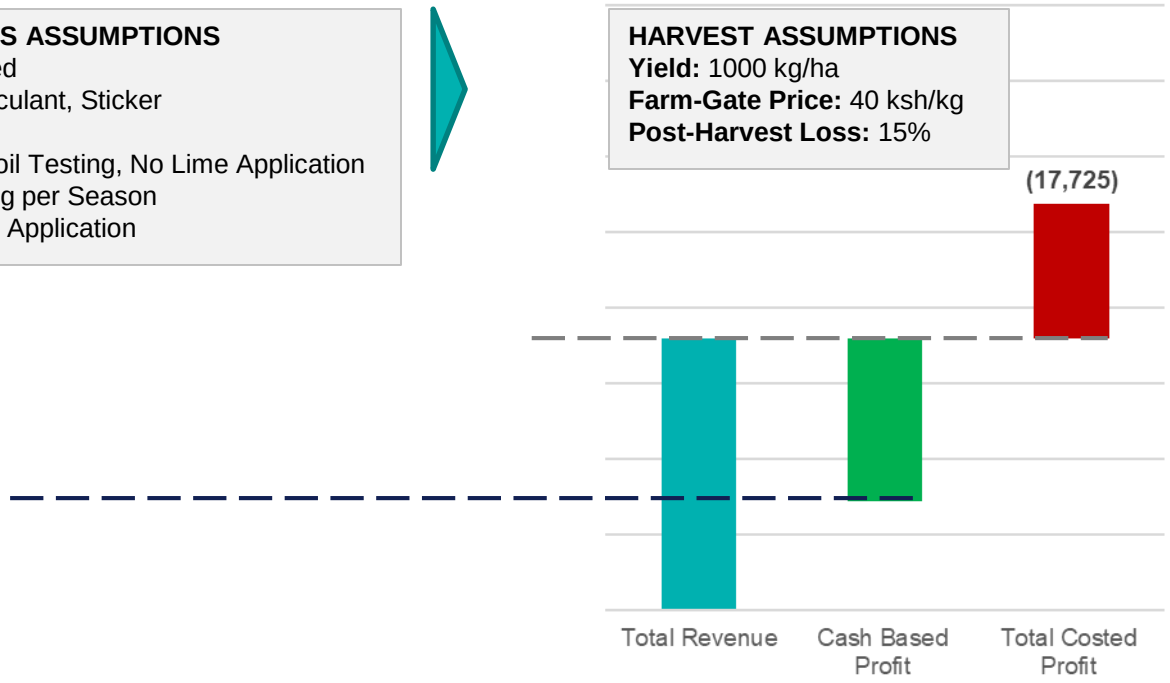
## BASE CASE

### Cash, Labor, and Land Costs vs. Revenue and Profit Per Hectare, 2017

KSH

**INPUTS & AGRONOMICS ASSUMPTIONS**
**Seed**: Farmer-Saved Seed
**Inoculant**: No Use of Inoculant, Sticker
**Fertilizer:** DAP
**Land Preparation:** No Soil Testing, No Lime Application
**Weeding**: Only 1 Weeding per Season
**Pesticide/Fungicide:** No Application

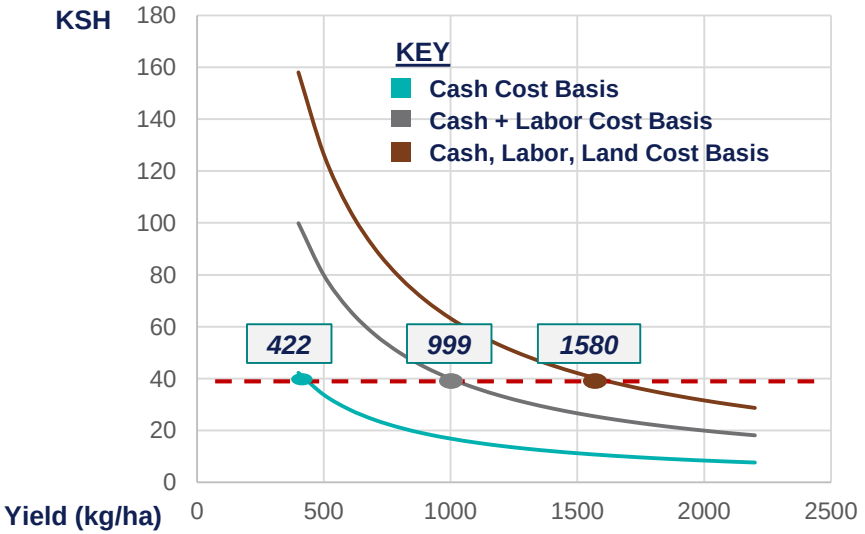
**HARVEST ASSUMPTIONS**
**Yield:** 1000 kg/ha
**Farm-Gate Price:** 40 ksh/kg
**Post-Harvest Loss:** 15%



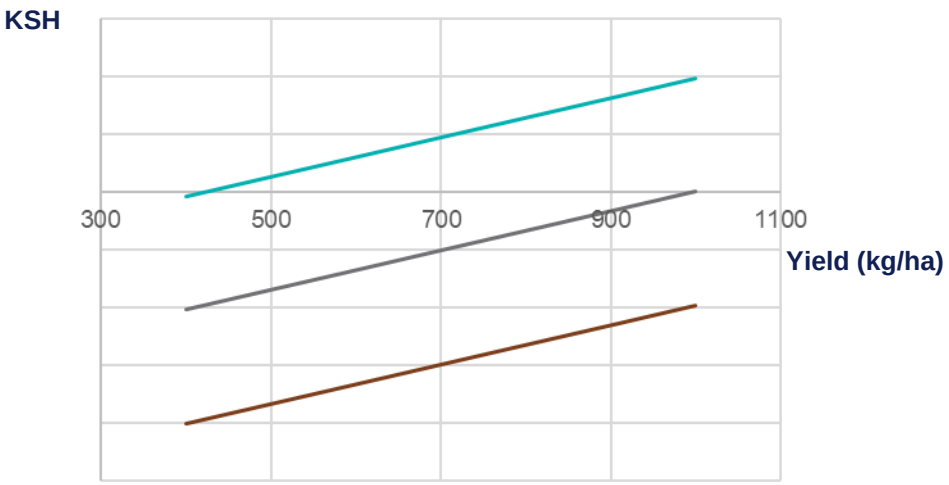
# B In this scenario, smallholder farmers are unlikely to profit when accounting for family labor and land rental

