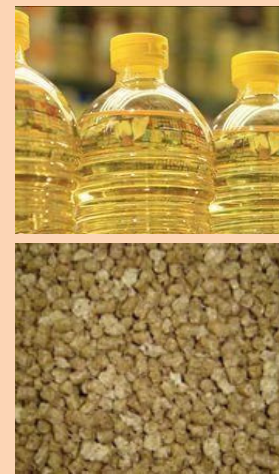


The South African Soybean Value Chain

by the
Markets and Economic Research Centre of the NAMC

March 2011



**National Agricultural
Marketing Council**

Strategic positioning of South African Agriculture
in dynamic global markets

This study originated from a request to ITAC to lower the tariff on importation of soybean oilcake given that South Africa is a net importer of this product. Government stakeholders regarded it necessary to conduct a comprehensive soybean value chain analysis in order to fully understand the potential of soybean production and processing in South Africa. Based on this analysis an optimal development strategy for the soybean industry in South Africa can then be developed. In the light of the aforementioned, this document was developed.

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The South African Soybean Value Chain

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 - The Industrial Development Corporation (IDC); and
 - Last, but not least the project steering committee that consisted of representatives of the Department of Trade and Industry (the *dti*) and the Department of Agriculture, Forestry and Fisheries (DAFF).
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The South African Soybean Value Chain

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International soybean production, consumption and trade

- Soybean production dominates the international oilseed market as it comprises about 54% of the world's total oilseed production.
- The compounded annual growth rate (CAGR) of world soybean area harvested was 3.2 % from 1991 to 2010 while the world production of soybeans showed a CAGR of 4.4 %. Indicating a slight increase in the world soybean yield.
- Major soybean producing countries are the United States of America, Argentina and Brazil. These countries represent 35 %, 30 % and 27 % of world soybean production. Argentina's soybean production grew by 13.32 % from 1995-97 to 2005/07
- Soybean meal production dominates the international protein meal market. Soybean meal is predominantly used for animal feed. China, the United States of America, Argentina and Brazil are the major soybean meal producing countries representing 78 % of the world's total production of soybean meal.
- Palm oil production dominates the international vegetable oil market with soybean oil following closely. World vegetable oil production increased by 15.13 % from 2005/06 to 2009/10, with a CAGR of 5 % during the same period. The United States of America produces 24 % of the world's total soybean oil and China, Argentina and Brazil produces 23 %, 17 % and 17 %, respectively of the world's total soybean oil.
- The CAGR for soybean consumption was 4 % from 1991 to 2010. During the same period soybean meal consumption showed a CAGR of 4.2 % and soybean oil showed the highest CAGR of 4.7 %.

International soybean production, consumption and trade *cont...*

- China is the largest soybean consuming country representing 26 % of world soybean use. The United States of America, Argentina and Brazil each represent 19 %, 16 % and 15 % of the world soybean consumption. The majority of soybeans consumed by these countries are crushed into meal and oil.
- China's soybean meal consumption represents 26 % of the world's total soybean meal. The EU-27 and the United States of America's soybean meal consumption represent 19 % and 16 % of the world soybean meal consumption.
- China, the United States of America and Brazil's soybean oil consumption represents 32 %, 20 % and 10 % of the world's consumption of soybean oil.
- Canada and Brazil is the main soybean exporting countries and China and the EU-27 is the main soybean importing countries.
- World stocks of soybean meal grew by 0.8 % annually from 2000 to 2010. During the same time the price of soybean meal grew 5.3 % annually. The world stocks of soybean oil declined by 2.4 % annual from 2000 to 2010 while the price of oil increased by 9.2 %.
- Argentina and Brazil are the major exporters of soybean meal and oil. The EU-27 is the largest importer of soybean meal and China is the largest importer of soybean oil.

Southern African soybean industry

- Angola – Although Angola has exceptional good conditions for the production of soybeans, domestic production of soybeans are very low. Angola imports soybeans and soybean products to meet its domestic demand.
- Democratic Republic of the Congo – Soybean production and agricultural production in general is very underdeveloped in the DRC.
- Malawi - The Malawian soybean market is currently self-sufficient; however, without significant increases in productivity, and large amounts of land being switched to soybeans, Malawi is poised to become a net importer over the next decade.
- Mozambique - The Mozambican soybean market is relatively new, but growing rapidly, with production dominated by smallholder farmers and considerable scope for production growth.
- Zambia - The Zambian soybean market is self sufficient and growing rapidly with some exports, with production dominated by commercial farmers and considerable scope for production growth.
- Zimbabwe - As a result of the decline in agricultural production, Zimbabwe's demand for soybeans exceeds its production, with demand at 125 000 ton per annum and production 50 000 per annum. Zimbabwe is a net importer of soybeans, soybean meal and soybean oil.

South African soybean industry

- South Africa's soybean production reached 566 000 tons in the 2009/10 production season, the largest soybean crop to date. Soybean area harvested in South Africa varied between 165 400 ha and 311 450 ha from the 2007/08 production season to the 2009/10 production season. During this period South African soybean yield averaged 1.9 ton/ha.
- From 1990/91 to 2009/10 soybean yields showed a CAGR of only 0.1 %, while production and area harvested showed CAGR's of 8 % and 7 %, respectively.
- The major soybean production areas are Mpumalanga (239 250 ton in 2009/10), the Free State (147 250 ton in 2009/10) and KwaZulu-Natal (73 250 ton in 2009/10). Soybean production in these three provinces represented 82 % of total soybean production.
- During the 2010/11 production season the Piet Retief production region had the highest directly allocated variable production cost. The Reitz/Bethlehem production area showed the lowest overhead production cost and also the lowest total production cost for the 2010/11 production season. Total marketing cost estimates for the 2010/11 production season are constant at R88.50/ha for all production areas.
- From 2006/07 to 2008/09 fertilizer and lime cost contributed the most to directly allocated variable cost.
- The domestic uses of soybeans consist mostly of soybeans processed for animal feed . The 6 years average is: full fat (53 % of domestically produced soybeans), meal and oil represent 37 % of the domestic use of locally produced soybeans and 7 % of the soybeans produced is used for human consumption.

South African soybean industry *cont...*

- Soybeans processed for meal and oil increased by 20 % annually from 2005 to 2010.
- South Africa's processing capacity for sunflower and soybean crushing (dual processing plants) is estimated at 1 100 000 ton per annum of which approximately 364 000 ton was utilized for processing soybeans in recent years.
- The processing capacity for full fat soybeans for animal feed is estimated at 534 000 ton with an additional 33 000 ton expected in the near future.
- Processing capacity for high protein soybean meal for animal feed is currently 127 000 ton and it is expected to increase to 327 000 ton in the near future. Processing capacity for high protein soybean meal for human consumption is 104 000 ton currently.
- Domestic soybean meal production meets only 10 % of the domestic soybean meal demand (on average). The demand for soybean meal is driven by the animal feed industry, especially the poultry industry. On average 90 % of the soybean meal consumed domestically is imported from Argentina. Soybean meal imports increased by 9 % annually from 2005 to 2020. During the same period domestic production of soybean meal increased by 20 % annually.
- The animal feed industry is the largest user of soybean meal. During 2009/10, 79.9 % of the total available soybean meal was used by the Animal Feed Manufacture's Association (AFMA) members which amounted to 701 055 tons. AFMA member's use of soybean meal increased by 8 % per annum from 2005/06 to 2009/10.

