The materials in this presentation are incomplete. For the full analysis, please consult the final project report at http://www.mim.monitor.com/articles_ideas.html.
**EXECUTIVE SUMMARY & BACKGROUND**

**SNAPSHOT OF LEGUMES IN FOCUS COUNTRIES**

In focus countries, legumes are grown by an estimated 18M smallholder farmers (SHFs) (~20% of all SHFs in Africa); carefully-designed interventions could have significant impact

<table>
<thead>
<tr>
<th></th>
<th>Burkina</th>
<th>Ethiopia</th>
<th>Ghana</th>
<th>Mali</th>
<th>Nigeria</th>
<th>Tanzania</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consumption Growth</strong></td>
<td>-8%</td>
<td>1%</td>
<td>11%</td>
<td>-6%</td>
<td>-9%</td>
<td>22%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Consumption</strong></td>
<td>571</td>
<td>482</td>
<td>895</td>
<td>424</td>
<td>5,275</td>
<td>1,437</td>
<td>906</td>
</tr>
<tr>
<td><strong>Land for Legumes</strong></td>
<td>17%</td>
<td>3%</td>
<td>7%</td>
<td>12%</td>
<td>15%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Legume Farmers</strong></td>
<td>1.2M</td>
<td>6.5M</td>
<td>0.8M</td>
<td>0.3M</td>
<td>4.1M</td>
<td>2.6M</td>
<td>3.1M</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td>795</td>
<td>612</td>
<td>895</td>
<td>426</td>
<td>5,273</td>
<td>1,526</td>
<td>921</td>
</tr>
<tr>
<td><strong>Production Growth</strong></td>
<td>8%</td>
<td>3%</td>
<td>11%</td>
<td>-5%</td>
<td>-9%</td>
<td>24%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Yield</strong></td>
<td>0.8</td>
<td>1.2</td>
<td>1.2</td>
<td>0.8</td>
<td>1</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Net Export Volume</strong></td>
<td>0.4</td>
<td>130</td>
<td>-8</td>
<td>2</td>
<td>-3</td>
<td>89</td>
<td>16</td>
</tr>
</tbody>
</table>

Note: 1 Consumption growth reflects the ('08–10) CAGR; 2 Consumption, production and net export volumes in thousand metric tons (MT); 3 Legumes and land cultivated with legumes; 4 Please refer to country decks for farmer calculation; Sources: FAOSTAT; “Total Labor Force Participation Rate”, World Bank, 2009; “400 million smallholders a ‘vital global asset’“, Global Donor Platform for Rural Development Website, 2011; Ethiopia Ministry Data; Tanzania Ministry Data; Ghana Ministry Data; Monitor Analysis
AGENDA

Executive Summary & Background

Legume Industry Overview

Production, Consumption, Trade

Trends Impacting the Legume Industry

Competitiveness Factors

Summary & Recommendations

Profiling Legume Value Chain Players
**LEGUME INDUSTRY OVERVIEW**

**LEGUME USES (1/2)**

The demand for legumes is driven by a variety of uses. Legumes can be used for human consumption — raw or processed — and for other purposes such as animal feed, seed generation and alternative fuels.

### Summary of Legume Uses

<table>
<thead>
<tr>
<th>Use</th>
<th>Common Beans &amp; Chickpeas</th>
<th>Cowpeas</th>
<th>Groundnuts</th>
<th>Soybeans</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human Consumption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct/primary</td>
<td>● Food grain eaten raw, sprouted, cooked, boiled, roasted, fried</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processed/Industrial Use</td>
<td>● Natural sources of amino acids, vitamin E, complex carbohydrates, potassium, calcium, fiber, antioxidants, amino acids, fatty acids and other nutrients</td>
<td>● Processed into high-protein snacks, ground into (cotyledon) fortified flour, juiced into milk, canned</td>
<td>● Confectionery products and oil; groundnuts and soybeans are both oilseeds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Building/textile materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Made into solvents and oils; used as ingredients in cosmetics and soaps</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peanut butter</td>
<td>● Processed into high-protein snacks, noodles and soy nut butter; curdled into tofu; fermented into soy sauce</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>● Input in the manufacturing of: Candles, paint, crayons and fibre (SoySilk)</td>
</tr>
<tr>
<td><strong>Animal Feed</strong></td>
<td>● Ingredient in animal feed (E.g., common beans for poultry feed, chickpea feed for horses, high quality cowpea feed/hay, groundnut cakes/hay, soybean meal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Crop residue post harvest also used as forage for livestock; particularly in the case of cowpeas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Seed</strong></td>
<td>● Used in the generation of seed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other¹</td>
<td>● Nitrogen-fixation: Intercropped to leverage nitrogen-fixing properties</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Health: E.g., Cowpeas treat boils, groundnut-based solvents used in medicine, soybeans aid kidney functioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Biofuels: Used to make biodiesel, given oilseed properties</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** ¹ The sub-category “other” refers to uses such as an input in the manufacturing of timber, tannins, resins, gums, insecticides, green manure