## BASE CASE

**Impacts of Yield (kg/ha) on Unit Cost of Production By Cost Basis Type**




**Estimated Profit by Cost Basis Type**




**Without the use of improved seed and inoculants, yields are unlikely to exceed 1000 kg/ha – the break-even point on a cash and labor costed basis**

**Therefore, in a "base case" scenario, soy farmers are unlikely to realize any profit except on a cash-cost basis at ~40 ksh/kg farm-gate price**

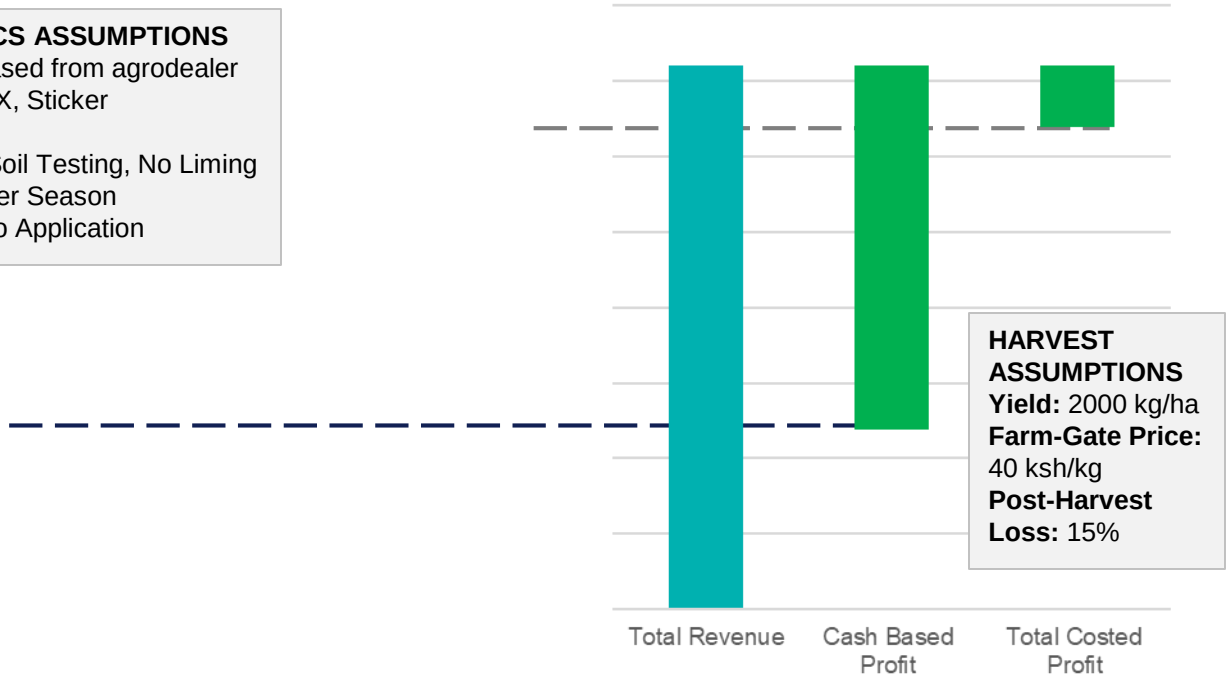
Source: TNS Interviews & Analysis

# B By using improved inputs, SHFs can achieve +227% return on investment measured by anticipated revenue growth

## HIGH CASE

### Cash, Labor, and Land Costs vs. Revenue and Profit Per Hectare, 2017

**INPUTS & AGRONOMICS ASSUMPTIONS**
**Seed**: SB Squire, purchased from agrodealer
**Inoculant**: Use of BIOFIX, Sticker
**Fertilizer:** Sympal
**Land Preparation:** No Soil Testing, No Liming
**Weeding**: 2 Weedings per Season
**Pesticide/Fungicide:** No Application