South African soybean industry *cont...*

- In South Africa vegetable oils are only used for human consumption and not used for biodiesel production as in some other countries.
- Sunflower oil dominates the South African vegetable oil market. The South African consumer prefers sunflower oil and soybean oil is mainly used in a blend with sunflower oil for cooking purposes.
- Refineries also focus on sunflower oil rather than soybean oil due to the higher demand for sunflower oil from the consumer.
- On average, 94 % of the soybean oil consumed domestically is imported. South Africa import soybean oil predominantly from Argentina and Brazil.
- South Africa's soybean price moved close to export parity the past two years.
- The price of soybeans in South Africa is influenced by the international soybean price, the price of imported soybean meal, the price of imported soybean oil and the cost of crushing soybeans.
- Processors calculate a derived soybean price in order to determine whether they will make a profit or a loss from crushing soybeans.
- The derived soybean price is calculated by taking the price the processor will receive when selling the meal and oil produced from crushing 1 ton of soybeans and subtracting the cost of purchasing 1 ton of soybeans and the cost of crushing and other operational costs.

The future of South Africa's soybean industry

- Since South Africa is a net importer of soybean meal and soybean oil, the domestic price of soybean meal and soybean oil will trade close to the import parity price of soybean meal and oil.
- Users of soybean meal expressed concerns about the quality of domestically produced soybean meal compared with the quality of imported soybean meal. This may cause discounts for locally produced soybeans. The reason for lower quality soybean meal in the local market can largely be attributed to older technology being used.
- Projections on South Africa's soybean demand in 2015 using different growth rates from different sources indicates that the **demand for soybeans may vary between 1 759 000 and 3 290 000 tons** per annum. Current soybean production is 566 000 ton per annum.
- Ideally South Africa should do its own processing of soybeans given that the potential to do so exists. This is especially important in light of the fact that soybean meal is currently one of South Africa's largest agricultural import products.
- In order to meet the local soybean demand in terms of soybean meal, soybean oil, full fat soybeans and soybeans for human consumption **local soybean production and processing would need to increase significantly**.
- Increasing soybean production means that more land area need to be allocated to soybeans. Increasing the amount of soybeans processed locally would mean an increase in the utilization of current crushing capacity (including an increase in the dual crushing capacity dedicated to soybeans). In the long run dedicated local crushing capacity should be expanded to meet future demand for soybean meal (and/or oil).

The future of South Africa's soybean industry *cont...*

- **Dedicating more land area to soybeans would require taking land area away from other crops (largely maize area).**
- Calculations on the area of land available for soybean production based on the assumption that the land used to produce the surplus of maize are used for soybean production indicates that **886 406 ha** is potentially available for the production of soybeans. Other calculations based on the area suitable for the production of dry land soybeans based **on crop rotation practices in different provinces indicates that 874 528 ha** is available for soybean production. A study conducted by the University of Pretoria funded by the Protein Research Fund concluded that **the total existing area under both dry land and irrigation conditions, which is suitable for commercial soybean production approximately 2 610 346 ha.**
- In order to **meet the minimum projected demand for soybeans 925 839ha is needed for soybean production** and in order to **meet the maximum projected demand 1 731 731 ha is needed for soybean production.**
- Meeting the minimum or maximum projected demand entails the following: **121 % increase** from the current hectares planted with soybeans over 5 years to meet the minimum projected demand for soybeans and a **314 % increase** from the current hectares planted with soybeans over 5 years to meet the maximum projected demand for soybeans.

The future of South Africa's soybean industry *cont...*

- The current **capacity dedicated to soybean crushing is 491 000 ton**. In order to meet the minimum projected demand for soybean products in terms of meal and oil the **current crushing capacity must increase with 226 %**.
- If half of the current crushing capacity of dual plants currently **dedicated to sunflower seed is used for soybeans** then the **current crushing capacity must increase with 86 % to meet the minimum projected demand**. In terms of meeting **the maximum projected demand** for soybean products in terms of meal and oil the current crushing capacity plus half of the dual capacity will have to **increase with 253 %**.
- An estimated additional capacity of **200 000 ton** for soybean high protein meal and an estimated additional capacity of **1 128 000 ton for dual processing is expected to be available within the next two years**.
- The **additional capacity** for high protein soy meal and half of the dual capacity including **the additional dual capacity** would need to **increase by 84 %** in order to meet **the maximum demand for soybean** products in terms of meal and oil in 2015.
- It is important to note **that maize is a substitute crop for soybeans** when it comes to a producers decision to plant, this implies that the cost of producing maize and the price of maize compared to soybeans will have a large impact on a producer's decision to plant soybeans.
- The decision to utilize dual capacity for soybean processing depends on (i) existing integration in the vegetable oil value chain, (ii) the relative price between soybeans and sunflowers and the respective derived products, (iii) use of waste material.

The future of South Africa's soybean industry *cont...*

- All current soybean production regions show positive market profitability.
 - Kwazulu-Natal performed relatively well compared to other regions.
- Economic profitability is significantly higher than market profitability suggesting that there are significant distortions in the prices of outputs and inputs at the primary production level.
- A DRC of smaller than 1 indicates that a product has a comparative advantage.
 - The DRC's for different soybean production regions range between 0.50 to 0.92.
 - KZN have the highest comparative advantage of all production regions in South Africa.
- The main factors seen to constrain the competitiveness of the soybean industry include:
 - Macro environment: Administered prices, Cost of crime, National Infrastructure, By laws, Labour laws
 - Meso environment: Governmental support, R & D, Standard grading (Safex), Industry information
 - Micro environment: Cost and supply of electricity, Cost of labour, Labour productivity, Distance from & to the markets, Quality of natural resources

The future of South Africa's soybean industry *cont...*

- The main factors seen to constrain the competitiveness of the soybean industry include:
 - Macro environment: Cost of capital, Consumer tastes and pref., Locally prod. Inputs, Imported inputs, Food safety
 - Meso environment: Industry organization, Quality programs, Technology, Relationship in the chain
 - Micro environment: Quality assurance programmes & mechanisms, Diversification strategies, Operation infrastructure, Nature & activities of industry organisation