### LEGUME INDUSTRY OVERVIEW

#### LEGUME USES: FOCUS COUNTRIES (2/2)

*In focus countries, processing and feed account for 35% of total legume consumption*

---

#### Domestic Consumption

- **Human**
- **Food**
- **Processing**
- **Feed**
- **Seed**
- **Other**

#### Focus Countries

<table>
<thead>
<tr>
<th>Common Beans</th>
<th>Domestic Consumption $^1$</th>
<th>Processing</th>
<th>Feed</th>
<th>Seed</th>
<th>Other $^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chickpeas</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Cowpeas</td>
<td>79%</td>
<td>20%</td>
<td>1%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>45%</td>
<td>37%</td>
<td>12%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Soybeans</td>
<td>9%</td>
<td>52%</td>
<td>34%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td><em>All Legumes</em></td>
<td>61%</td>
<td>27%</td>
<td>8%</td>
<td>2%</td>
<td>2%</td>
</tr>
</tbody>
</table>

---

*Note: $^1$ Excludes exports; $^2$ Includes wastage*

Source: FAOSTAT, USDA; Ministry Data; Monitor Analysis
Although several food and non-food substitutes exist, many are economically out of reach in most African countries, and are therefore underutilized.
AGENDA

- Executive Summary & Background
- Legume Industry Overview
- Production, Consumption, Trade
- Trends Impacting the Legume Industry
- Competitiveness Factors
- Profiling Legume Value Chain Players
- Global production CAGR +5%
- Focus country CAGR -1%
  - Unattractive yields
  - Land area cultivated with legumes growing

- Global consumption CAGR +9%
  - Growing populations
  - Rising incomes
    - More poultry consumed
    - More processed food consumed
- Focus country CAGR -3%

- Mostly trading common beans
- Focus countries:
  - Importing from USA, Argentina, regional partners (Kenya, South Africa, Uganda, Burkina Faso)
  - Exporting to regional partners (Kenya, Sudan), Asia and the Gulf

**Implications**

### Local Import Substitution
- Small opportunity in each focus country

### Regional Import Substitution
- **East Africa**: Biggest opportunity in substitution of imports in Kenya and Burundi
- **West Africa**: Biggest opportunity in substitution of imports in Senegal and Sierra Leone

### Asia and the Gulf export growth
- Biggest opportunity in growing exports to UAE, Pakistan and Yemen

### Rest of Africa export growth
- **North Africa**: Biggest opportunity in establishing exports to Egypt, Morocco, Algeria
- **Other**: Biggest opportunity in establishing exports to South Africa and Chad
Global production has grown at 5% compounded annually, driven by strength in all regions.

**Global Legume Production Growth**

**Legume Production: Africa vs. Other Regions (2008–2010)**

- **2008**: 305 Million Metric Tons, 1% CAGR ('08–'10)
- **2009**: 296 Million Metric Tons, 7% CAGR ('08–'10)
- **2010**: 339 Million Metric Tons, 6% CAGR ('08–'10)

**Legume Production: Focus Countries vs. Rest of Africa (2008–2010)**

- **2008**: 20 Million Metric Tons, 1% CAGR ('08–'10)
- **2009**: 21 Million Metric Tons, 1% CAGR ('08–'10)
- **2010**: 21 Million Metric Tons, 1% CAGR ('08–'10)

Source: FAOSTAT; Ethiopia Ministry Data; Tanzania Ministry Data; Ghana Ministry Data
In focus countries, overall production growth is slightly weak, driven by Nigeria’s reductions in land and yields for cowpeas, groundnuts and soybeans.

### Drivers and Trends in Legume Production

In focus countries, legume production is primarily driven by land harvested, access to inputs, demand, and yields. For each legume, the production CAGRs (’08–’10) can be attributed to the following countries and trends:

- **Chickpeas**
  - Tanzania and Uganda, with 3% and 2% growth respectively
  - Driven by: Increase in land harvested, access to seed systems and growing export market

- **Soybeans**
  - Nigeria, with production growth decline of 18%
  - Driven by: significant decline in land harvested

- **Common Beans**
  - Tanzania and Ethiopia, with 23% and 4% growth respectively
  - Driven by: Increasing demand, area harvested, improving yields, and access to seed inputs

- **Cowpeas**
  - Nigeria, with production growth decline of 12%
  - Driven by: Significant decrease in land allotted to cowpeas

- **Groundnuts**
  - Mali and Nigeria, with production growth declines of 10% and 4% respectively
  - Driven by: Significant decrease in yields
Overall, weak production growth is primarily a function of low yields; land area harvested with legumes is growing.