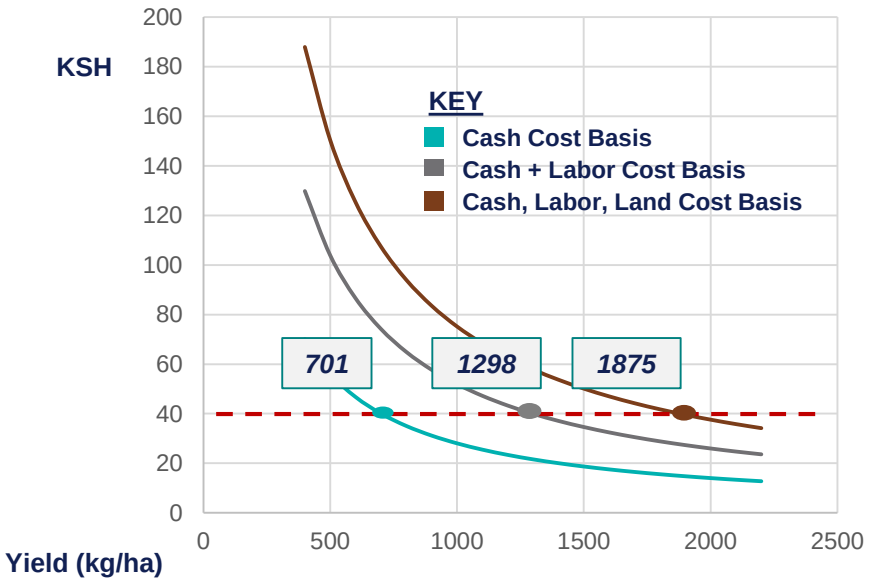



**HARVEST ASSUMPTIONS**
**Yield:** 2000 kg/ha
**Farm-Gate Price:** 40 ksh/kg
**Post-Harvest Loss:** 15%

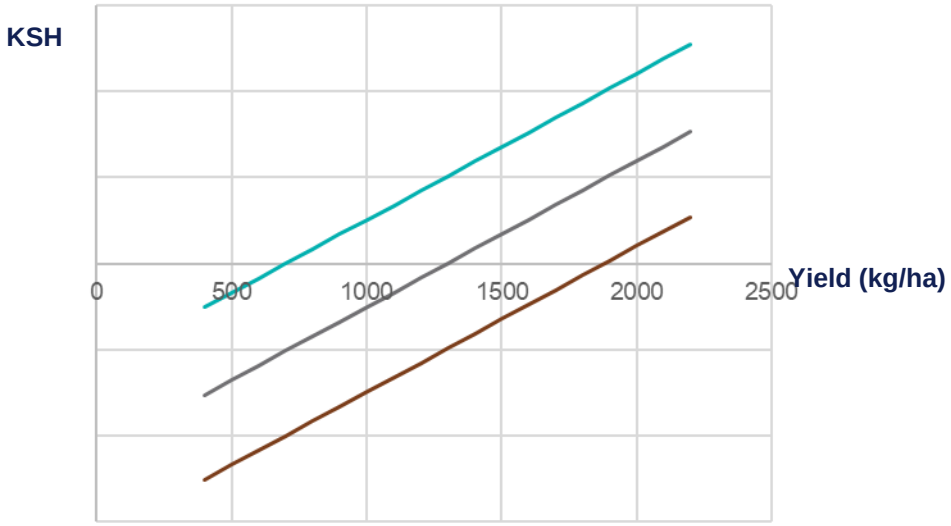
# B With yields exceeding 1875 kg/ha, soy production becomes profitable when accounting for cash, labor, and land costs

## HIGH CASE

### Impacts of Yield (kg/ha) on Unit Cost of Production By Cost Basis Type




### Estimated Profit by Cost Basis Type

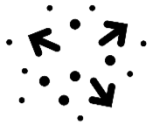



**N2Africa trials demonstrate average yields of at least 1500 kg/ha using improved inputs, with potential to reach 2.0 – 4.0 MT depending on geographic area**

**SHF profitability on a cash-basis sky-rockets, yet, land rental costs still have greatest impact on potential profitability**

Source: TNS Interviews & Analysis

# C Kenya's soybean producers, particularly SHF cooperatives, face barriers when bringing harvested soybeans to market



**Customer Fragmentation:** High fragmented customer bases in both feeds, foodstuff industries drive up marketing costs for producers

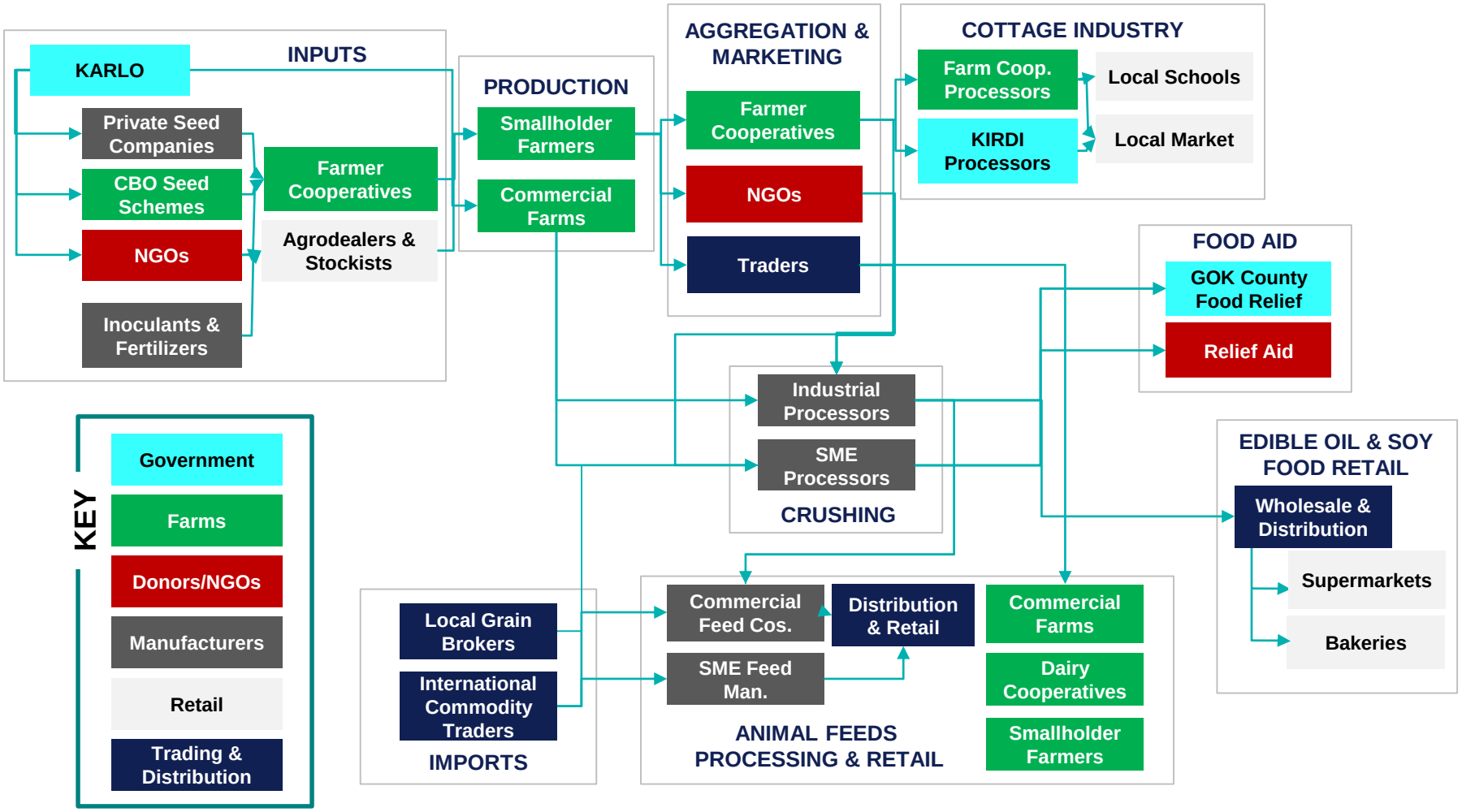
**Low Volumes:** 90% of feed, foodstuffs customers require 1-100MT per month; many farmers collectives produce >40 MT per growing season