SOUTH AFRICAN SOYBEAN INDUSTRY STUDY

Outline of the study

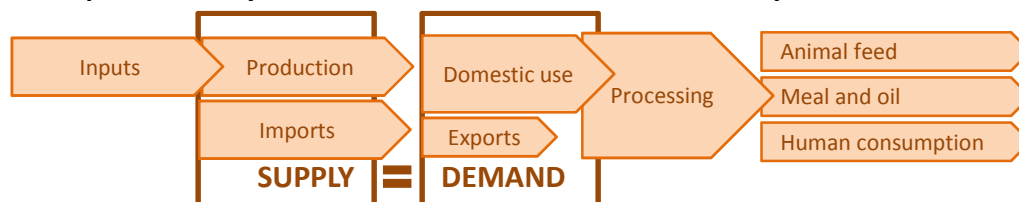
1. Overview on the international soybean industry

soybean production	soybean meal production	soybean oil production
soybean consumption	soybean meal consumption	soybean oil consumption
soybean trade	soybean meal trade	soybean oil trade

2. Southern Africa soybean industry study

Angola	Mozambique
DRC	Zambia
Malawi	Zimbabwe

3. In-depth analysis of the South African soybean industry



4. The future of the soybean industry – What the figures shows...

Current situation and options
The future

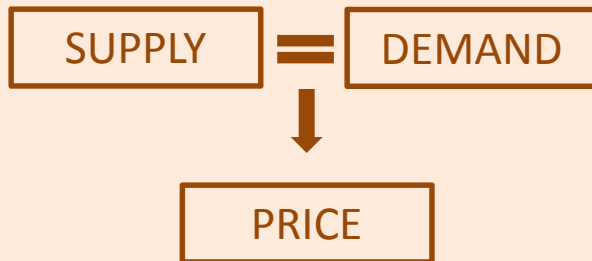
SOUTH AFRICAN SOYBEAN INDUSTRY

The soybean complex consist of soybeans, soybean meal and soybean oil. The demand, supply and price of the various products have direct implications for the other products in the complex. It is important to note this fact and let it serve as background information for discussions on all aspects of the soybean value chain.

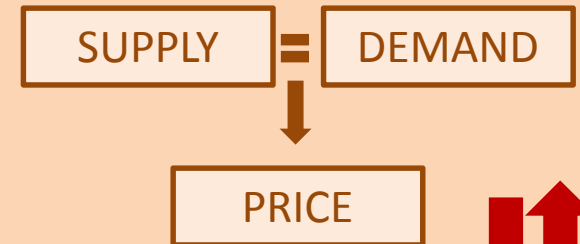
The Soybean Complex



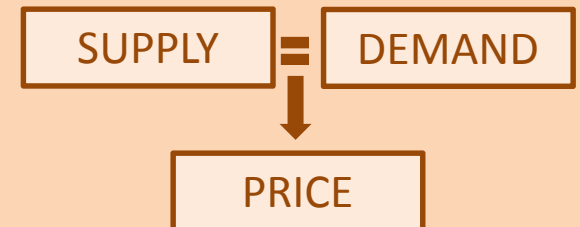
Soybeans



Soybean oil



Soybean meal



Overview on the international soybean industry

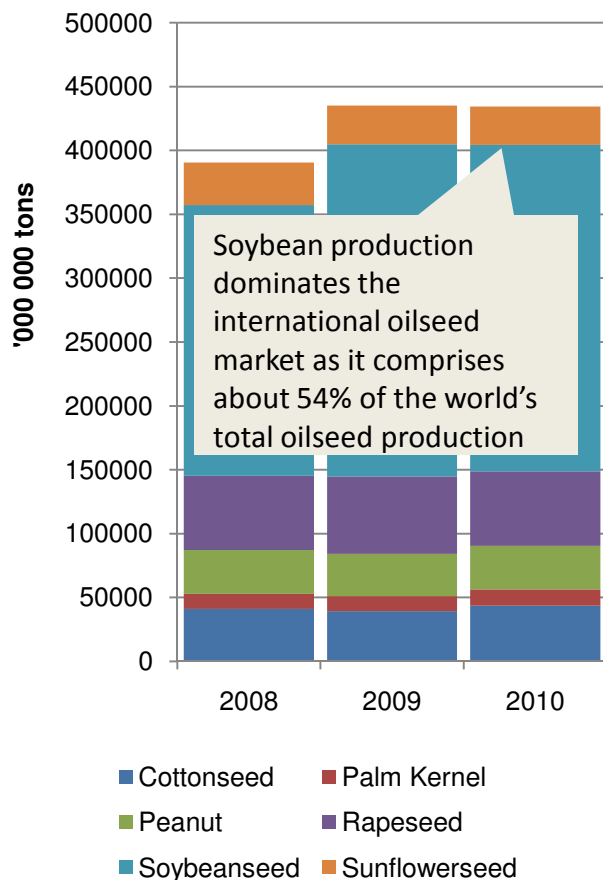
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soybean consumption	soybean meal consumption	soybean oil consumption
soybean trade	soybean meal trade	soybean oil trade



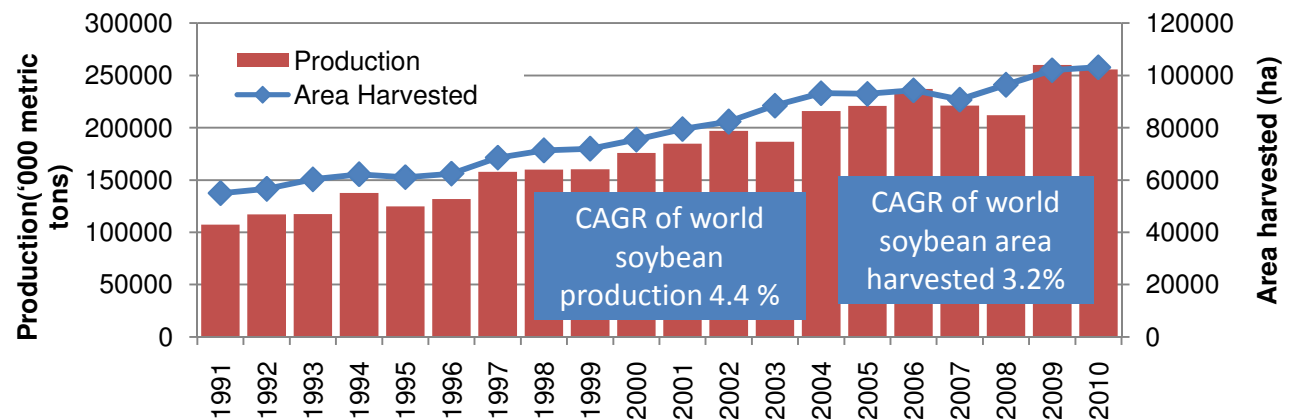
WORLD SOYBEAN OVERVIEW

soybean production	soybean meal production	soybean oil production
soybean consumption	soybean meal consumption	soybean oil consumption
soybean trade	soybean meal trade	soybean oil trade

World soybean production World oilseed production.