**Production Growth**

1. **Yield**
2. **Land Area**
3. **Farming Intensity**

**Market Demand & Market Prices**

**Production Cost of Substitutes**

Source: FAOSTAT; “World Agriculture Towards 2015/2030”, FAO, 2002; Expert Interview; Monitor Analysis
Although yields are growing, the pace is sluggish given limited access to investment, seed and productivity-enhancing technologies

**Legume Yield Comparison: Focus Countries vs. Other Regions, 1970–2010**

*In focus countries:*

- **Yields have only shown 1% compounded annual growth** over a 40-year period, primarily driven by improved agronomic practices (e.g., rhizobium inoculation, earlier planting, close spacing, active weeding, use of herbicides)
- Despite this, **yields are still low in absolute terms**
  - **Yields are currently 940kg/ha; they are yet to reach 1 MT/hectare**
    - **Versus Potential:** South Africa has the highest legume yields in Sub-Saharan Africa. South Africa has much higher yields; the yield gap is ~0.8 MT/ha
    - **Versus Similar Region:** Yields are essentially in-line with South Asia, a region that has also traditionally underinvested in the legume value chain
- **There is a wide disparity in yields among focus countries**
  - Ghana and Ethiopia have the highest legume yields at 1.2MT/ha, while Uganda has the lowest at 715 KG/ha

Source: FAOSTAT; Ethiopia Ministry Data; Tanzania Ministry Data; Ghana Ministry Data; “Pulses: past and future trends”, FAO, 2005; Monitor Analysis
Across legumes, yield performance is mixed. Chickpeas, groundnuts and soybeans have yields above 1MT/ha, in comparison to common beans and cowpeas which have yields sub-900kg/ha.
Global consumption has grown 9% compounded annually, driven by growth in all regions.

Legume Consumption\(^1\): Africa vs. Other Regions (2008–2010)

<table>
<thead>
<tr>
<th>Year</th>
<th>Africa</th>
<th>Asia</th>
<th>Americas</th>
<th>Rest of Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>285</td>
<td>42%</td>
<td>43%</td>
<td>43%</td>
</tr>
<tr>
<td>2009</td>
<td>292</td>
<td>43%</td>
<td>44%</td>
<td>44%</td>
</tr>
<tr>
<td>2010</td>
<td>336</td>
<td>43%</td>
<td>44%</td>
<td>43%</td>
</tr>
</tbody>
</table>

CAGR ('08–'10)
- Africa: 4%
- Asia: 9%
- Americas: 10%

Legume Consumption\(^1\): Focus Countries vs. Rest of Africa (2008–2010)

<table>
<thead>
<tr>
<th>Country</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mali</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>22</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Ghana</td>
<td>21</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>22</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Tanzania</td>
<td>21</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Nigeria</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Rest of Africa</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
</tbody>
</table>

CAGR ('08–'10)
- Mali: -6%
- Ethiopia: 1%
- Ghana: 11%
- Burkina Faso: -8%
- Tanzania: 22%
- Nigeria: -9%

Note: \(^1\) In some cases, consumption estimated using the formula: consumption = production + imports - exports

Source: FAOSTAT; Ethiopia Ministry Data; Tanzania Ministry Data; Ghana Ministry Data; Monitor Analysis
CONSUMPTION, PRODUCTION, TRADE

GLOBAL CONSUMPTION GROWTH BY LEGUME

Population and income growth are driving the global growth in consumption

<table>
<thead>
<tr>
<th>Legume</th>
<th>CAGR ('08–'10)</th>
<th>Drivers of Global Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickpeas</td>
<td>13%</td>
<td>• Population growth, especially in India</td>
</tr>
</tbody>
</table>
| Soybeans     | 6%             | • Population growth and increasing incomes, especially in China and India  
|              |                | • Greater demand for derivative products:  
|              |                |   • Soybean-based animal feed (soybean meal), given:  
|              |                |     • Rising global incomes which are driving a migration to meat-based diets and processed foods  
|              |                |     • EU ban of meat and bone meal to curb mad cow disease  
|              |                |     • Low market price of soybean oil alternatives has promoted its consumption  
| Common Beans | 5%             | • Population growth |
| Groundnuts   | -1%            | • Slight decline in global production |
| Cowpeas      | -2%            | • Slight decline in global production |

Chickpeas are driving most of the global growth with strength in soybeans also

Note: 1 In some cases, consumption estimated using the formula: consumption = production + imports - exports

In focus countries, consumption growth is primarily driven by common beans.