**Purchasing & Production Schedule Gap:** Soybean meal processors require steady monthly product supply; producers lack high quality storage to maintain product quality

**Farmer-Purchaser Distrust:** Farmer groups distrust both traders and major urban buyers owing to past disagreements over grain sale price points

**Quality Assurance Concerns:** Limited training for farmers groups, producers on soybean quality assurance and customer quality concerns, leading customers to seek quality assured imports

# C In a highly fragmented market, producers also face challenges identifying customers and understanding their buying behaviors



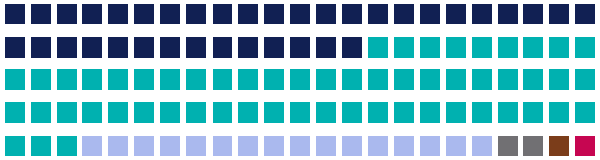
# C SHF collectives, constrained by small average plot sizes, have struggle to provide customers with necessary product volumes

**CASE STUDY: Cereal Growers Association and MFAGRO Farmers Group, Vihiga County**
Cereal Growers Association contracted 125 members of MFAGRO to provide soybean for the upcoming 2018/2019 short rains season.

Over 90% of all soy market players purchase between **1 MT – 100 MT per month,** demonstrating the significant gap between customer requirements by volume and SHF production capability

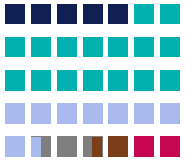
**Number of Farmers by Property Size**

**125 Farmers**



**Total Acreage under Soy production by Property Size**

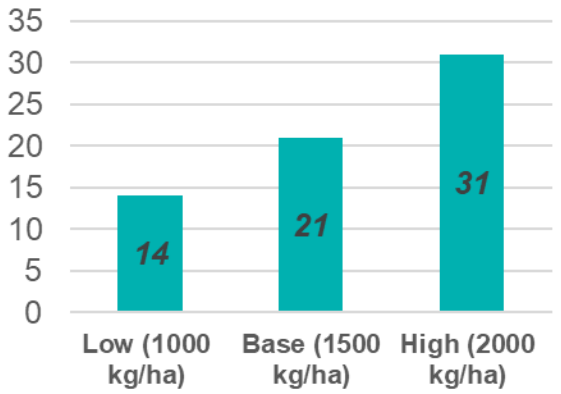
**35 Acres (13.8 ha)**



**KEY**

- 1/8 Acre
- 1/4 Acre
- 1/2 Acre
- 1 Acre
- 1-2 Acres
- 2 Acres

**MFAGRO 2018/2019 Short Rains Production, MT by Yield Estimate**




Source: TNS Interviews & Analysis

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*Kenya Markets Overview*

*Kenya Production: Challenges and Opportunities*

**Syngenta Foundation Seeds2B – Kenya Soybean Trials**

*Investment Opportunities & Partnership Assessment*

# Trials Outline

- Syngenta Foundation has tested 3 varieties across 5 locations over three consecutive seasons in Kenya: Short Rains 2015/2016, Long Rains 2016, Short Rains 2016/2017
- Short Rains Seasons 2016/2017: 20 soybean varieties, provided by public and private sector players in Latin America and Africa two trial sites: Thika and Machakos
- Applied Fertilizers & Pesticides include:

Table 1: Applied Fertiliser

| Fertiliser Type | Application Time | Application Rate | Remarks |
|---|---|---|---|
| Diammonium phosphate | At planting time | $125\frac{kg}{ha}$ | Applied along the planting line and mixed with soil |
| Calcium ammonium nitrate | Three weeks after planting | $100\frac{kg}{ha}$ | Applied as top dressing fertiliser after the first weeding |

Table 2: Applied Pesticides

| Pesticide | Active Ingredient | Target | Application Rate | Number of Applications |
|---|---|---|---|---|
| Engeo | Thiamethoxam | Aphids | $\frac{8ml}{20l}$ | 2 |
| | Lambda-cyhalotrhin | Caterpillars | | |
| Ortiva | Azoxystrobin | Leaf Rust | $\frac{20ml}{20l}$ | 1 |