World soybean area planted and production



Long run trends show that there is an increase in the area planted with soybeans globally.

The increase in production over the depicted period was mainly due to the expansion in the area under production.

Soybean producing countries	Percentage of world production in 2010	Growth in production from 2005 to 2010	Production in 2010 in thousand metric tons
United States	35.46	8.51	90610
Brazil	26.42	18.42	67500
Argentina	19.76	24.69	50500
China	5.64	-11.93	14400
India	3.76	37.14	9600
Paraguay	2.74	92.31	7000
Canada	1.70	37.67	4345
Uruguay	0.63	156.33	1620
Bolivia	0.62	-23.30	1580
Ukraine	0.59	145.90	1500
Russia	0.45	66.91	1150
EU-27	0.40	-12.69	1025
Indonesia	0.31	-3.85	800
South Africa	0.28	68.63	715
Nigeria	0.18	4.65	450
Other	1.07	2.89	2738

WORLD SOYBEAN OVERVIEW

soybean
production

soybean
consumption

soybean
trade

soybean meal
production

soybean meal
consumption

soybean meal
trade

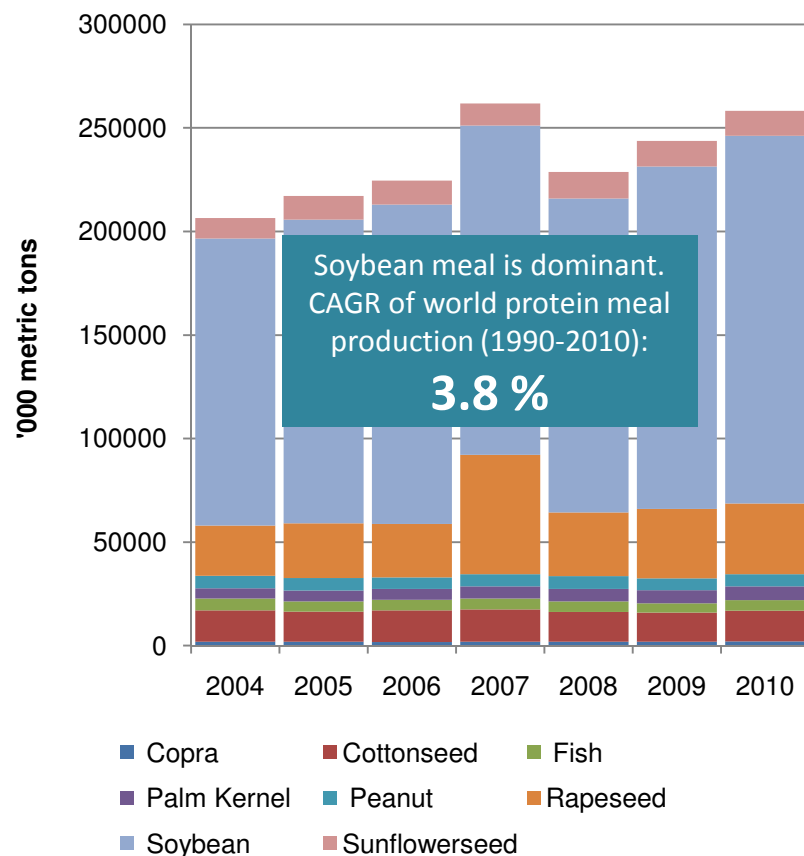
soybean oil
production

soybean oil
consumption

soybean oil
trade

World soybean meal production

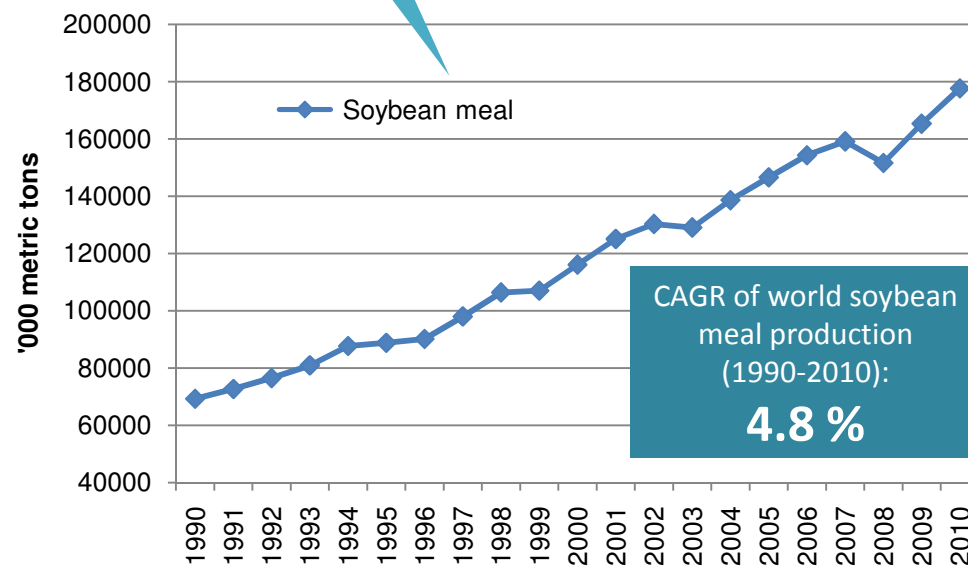
World protein meal production



The world's soybean meal production increased from 69.2 MT in 1990/91 to 165.1 MT in 2009/2010

World soybean meal producing countries

Major soybean meal producing countries	Percentage of world production in 2010/2011
China	26 %
USA	20 %
Argentina	17 %
Brazil	15 %
EU-27	6 %
India	4 %
Other	12 %