### Consumption, by Legume: Focus Countries ('08–’10)

<table>
<thead>
<tr>
<th>Legume</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickpeas</td>
<td>34%</td>
<td>31%</td>
<td>30%</td>
</tr>
<tr>
<td>Cowpeas</td>
<td>44%</td>
<td>44%</td>
<td>45%</td>
</tr>
<tr>
<td>Soybeans</td>
<td>11%</td>
<td>13%</td>
<td>15%</td>
</tr>
<tr>
<td>Common Beans</td>
<td>8%</td>
<td>9%</td>
<td>2%</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>11%</td>
<td>13%</td>
<td>3%</td>
</tr>
</tbody>
</table>

**CAGR ('08–’10)**
- -3%
- -6%
- -8%
- 13%
- -8%
- -1%

### Trends in Legume Consumption

In focus countries, legume consumption is primarily driven by population growth, and increased demand for industrial/processing use (especially animal feed). For each legume, consumption CAGR ('08–’10) can be attributed to the following countries and trends:

- **Chickpeas**
  - Significant decrease in consumption in Tanzania (-51% growth)

- **Soybeans**
  - Nigeria and Tanzania, with decreased consumption rates of -18% and -4% respectively

- **Common Beans**
  - Tanzania and Ethiopia, with 22% and 5% growth respectively
  - *Driven by:* Sustained importance in traditional diets, increased use in animal feed

- **Cowpeas**
  - Decrease in consumption driven by Burkina Faso (-15% growth) and Nigeria (-12% growth)

- **Groundnuts**
  - Decrease in consumption driven by Mali (-10% growth) and Nigeria (-4% growth)

Note: In some cases, consumption estimated using the formula: consumption = production + imports − exports

Source: FAOSTAT, ITC Trade Map; Ministry Data
Although consumption and production volumes are closely aligned across the continent, many African countries engage in global trade.
### Legume trade in focus countries is largely informal and dynamic; while directionally correct, official data does not fully capture volume movement

#### Burkina Faso
- **Cowpeas:** Cowpeas are the most exported legume from Burkina Faso; the country is a net exporter of cowpeas
  - Burkina Faso’s cowpea trade is not tracked formally at all
  - Informal trade could account for as much as 50% of production (~200K MT)
  - Cowpeas are exported to Nigeria, Togo, Ivory Coast, Ghana, Mali and Benin and imported from Niger:
    - Burkina Faso accounts for a significant proportion of Ghana and Togo’s imports
- **Groundnuts:** Informal groundnut exports are relatively lower than cowpea exports. Exports are mostly channeled to regional neighbors: main trade partners are Ghana (imports for human consumption), Ivory Coast (imports for animal feed), Mali, Niger and Togo; officially, Burkina Faso also imports low volumes from these countries
- **Soybeans:** Soybeans are traded informally; volumes are low and partners are regional neighbors

#### Ethiopia
- **Faba beans:** Faba bean is the only legume in Ethiopia that is informally traded in any meaningful way; faba bean is smuggled into Sudan
- **Red kidney beans:** Red kidney beans are also traded informally, primarily from the South of Ethiopia into Northern Kenya

#### Ghana
- **Cowpeas:** Ghana has limited export of cowpeas to Togo

#### Mali
- **Cowpeas:** Mali is a net exporter of cowpeas; exports are primarily channeled to Ivory Coast
- **Groundnuts:** No data exists on the informal trade of groundnuts, but similar to Burkina Faso, Mali likely engages in trade with regional neighbors
- **Soybeans:** Soybeans are traded informally; volumes are low and partners are regional neighbors

#### Nigeria
- Nigeria is not exporting legumes in significant volumes, even informally; the country is the “consumption basin” for legumes
- **Cowpeas:** There is limited export of cowpeas to Gabon and Benin

#### Tanzania
- **Common beans:** Common beans are traded informally in the most significant volumes versus other legumes
  - Top trade destinations are Kenya (small red beans), Malawi (cream colored and sugar beans), Zambia (cream colored beans) and the DRC (red-mottled bean)
- **Groundnuts:** The bulk of informal regional groundnut exports are channeled to Malawi and Kenya with much smaller volumes to Zambia, Burundi and Uganda

#### Uganda
- **Common beans:** Common beans are the most widely exported legume from Uganda
  - 84% of Uganda’s common bean output is traded informally
  - Key destinations for this output are Kenya, Tanzania, the DRC and South Sudan
  - While Tanzania is also a large producer of beans, there is still some informal trade due to the multiple varieties available and similar tastes of people living around border regions

Source: Monitor Analysis; Expert Interviews; Field Interviews
Africa and all other regions, except the Americas, are net importers of legumes.

Net Exports: Africa vs. Other Regions, 2010

Formal Trade: Focus Countries vs. Rest of Africa, 2010

Note: No official data available for cowpeas. Legume trade in focus countries is largely informal and dynamic; while directionally correct, official data does not fully capture volume movement.