Source: Kenya Soybean Trial Report SR Season 2016/2017; SFSA, October 2017

# Grain Yields – Short Rains 2016/2017

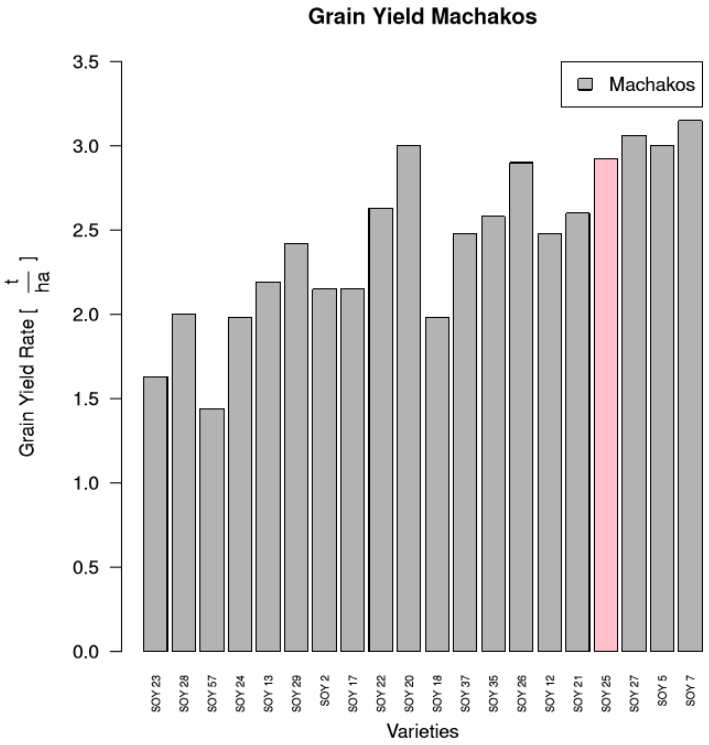


Figure 3: **Site Yield Analysis at Machakos** Yields of the 20 soybean lines at Machakos. Columns show the mean values of the three replicates. The control line SOY-25 is highlighted in light red.

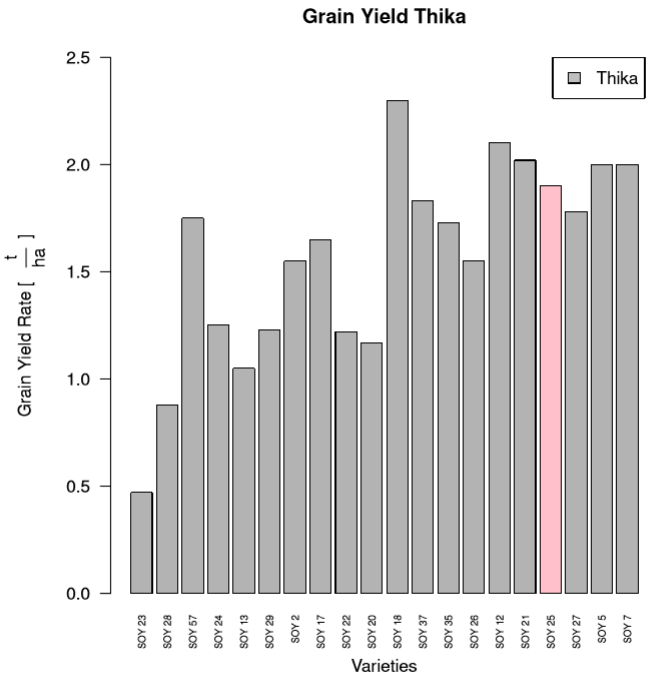


Figure 4: **Site Yield Analysis at Thika** Yields of the 20 soybean lines at Thika. Columns show the mean values of the three replicates. The control line SOY-25 is highlighted in light red.

Source: Kenya Soybean Trial Report SR Season 2016/2017; SFSA, October 2017

# Days to Maturity vs. Grain Yields Comparison – Short Rains 2016/2017

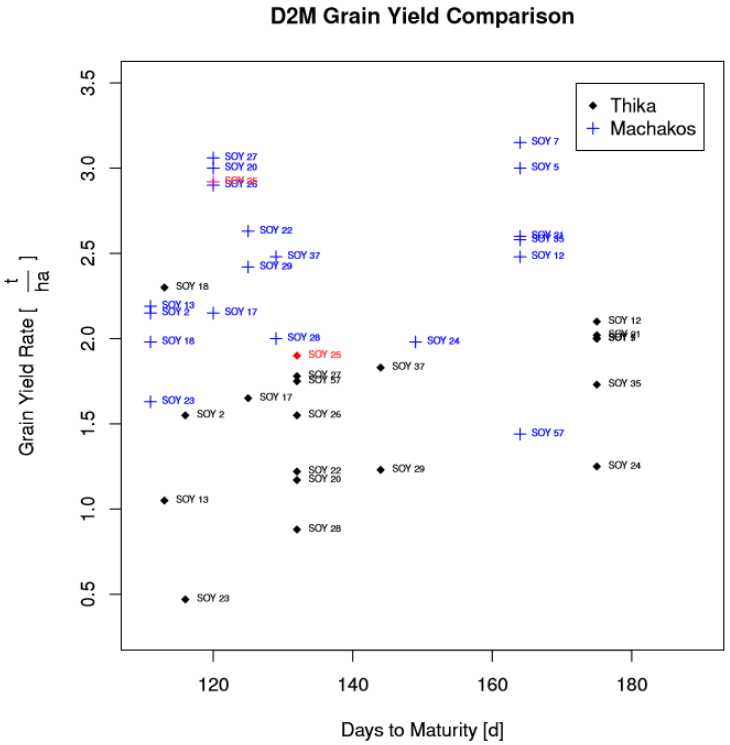


Figure 5: **Days to Maturity vs. Grain Yield Comparison** Grain yield rates were compared to days to maturity for each variety. Black diamonds represent results from Thika site, whereas black crosses show the results ot Machakos site. Values represent the mean values of the three replicates. Results of the control line SOY-25 are highlighted in light red.