WORLD SOYBEAN OVERVIEW

soybean
production

soybean
consumption

soybean
trade

soybean meal
production

soybean meal
consumption

soybean meal
trade

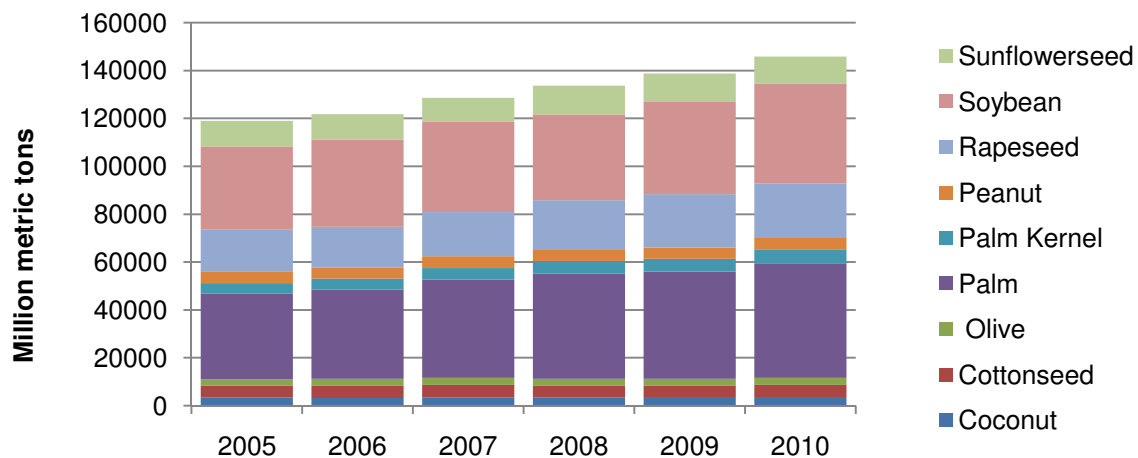
soybean oil
production

soybean oil
consumption

soybean oil
trade

World soybean oil production

World vegetable oil production



Vegetable oil production for 2010 was estimated at 145.81 million metric tons. Production increased with 22 % from 2005 to 2010.

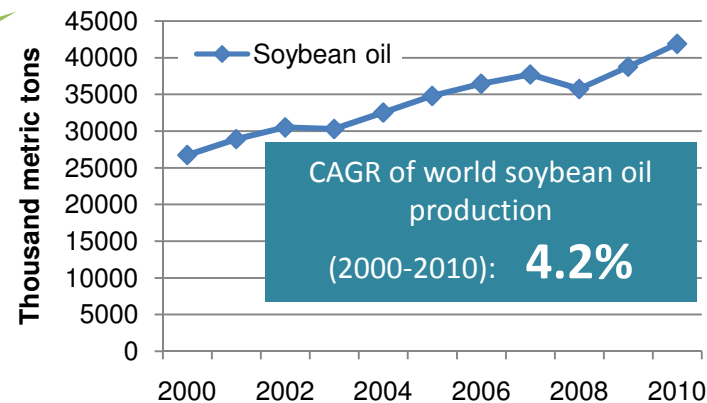
The compounded annual growth rate of vegetable oil production was 3.45 % from 2005 to 2010.

Soybean oil production increased from 15.8 MT in 1990 to 41.8 MT in 2009/2010

World soybean oil producing countries

Major soybean oil producing countries	Percentage of world production
1. USA	24 %
2. China	23 %
3. Argentina	17 %
4. Brazil	17 %
5. EU-27	6 %
6. India	3 %
7. Other	10 %

World soybean oil production



WORLD SOYBEAN OVERVIEW

soybean
production

soybean
consumption

soybean
trade

soybean meal
production

soybean meal
consumption

soybean meal
trade

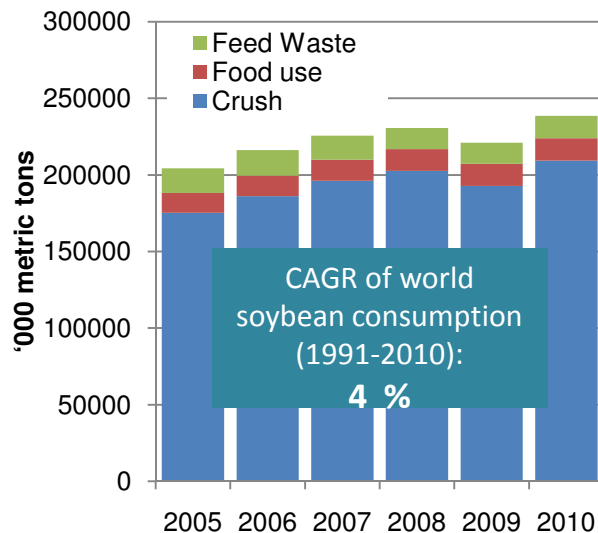
soybean oil
production

soybean oil
consumption

soybean oil
trade

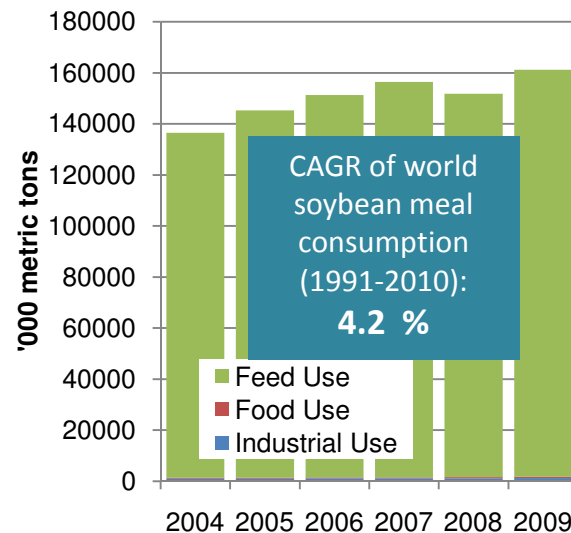
World soybean seed, meal and oil consumption

World soybean consumption



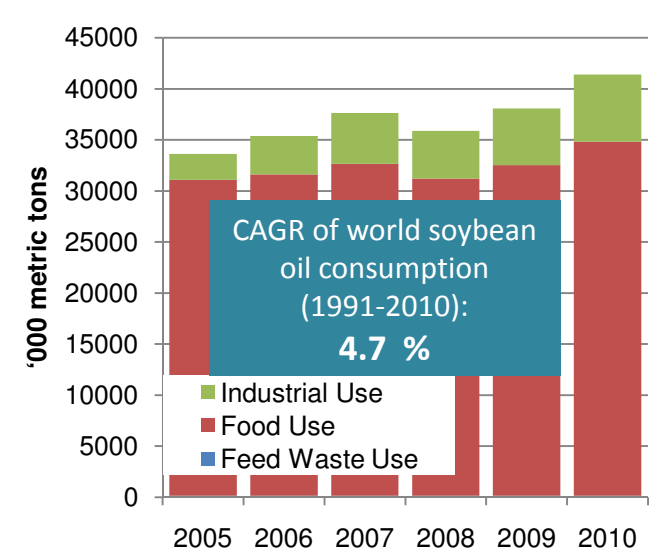
Major soybean consuming countries	Percentage of world consumption
1. China	26 %
2. USA	19 %
3. Argentina	16 %
4. Brazil	15 %
5. EU-27	6 %
6. Others	18 %

World soybean meal consumption



Major soybean meal consuming countries	Percentage of world consumption
1. China	26 %
2. EU-27	19 %
3. USA	16 %
4. Brazil	8 %
5. Mexico	2 %
6. Other	29 %