Source: International Trade Center (ITC) Trade Map; Monitor Analysis.
Focus countries are net exporters of legumes, with common beans, chickpeas and groundnuts accounting for the bulk of volume movements

Net Exports, by Legume: Focus Countries, 2010

<table>
<thead>
<tr>
<th>Legume</th>
<th>Thousand Metric Tons</th>
<th>Export</th>
<th>Import</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Beans</td>
<td>116</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Chickpeas</td>
<td>88</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>58</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>Soybeans</td>
<td>19</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

**Trends in Legume Exports**

In focus countries, the absolute volume of legume net exports is low. Export potential is limited by inability to meet global quality standards, the existence of strict trade barriers and prohibitively high tariffs on exports. The following is a summary, by legume:

- **Common Beans**
  - 43% of total legume export volumes from focus countries
  - Highest volumes of exports from Ethiopia (70% of total common bean exports from focus countries) and Uganda (16%)

- **Chickpeas**
  - 33% of total legume export volumes from focus countries
  - Highest volumes of exports from Ethiopia (61% of total chickpea exports from focus countries) and Tanzania (38%)

- **Cowpeas**
  - No formal trade data available

- **Groundnuts**
  - 22% of total legume export volumes from focus countries
  - Tanzania accounts for 94% of total groundnut exports from focus countries

- **Soybeans**
  - 2% of total legume export volumes from focus countries
  - Uganda and Tanzania account for the bulk of soybean exports from focus countries, representing respectively 34% and 29% of total soybean exports

Note: Legume trade in focus countries is largely informal and dynamic; while directionally correct, official data does not fully capture volume movement

Source: International Trade Center (ITC) Trade Map; Monitor Analysis
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- Profiling Legume Value Chain Players
TRENDS IMPACTING THE LEGUME INDUSTRY

RISING POPULATIONS AND FOOD INSECURITY

Growing populations and an increased focus on food security promote the growth of legume markets in focus countries

Impact on Legume Markets in Focus Countries

- Growing populations will boost the legume industries in focus countries as:
  - Local demand grows
  - Export demand grows

Growing Populations

- Urbanization is a function of growth in incomes and population
- Populations are growing globally, albeit at a slower pace than most recent history
- As such, demand for agricultural products will continue to grow, also at a slower rate

Increasing Focus on Food Security

- Food Security: “When all people at all times have (physical and economic) access to sufficient, safe, nutritious food to maintain a healthy and active life.”
- Governments and donor agencies are shifting focus and attention away from aid-reliance; increased attention is being given to sustainably growing and securing food sources

- The focus countries are some of the most fragile versus the rest of the world, when it comes to food security

- Legumes will have an important part to play in the efforts toward increased food security as they are typically intercropped with traditional food security crops. To that end, they:
  - Are a cheap organic fertilizer
  - Improve yields of cereals

Rising incomes are a positive; they result in growth in animal feed, processing and vegetable oil industries

Rising Incomes and Changing Diets

- Incomes are rising in focus countries and the rest of the world
- Increasing incomes have three effects:
  - A migration toward higher quality diets, such as processed foods
  - An increase in the consumption of more expensive proteins, such as poultry and pork
  - Consumption of healthier foods such as vegetable oils

Impact on Legume Markets in Focus Countries

- Rising incomes and subsequent changing diets will have a net positive effect on the legume industries in focus countries. As diets shift, the demand for animal feed, processed foods and oilseeds will increase, given:
  - Legumes are a primary ingredient in animal feed
    - Global animal feed prices and demand are growing
  - Legumes can be processed into a variety of high quality foods and oils

- Globally, legumes are considered a cheap substitute for other proteins. As incomes of population in focus countries increase, legumes will sustain their importance and remain core to diets, as:
  - Population growth and demand are significant enough to increase growth in direct/primary (food) consumption
  - Even with shifts toward poultry and other meats, import data suggests that demand for legumes remains strong

Given the short term economic condition of Africa, and the cultural importance of legumes, legumes continue to be a major source of protein.

**Legume Contribution to per Capita Protein Intake, 2007**

- **Uganda**: 25%
- **Burkina Faso**: 19%
- **Tanzania**: 19%
- **Ethiopia**: 16%
- **India**: 13%
- **Mali**: 9%
- **Ghana**: 6%
- **Bangladesh**: 5%

**Focus Countries where legumes contribute > 10% of per capita protein intake**

**Focus Countries where legumes contribute < 10% of per capita protein intake**

**South Asian Countries**

Notes: ¹ Legumes include groundnuts, soybeans, common beans and other legumes (bambara beans & cowpeas) ² CHO, Riboflavin, Vitamins (B6, B12, A, C), Calcium, Iron

Source: FAOSTAT, Updated June 2011; Agdev; Monitor Analysis
**TRENDS IMPACTING THE LEGUME INDUSTRY**

**DIETARY IMPORTANCE OF LEGUMES (2/2)**

In the long-term, the importance of legumes is likely to increase driven by growth in consumption of legumes, vegetable oils and meat.