Source: Kenya Soybean Trial Report SR Season 2016/2017; SFSA, October 2017

# Overall Analysis – Recommended Varieties

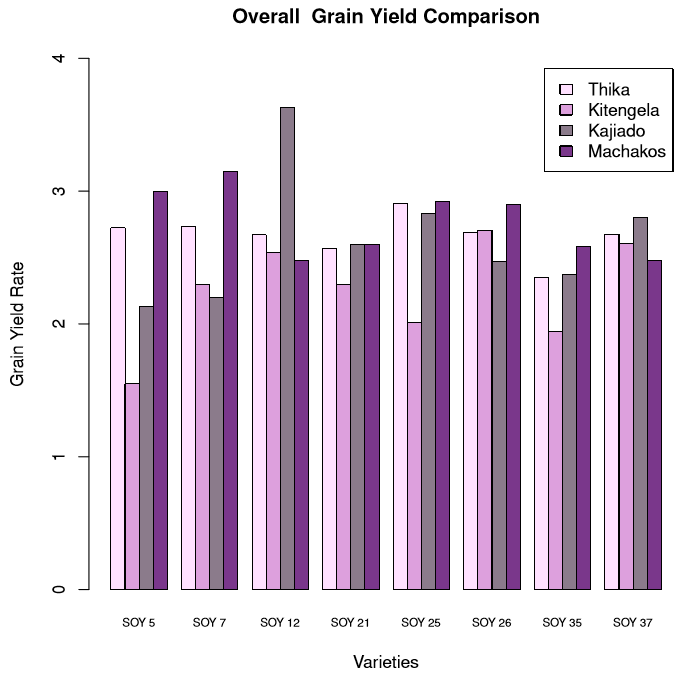


Figure 8: **Grain Yield Rates in $[\frac{t}{ha}]$ over all trialing locations** Grain yield rates of 8 soybean lines at the different trial sites are shown. Only varieties tested in all seasons are shown. Grain yield values are means across three replicates and across all of the three seasons.

After three seasons, Syngenta's field experts recommend the following for registration:

- **Soy-26:** Early maturation, high fodder yield, has performed well under different weather conditions
- **Soy-37:** Early maturation, no shattering recommended for low rainfall areas
- **Soy-12:** High fodder yield, best performance with good rainfall, recommended for high rainfall areas
- **Soy-21:** High fodder yield, not recommended for low rainfall areas
- **Soy-7:** High fodder yield, high grain yield under high rainfall conditions, not recommended for low rainfall areas

Source: Kenya Soybean Trial Report SR Season 2016/2017; SFSA, October 2017

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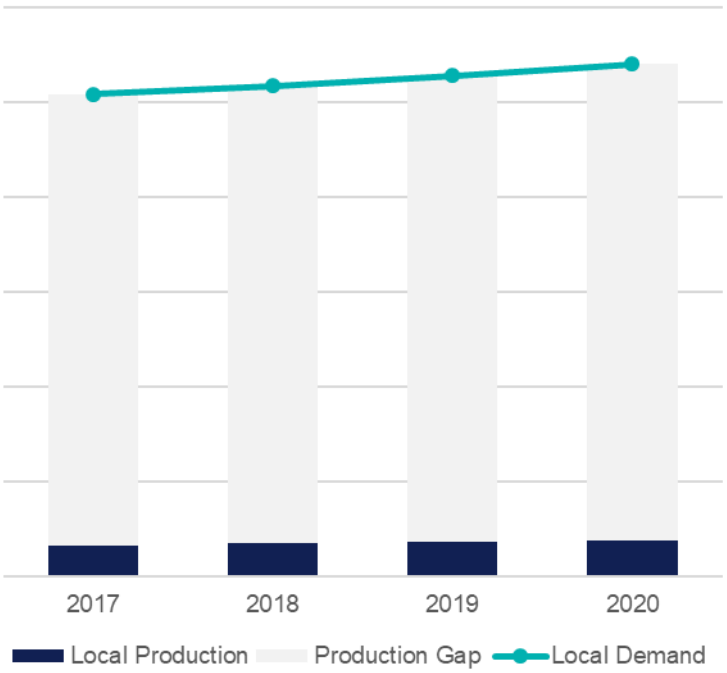
# The vision for Kenya's Industry Strategic Plan is threefold:

**Kenya Soybean Production vs Demand (MT), 2017-2020**




1. Increase ***Market Access*** for Kenya's Soy Farmers

2. Stimulate ***Seed Demand*** and ***Local Production***

3. Decrease Kenya's ***Reliance on Imports***

Source: FAOSTAT, April 2018; 2017 Nutrimix Report; TNS Interviews & Analysis

# To achieve this vision, TechnoServe assessed investments by evaluating multidimensional *impact* and *viability*

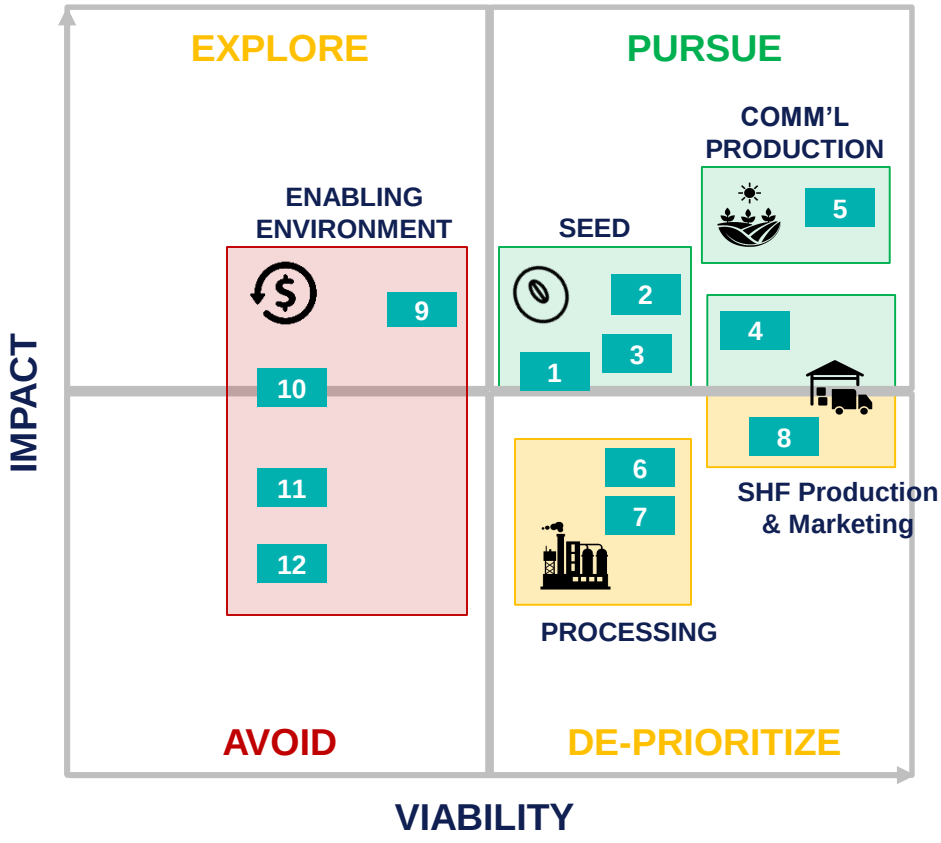
## Impact

| | |
|---|---|
| **Opportunity Size** | Generates revenue increases for one or more players in the value chain via increased existing sales, new production, or new value addition |
| **Farm Profitability** | Lowers unit costs of production, increases yields, increase farmers' bargain power, introduce contracts that reward quality and consistency in deliveries |
| **Food Security** | Availability of food supply, sustain steady expansion of food consumption, offset fluctuations in production and prices; increase population access to sufficient, safe, and nutritious foods |
| **Soil Health** | Decreased use of N fertilizer as a result of biological nitrogen fixation from increased soya bean production; potential increase in soil fertility, permeability, and organic matter to benefit non-legume crops |

## Viability

| | |
|---|---|
| **Time to Achieve** | Returns on investment can be realized within a near to mid-term timeline (e.g. 1-5 years) |
| **Level of Investment** | Level of investment does not crowd out majority of value chain players, interested donors; Return on investment likely within near to mid-term period |
| **Stakeholder Complexity** | Investment can be achieved via one to three key partnerships; complex coordination across the value chain *not* required to achieve key investment goals |
| **Regulatory Barriers** | Limited to no regulatory action required in order to realize investment's vision |

# Promoting commercial scale production and bolstering the seed market system emerge as priority investment areas



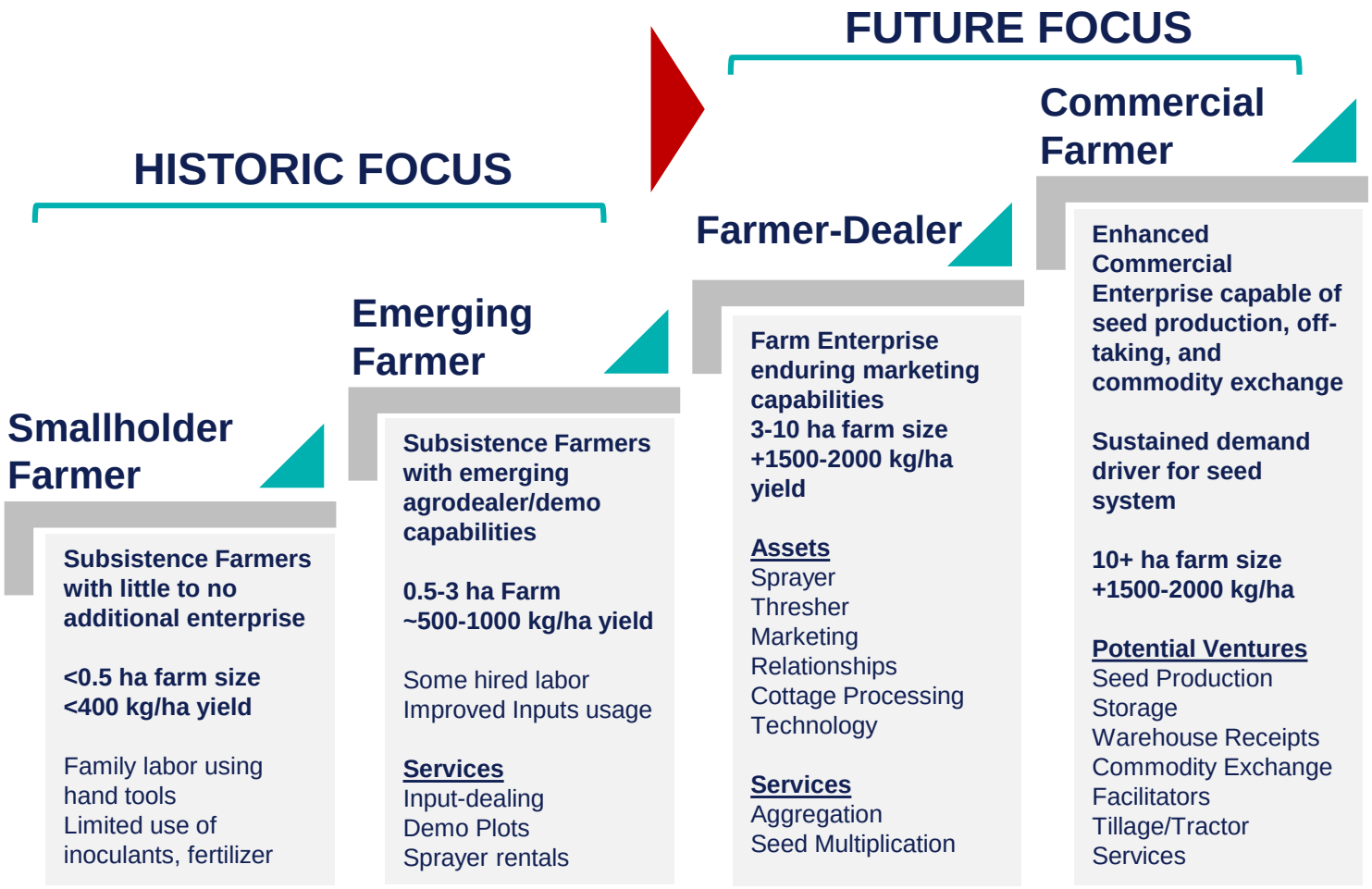

## INVESTMENT AREAS

1. Improved OPV Seed Releases
2. Seed Multiplication & Distribution
3. Seed Grading
4. Emerging Farmer "Graduation"
5. Commercial Production
6. Processing (Animal Feeds)
7. Processing (Edible Oils & Foodstuffs)
8. Processing (Microenterprises)
9. Soy Household Consumption
10. National Crop Strategy
11. Market Information Tools
12. Import Substitution Policies