World soybean oil consumption



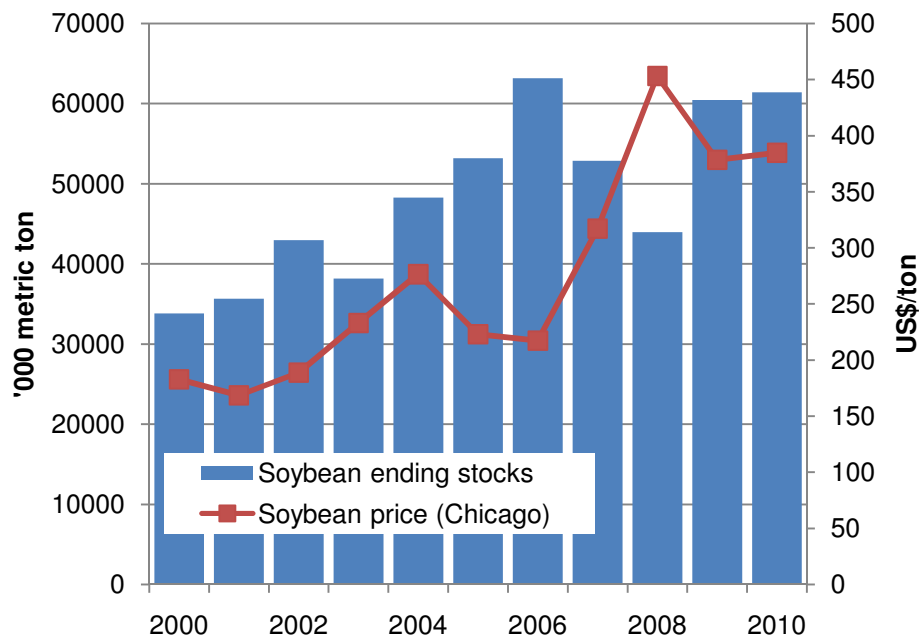
Major soybean oil consuming countries	Percentage of world consumption
1. China	32 %
2. USA	20 %
3. Brazil	10 %
4. India	9 %
5. EU-27	4 %
Other	25 %

WORLD SOYBEAN OVERVIEW

soybean production	soybean meal production	soybean oil production
soybean consumption	soybean meal consumption	soybean oil consumption
soybean trade	soybean meal trade	soybean oil trade

World soybean trade, stocks and prices

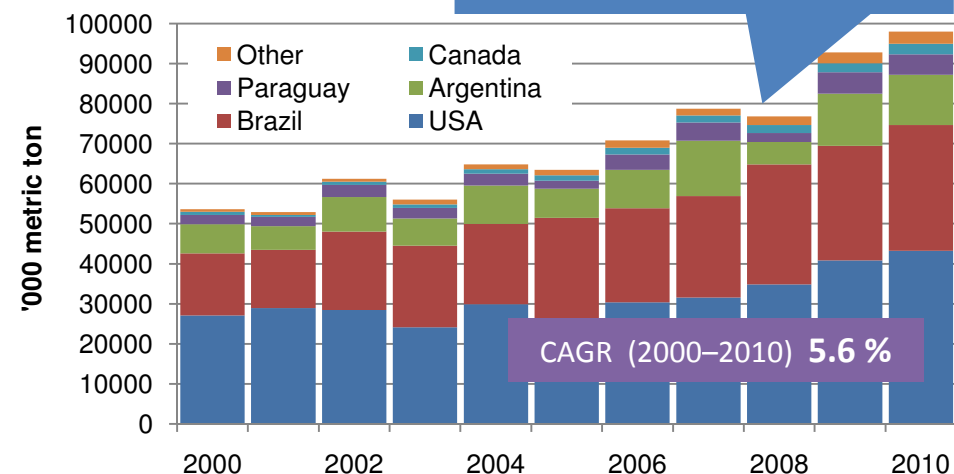
World soybean stocks and prices



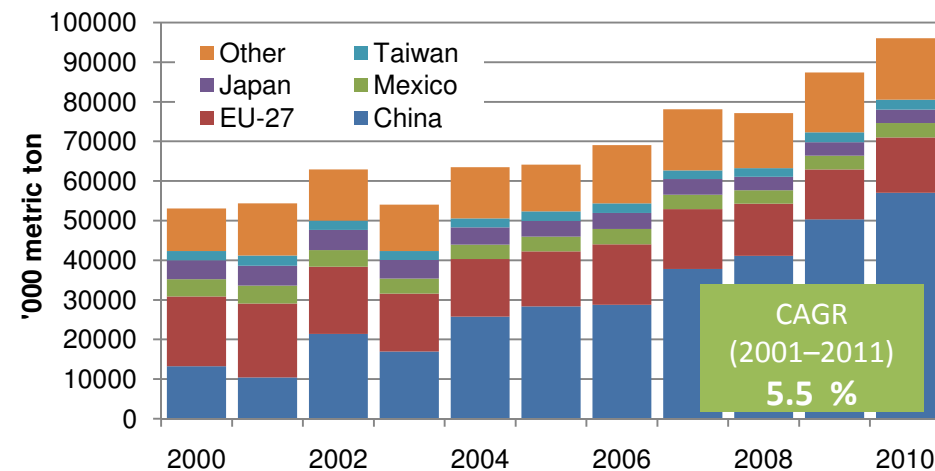
CAGR of soybean
ending stocks
(2000–2010)
5.6 %