### Changes in Commodity Composition of Food

<table>
<thead>
<tr>
<th>Year</th>
<th>World</th>
<th>Sub-Saharan Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>85.2%</td>
<td>92.0%</td>
</tr>
<tr>
<td>2030</td>
<td>84.3%</td>
<td>92.2%</td>
</tr>
<tr>
<td>'79–'81</td>
<td>88.7%</td>
<td>91.5%</td>
</tr>
<tr>
<td>'97–'99</td>
<td>88.3%</td>
<td>92.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KG/Capita/Year</th>
<th>World</th>
<th>Sub-Saharan Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>'79–'81</td>
<td>378.9</td>
<td>359.8</td>
</tr>
<tr>
<td>'97–'99</td>
<td>385.7</td>
<td>382.9</td>
</tr>
<tr>
<td>2015</td>
<td>411.0</td>
<td>403.7</td>
</tr>
<tr>
<td>2030</td>
<td>428.5</td>
<td>426.2</td>
</tr>
</tbody>
</table>

Note: ¹ Other includes: cereals, roots, tubers, sugar, milk and dairy


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In the long-term, the importance of legumes is likely to increase driven by growth in consumption of legumes, vegetable oils and meat.
Africa is one of the few continents where unused arable land is available; with mechanization, land area under cultivation could grow significantly.

**Increasing Land Available for Farming**

- Approximately three quarters of the land suitable for farming in Sub-Saharan Africa is unused
  - This is the region with the highest availability, globally
  - Although some focus countries may be in a position to marginally expand land available for farming, land scarcity will be a challenge in others

- If we compare growth between 1985 and 2010, land cultivated with legumes has grown twice as much in focus countries, versus the rest of the world

- As demand for agricultural products increases, farmers will expand their agricultural production into unused areas

**Impact on Legume Markets in Focus Countries**

- Expansion in land available for farming will result in larger land area allotted to legumes
- Larger areas of land allotted to legumes will allow legume farmers to increase multiple cropping practices, reduce the length of time during which crops are rotated or land is left fallow; **farming intensification will increase**
- The combination of larger land areas and high farming intensification will lead to **higher production of legumes**

**Land Harvested with Legumes, Indexed to 1985**

![Graph showing land harvested with legumes indexed to 1985](image)

Rising fertilizer prices and increased focus on climate change bode well for legumes given that they are largely used as an organic fertilizer.

**Impact on Legume Markets in Focus Countries**
- Rising fertilizer prices will promote the farming and intercropping of legumes as they are largely used as cheaper, organic fertilizers.
- The increased frequency in legume cultivation will also mean more intense farming practices; production will increase.

**Rising Fertilizer Prices**
- Fertilizer prices will continue to rise as:
  - They are closely linked to trends in crude oil prices, since oil and natural gas are used as feedstock in the production of fertilizer.
  - They are mostly imported, which adds an additional cost dimension in terms of transportation (freight and shipping).

**Increased Focus on Climate Change**
- As focus on climate change increases, countries will seek out ways to reduce their carbon footprints.
- Legumes produce lower carbon emissions than nitrogen-based inorganic fertilizers.
- Heightened focus on climate change will have a positive impact on legume markets in focus countries.
- E.g., through the Clean Development Mechanism program, global companies can fund green projects in Africa for carbon credits.

Competitiveness

Yield

Agronomic Practices¹

Core inputs
- Seed
- Labor
- Fertilizer
- Irrigation
- Chemicals
- Equipment

Internal inputs

Crop-enhancing inputs

External Factors

Internal inputs

Rainfed

Diseases/Weeds²

Pest

Soil

Note: ¹Agronomic practices include cultivation methodology (timing, depth, etc.) harvesting methodology, row spacing, cropping systems (rotation, intercropping), land preparation, rhizobium inoculant application, mechanization, labor use, close spacing, active weeding, crop management (e.g., field inspection), post-harvest management. ²If applied with optimal frequency, use of fungicides, insecticides and herbicides can limit disease.
# Profiling Major Legume Buyers

## Major Legume Buyers

### Feed Companies
- Archer Daniels Midland (ADM)
- Cargill

### Aggregators/Primary Processors
- Export Trading Group
- Olam International Company

### Secondary Processors
- Grand Cereals & Oil Mills Limited
- Mohammed Enterprises
- Sunseed
- Yakasai Oil Mills

### Agricultural Commodity Supplies
- Fida Hussein and Company
- Fortune Oil Mills
# Major Legume Buyers

### Feed Companies
- Agricorp International
- Bunge Agribusiness
- China National Cereals, Oil and Foodstuffs Corporation (COFCO)
- Monsanto
- Noble Group

### Aggregators/Primary Processors
- Astral Foods
- Ken Chic
- Meadow Feeds

### Secondary Processors
- Batchelors
- Bidco
- Heinz
- Pepsi
- Nestle
**PROFILING MAJOR LEGUME BUYERS**

**MAJOR BUYERS – NIGERIA: GRAND CEREALS (1/2)**

*Grand Cereals was incorporated in 1983, originally to produce wheat flour but is now the largest private buyer of groundnuts and soybeans in Nigeria, operating out of Jos*

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**Grand Cereals and Oil Mills Operations**