# Priority investments aim to rapidly scale production and to grow the customer base for innovations in seed (facilitated by SFSA trials)

| | NEAR TERM (1-3 YEARS) | MID-TERM (3-5 YEARS) |
|---|---|---|
| **ACTION** | 5 Commercial Production<br>2 Seed Multiplication & Distribution<br>1 Improved OPV Seed Releases<br>4 Emerging Farmer "Graduation" | 3 Seed Grading<br>8 Processing (Micro-enterprises)<br>10 National Crop Strategy |
| **IMPACT** | Rapidly expand total soy acreage by focusing on large-scale farms<br><br>Grow customer base for improved seed, inoculant market<br><br>Bolster volumes to satisfy animal feed, edible oils customer demand, facilitating decrease in input reliance | Facilitate seed industry scaling through seed quality assurance<br><br>Increase Food Security by working through Emerging Farmer network to promote processing |

# To sustainably grow soy production, Farmer-Dealers and Commercial Farms can serve as “agro-hubs” for seed multiplication, aggregation



# Interested investors and donors can tap into an existing network of “emerging farmer” groups producing soy

## Emerging Farmer Partner Candidates

**Siaya**
*Ugunja Community Agrodealer*

**Bungoma**
*Green Belt Zone Enterprises*
*UNGEINT Agrodealer*

**Busia**
*AFDP Agrodealer*

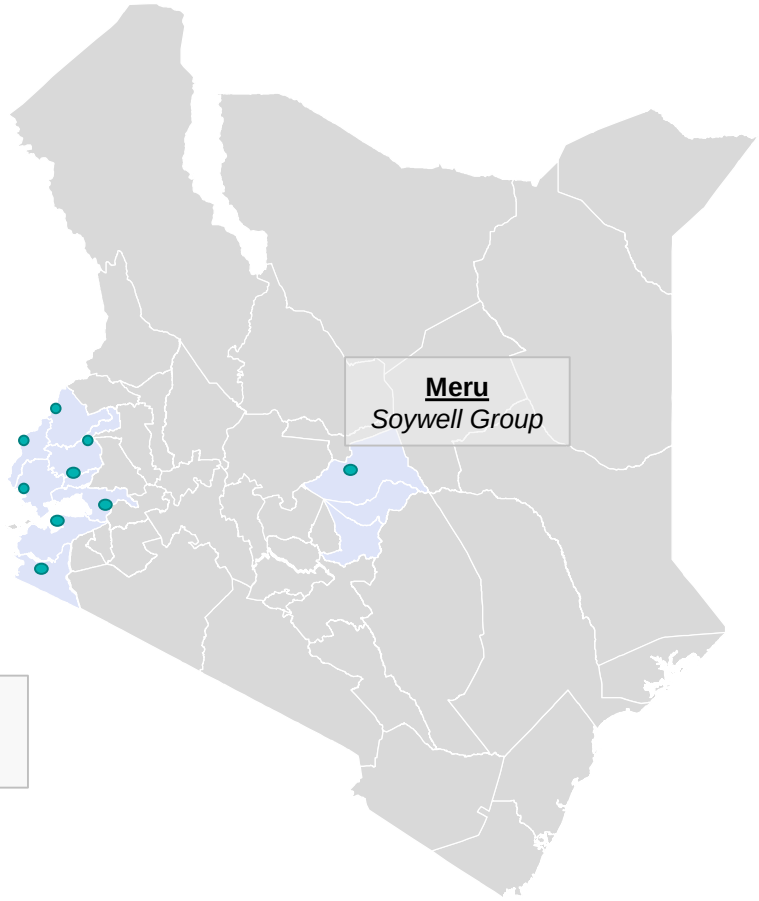
**Vihiga**
*MFAGRO Agrodealer*

**Kakamega**
*Farmers’ Key Enterprises*
*Karibuni Agrosales*

**Kisumu**
*KOMAME Agrodealer*
*Power Mark Enterprises*

**Migori**
*Kipeo Agrodealer*
*KUFGRO Agrodealer*

**Homa Bay**
*KAGAN Agrodealer*



# The COPAZA collective in Gurue, Mozambique provides a successful case study for the “agro-hub” model

**Market Constraint**

- In 2012, less than 15% of Mozambique’s soy was produced locally owing to **lack of access to improved seed**
- Seed companies did not stock seed in areas where farmers lived, leading to **low improved seed supply and high prices**
- **95%+** of seed was recycled, leading to low productivity and high unit costs

**Business Model Approach**

- In 2012, 6 small commercial farmers (average ~ 20 hectares/farm) formed **COPAZA**, a cooperative to produce and market improved seed in Zambezia, Northern Mozambique
- COPAZA farmers received **co-financing** for equipment (tractors, threshers, irrigation) – 50% in grant funding, 40% Bank Loan, and 10% Farmer provided
- COPAZA formed a joint venture with a local investor to establish **SBS**, a local seed processing plant (Ownership: 80% Local Investor; 20% COPAZA farmers)
- **Business Model:** (1) COPAZA produces seed → (2) SBS sorts, cleans, and packages seed, (3) COPAZA members market seeds to existing farmer networks

**Results**

- From 2012 to 2017, COPAZA expanded from **6 small commercial farmers producing 30 tons of seed** to **33 small commercial farmers producing 300 tons of seed**
- By 2017, it is estimated **that nearly 50% of soy demand in Mozambique is met by local production**, a significant increase from 2012