CAGR of soybean
price
(2000–2010)
7.0 %

World soybean exports



World soybean imports



SOUTH AFRICAN SOYBEAN INDUSTRY

soybean
production

soybean
consumption

soybean
trade

soybean meal
production

soybean meal
consumption

soybean meal
trade

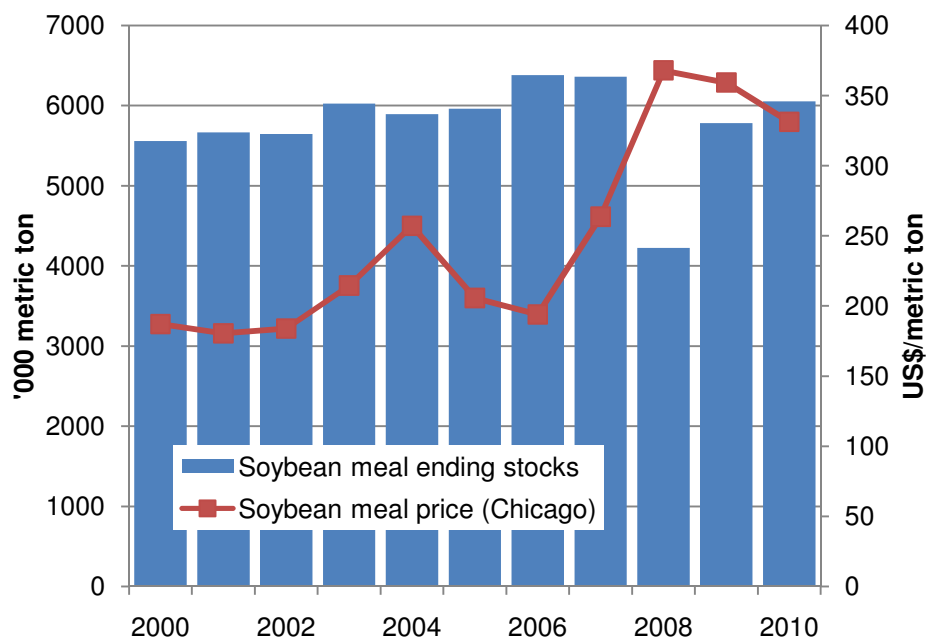
soybean oil
production

soybean oil
consumption

soybean oil
trade

World soybean meal trade, stocks and prices

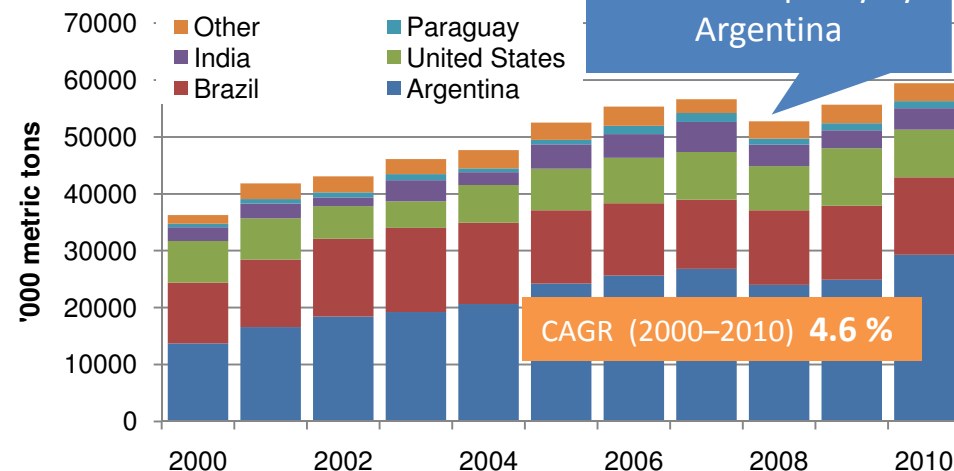
World soybean meal stocks and prices



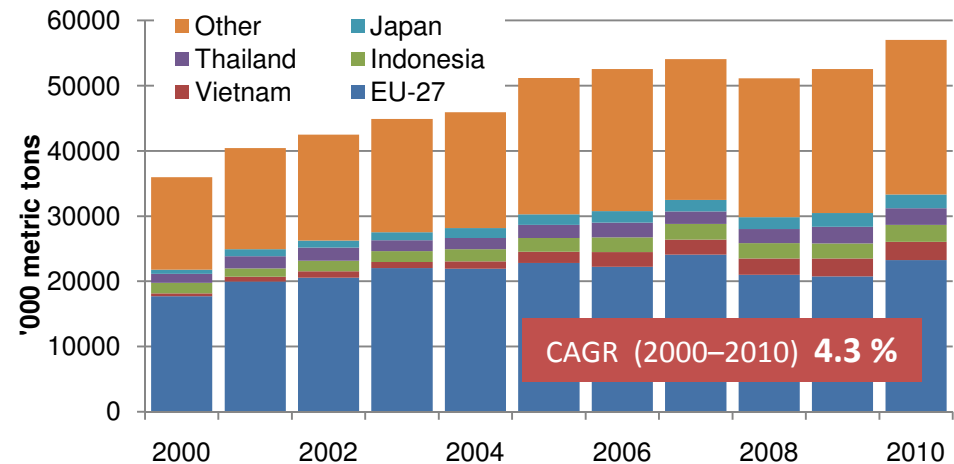
CAGR of soybean
meal ending stocks
(2000–2010)
0.8 %

CAGR of soybean
meal price
(2000–2010)
5.3 %

World soybean meal exports



World soybean meal imports

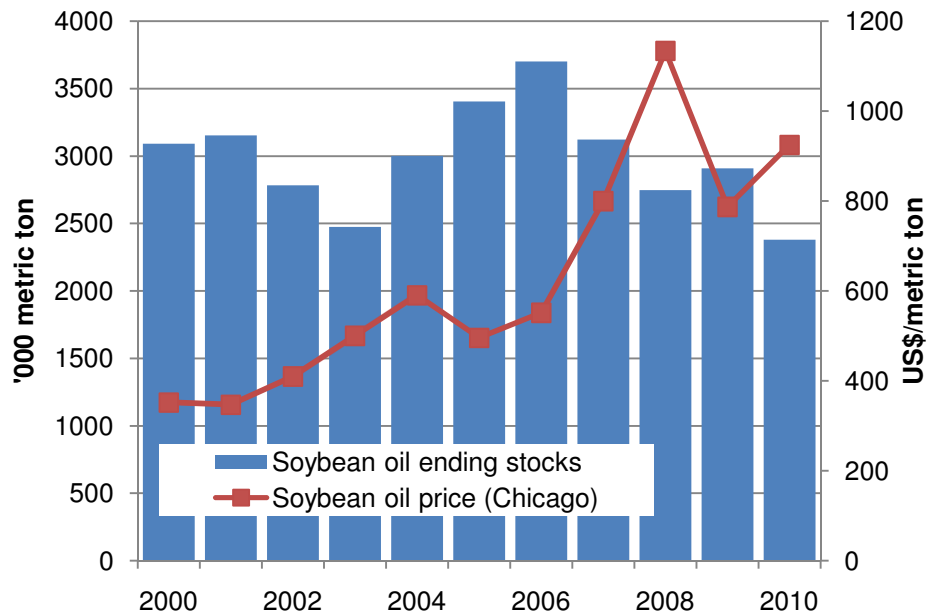


SOUTH AFRICAN SOYBEAN INDUSTRY

soybean production	soybean meal production	soybean oil trade
soybean consumption	soybean meal consumption	soybean oil consumption
soybean trade	soybean meal trade	soybean oil trade