**Cereal Mill**
- Processes maize into flour, grits and offal as by-product
- Cleans sorghum for industrial use

**Oil Mill**
- Processes groundnuts, soybeans, palm kernel, and cotton seed oil into high quality deodorized groundnut oil, cakes, soap stock and lecithin

**Animal Feed Plant**
- Processes by-products (bran and cake) from the Cereal and Oil mills respectively at 140MT per day
- Processes pelletized poultry feed, cow, pig and fish feed on request
- Concentrate/premix plant
- Recent capacity expansion initiatives, to create a modern, fully-automated feed plant, with feed production capacity of 400MT per day

**Strategic Silos**
- Hold 16,000MT of grains

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*Source: Grand Cereals & Oil Mills Website, Accessed December 10, 2011; “Major players of grain legume value chain in Nigeria identified”, N2Africa, 2011; Primary Research; Monitor Analysis*
Grand Cereals currently sources soybean from intermediaries, whilst also importing a significant amount of soybean to supplement supply due to inadequate quality and quantities from farmers.

**Focus Crop(s):**
- Soybeans, groundnuts

**Processing Capacity:**
- 30–40,000MT (soybeans)
- 6,000MT (groundnuts)

**Capacity Utilization:** 96%

### Suppliers and Sourcing Strategies
- **Currently all sourcing is through agents/intermediaries** but looking to develop a model to source from smallholders directly
  - Currently in talks with the USAID MARKETS Program and GTZ, to determine how they can participate in *programs to procure directly from farmers and/or farmer cooperatives*
- **Import ~90,000MT of soymeal** from South America to be used in poultry feed

### Pricing
- **Local supply** of soybeans: 96,000Naira/MT
- **Import price** of soymeal: 106–108,000 Naira/MT

### Quality of Supply
- Not receiving the quality and quantity of supply that they need
- Farming systems are not organized, so farmers are **unable to provide the volumes required**
- **No specific varieties** required by Grand Cereals

### Products and Customers
- **Key products:** Oil and cakes
- **Customers:** Oil for retail market. Cakes for own consumption

Source: Grand Cereals & Oil Mills Website, Accessed December 10, 2011; “Major players of grain legume value chain in Nigeria identified”, N2Africa, 2011; Primary Research; Monitor Analysis
PROFILING MAJOR LEGUME BUYERS

MAJOR BUYERS – ASIA/THE GULF: EXPORT TRADING (1/3)

Export Trading Group (ETG) is a global company operating in all the focus countries, committed to providing bigger markets for SHFs, expanding product offering and breaking into the biofuels market.

**Export Trading Operations**

- **Production, processing and distribution of agricultural commodities, farm inputs and farm implements**
- **Headquartered in Singapore with 4 major business units**
- **Trading**
  - Procures commodities at farm gate and trades locally, regionally and internationally
  - Annually procures 1.2M MT of commodities and 10% of this volume is processed into a supermarket ready product before being traded
- **Infrastructure**
  - Over 1.2M MT of warehousing capacity across the countries where it operates
  - Each country has its own logistics team, using a combination of rail, road and water for transportation as well as its own fleet of trucks in some countries
  - Invested in a container terminal in Tanzania to service its own and third party cargo transshipment requirements
- **Agricultural Processing**
  - 21 processing plants in Africa and Asia
- **Farming**
  - Long term investment area for ETG for the supply of certain key commodities
  - Focus is on R&D into new technologically enhanced farming practices and commodities such as Bio Fuels
  - Currently ETG has 3 farming estates in Tanzania, Zambia and Mozambique totaling 60,000 hectares

ETG sources from farmers through their warehouses and Farmer Service Centers, however, farmers must organize themselves and bring produce to the warehouses

<table>
<thead>
<tr>
<th>Focus Crop(s):</th>
<th>Commodities, legumes, cereals, oil seeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing Capacity:</td>
<td></td>
</tr>
<tr>
<td>Capacity Utilization:</td>
<td></td>
</tr>
</tbody>
</table>

**Suppliers and Sourcing Strategies**

- Source directly from farmers through warehouses and Farmer Service Centers
  - Farmers must organize themselves to bring produce to the warehouses
  - Farmers are paid immediately for their produce
  - ETC buys from small traders too
- Farmer Service Centers provide:
  - Extension services to farmers (e.g., post-harvest handling)
  - Financing; SHF microfinance scheme
  - Inputs (e.g., storage, fertilizers, equipment)
  - Guaranteed pricing and market pricing information
  - Guaranteed off-take for crops
  - Logistics support

**Quality of Supply**

- Poor moisture control due to insufficient drying of produce by farmers, making it difficult to trade with customers such as the WFP, who are very particular about quality
- No cleaning, grading and sorting of produce; grit, sand and rubbish in bags increase the weight

**Produce and Customers**

- Largest supplier to the World Food Program (WFP)
- Trades primarily within the region with some overseas import and export

Source: Grain Cereals & Oil Mills Website, Accessed December 10, 2011; “Major players of grain legume value chain in Nigeria identified”, N2Africa, 2011; Primary Research; Monitor Analysis
Profilinng Major Legume Buyers

Major Buyers – Asia/The Gulf: Export Trading (3/3)

Robust logistical support, ample warehousing and processing capacity and large international customers makes ETG a leader in the Africa legumes market.

- 80% of commodities sourced directly from farmers, through an aggregator
- Logistics team in each country
  - Uses combination of rail, road and water
  - Fleet of trucks in larger countries
- Once collected from farmers, commodities go to small buying centers for grading

- ~10% is processed further at ETG’s various processing plants
- ~90% of the produce repackaged and distributed locally or exported internationally
  - WFP is the largest customer
- Container terminal in Tanzania, serving own/third party cargo transshipment requirements
- Legumes and maize key trade routes:
  - From: Ethiopia, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia
  - To: India, Singapore, North Korea, China, Japan, Europe, South Africa & Kenya

21 processing plants in Ethiopia, India, Malawi, Mozambique, Tanzania, Uganda and Zambia,
- Soy pieces — 7,350 MT/year
  - Processed in Ethiopia, Malawi, Uganda, Zambia
  - Sold under “SEBA” and “Tasty Pieces” brands
- Dal (Pigeon Peas) — 48,000 MT/year
  - Processed in Malawi, Mozambique, Tanzania
  - Exported under “Toor” brand

After processing, goods are standardized before being transferred to warehouses. ETG has 500+ warehouses; 1.69M MT warehousing capacity
- Tanzania — 34 warehouses
  - 145,000 MT capacity
- Uganda — 3 warehouses
  - 6,300 MT capacity
- Ethiopia — 1 warehouse
  - 7,000 MT capacity

Olam is a global company specializing in the management of supply chains and processing of agricultural produce.

### Olam Operations

<table>
<thead>
<tr>
<th>Locations</th>
<th>Products</th>
<th>Customers</th>
<th>Sourcing/Logistics</th>
<th>Processing</th>
<th>Growth Initiatives</th>
</tr>
</thead>
</table>
| • Headquartered in Singapore | • Presence in 65 countries  
  – 21 countries in Africa  
  – 6 countries amongst our focus group | • More than 11,000 customers globally  
  – Many of them large global brands | • Farm gate cross-sourcing model  
  – 2,000,000 farmer relationships | • 100 factories  
  – 1.3M MT produced per year | • 60 growth initiatives across 12 products  
  – 11 of them related to edible nuts |

### Olam Livelihood Charter

<table>
<thead>
<tr>
<th>Finance</th>
<th>Improved Yield</th>
<th>Market Access</th>
<th>Quality</th>
<th>Trace-ability</th>
</tr>
</thead>
</table>
| Pre-finance of crop purchase and capital advances for product  
  • Crop and loan $21.1M | Investment in training and input supply  
  • Invested $2.4M to reach ~60K farmers  
  • ~440K seedlings, ~150K fertilizer bags | Commitment to a fair and competitive price  
  • Buy back in cash $98.2M | Encouragement of good quality by enhancing value to farmers/customers  
  • Premium paid $3.5M | Tracking of products to source |

Significant profits are derived from the Edible Nuts and Beans segment, with strong sourcing links already established in Africa.

**FY 2011 Regional Sales and Sourcing**

- **Sourcing**
  - Europe: 23.6%
  - Africa: 17.1%
  - Americas: 26.6%
  - Asia and Middle East: 32.7%
- **Sales**
  - Europe: 12.1%
  - Africa: 17.6%
  - Americas: 27.8%
  - Asia and Middle East: 42.5%

**Profitability**

- Net Contribution /Metric Ton
  - Edible Nuts, Spices, Beans: 233
  - Confectionery & Beverages Ingredients: 212
  - Food Staples & Packaged Foods: 74
  - Industrial Raw Materials: 133

PROFILING MAJOR LEGUME BUYERS

MAJOR BUYERS – ETHIOPIA: ACOS

Agricultural Commodity Supplies is an Italian company involved in the production and sale of dried legumes in containers

- **A Global Supply Network (GSN)** with vertical consolidation to increase the degree of supply control across 10 countries and 4 continents, connecting headquarters in Italy with various production sites through:
  - Own factories
  - Satellite offices
  - Joint ventures
  - Partnerships
- **Direct control of the food supply chain** allows **complete traceability of all products** due to product identification in the field and supply-chain control through an informatics system developed
- **ACOS guarantees the absence of GMO’s**
- **Operations**:
  - 7 factories (6 food and 1 textile)
  - 650 people employed by the Group worldwide
  - 4,000 containers operated every year
  - 90M kgs of products processed

Source: ‘Evaluating marketing opportunities for haricot beans in Ethiopia’, CIAT, CRS, IPMS, 2008; ACOS S.P.A. website, accessed December 14, 2011; Primary Research; Monitor Analysis