World soybean oil trade, stocks and prices

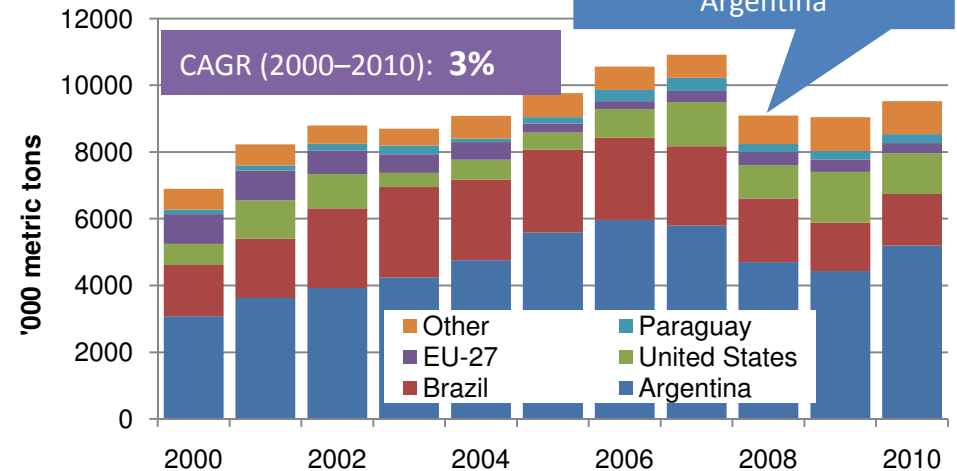
World soybean oil exports



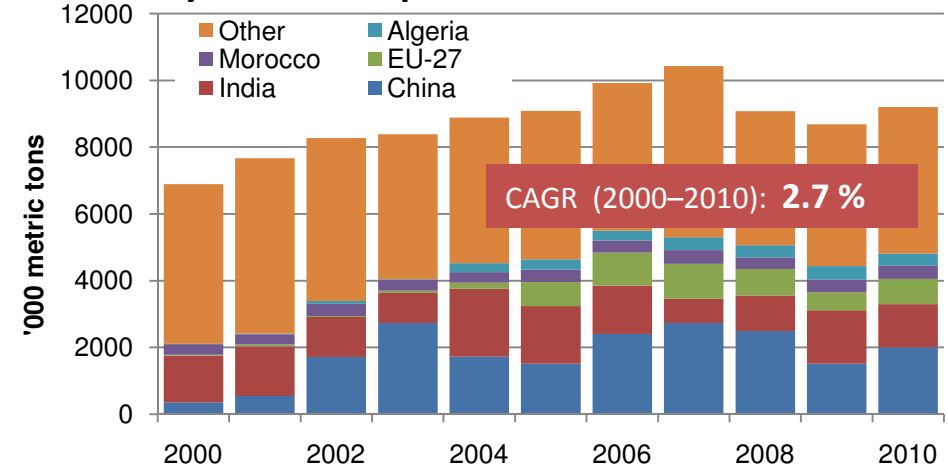
CAGR of soybean oil ending stocks (2000–2010): **-2.4 %**

CAGR of soybean oil price (2000–2010): **9.2 %**

World soybean oil exports



World soybean oil imports



Southern Africa soybean industry study

Angola

Mozambique

DRC

Zambia

Malawi

Zimbabwe

Angola soybean value chain analysis

- Angola has good potential for agricultural production, given the amount of land available (58 million hectares), its suitability for agriculture production (for instance, more than 90% of the country is suitable for soybean production), and its fertility (some areas can achieve 2 seasons of soybeans without irrigation)
- The soybean industry is characterized by imported inputs (mainly from Brazil, South Africa, and Zambia), low and centralized production, dominated by commercial players (around 15 000 ton, 70% from commercial players), small domestic market (small poultry industry, and significant pork industry, but very informal and fragmented), very low trade, except for soybean oil (95 000 tons imported), and poor infrastructure (transport, ports and storage).
- The cost of producing soybeans varies between \$300 (R2 100) and \$600 (R4 200) per ton, with low yields.
- Lack of access to markets is the biggest problem affecting the industry. Other important problems are lack of knowledge on production and lack of cohesive industry bodies.

Democratic Republic of the Congo (DRC) soybean value chain analysis

- The DRC presents several challenges to do business due to the war, insecurity, disease, bad governance and poverty.
- However, things have been improving, and there is increasing activity to develop a country so big that it can be divided in a handful of regions, each of which is the size of a typical country.
- There is enormous agricultural potential, derived from a great amount of arable land, most of which still empty, and from a favorable climate and highly fertile land that, for instance, allows an average of two seasons of soybeans per year without irrigation.
- Despite this potential for agricultural production, the soybean industry (and in fact all the agricultural industry) is very underdeveloped.
- Underdevelopment of the soybean industry is mainly caused by small domestic markets, poor infrastructure, and lack of cohesive industry bodies.
- Commercial players are in a better position to tackle the issues that hinder the development of the industry.
- Commercial players won't be attracted by the small domestic market, but they could be interested in the export potential of raw soy.
- Given the serious food insecurity situation in the country, and given the role soybeans can play to alleviate malnutrition, there is also an opportunity to tackle this issue with soybean production at smallholder level with small scale processing.

Malawi soybean value chain analysis

- The Malawian soybean market is currently self-sufficient; however, without significant increases in productivity, and large amounts of land being switched to soybeans, Malawi is poised to become a net importer over the next decade.
- In 2010 Malawi produced 73 000 tons and consumed 63 000 tons and they exported the rest.
- Production has grown over the past 5 years at 12.7 % compounded annually, driven primarily by an increase in yields due to an increase in the use of fertilizer. The demand for soybeans has grown at a 9.6 % compounded annual growth rate for the past 5 years driven by the poultry feed and the corn soy blend industries.
- The demand for soybeans is expected to continue to grow to 131 000 tons by 2020 (7.7 % p.a. growth)
- Yields are low due to low usage and availability of inputs and poor agronomics, which in turn reduces the profitability of farmers.
- The processing industry is self-sufficient and expanding, driven by the markets for poultry feed, corn soy blend, and cooking oil.

Mozambique soybean value chain analysis

- The Mozambican soybean market is relatively new, but growing rapidly, with production dominated by smallholder farmers and considerable scope for production growth.
- Mozambique is a net importer of soybeans, with production of 18 000 tons and consumption of 40 000 tons expected for 2010/11.
- Smallholder farmers are responsible for 95 % of the production of soybeans.
- The soybean industry is split between production areas in the North and Centre regions and consumption areas mainly in the South.
- Mozambique currently meets its demand for soybeans in the North and Centre regions with some surplus, yet there is a large deficit in the South. This pattern is expected to persist for the next 10 years.
- Production has doubled over the past year, largely achieved by increasing planting area rather than increasing yields. Production is also expected to double to 33 000 tons by 2014.
- In theory, there is no cap on production as Mozambique has over 7 million hectares available for additional agricultural production
- The soybean meal market (37 000 ton in 2009/10) has been driven by the growth of the poultry industry which drives demand for poultry feed. This is expected to continue, with the cake market rising to 131 000 ton domestic market by 2020.
- The oil market is large enough to absorb all the soybean oil produced in the country. It is currently equivalent to 216 000 ton of soybeans.
- Mozambique is well placed to export its excess soybeans in the North and Center to neighboring Malawi, Tanzania and Zimbabwe, while continuing to import soybean meal from South Africa and other international markets for demand in the South.

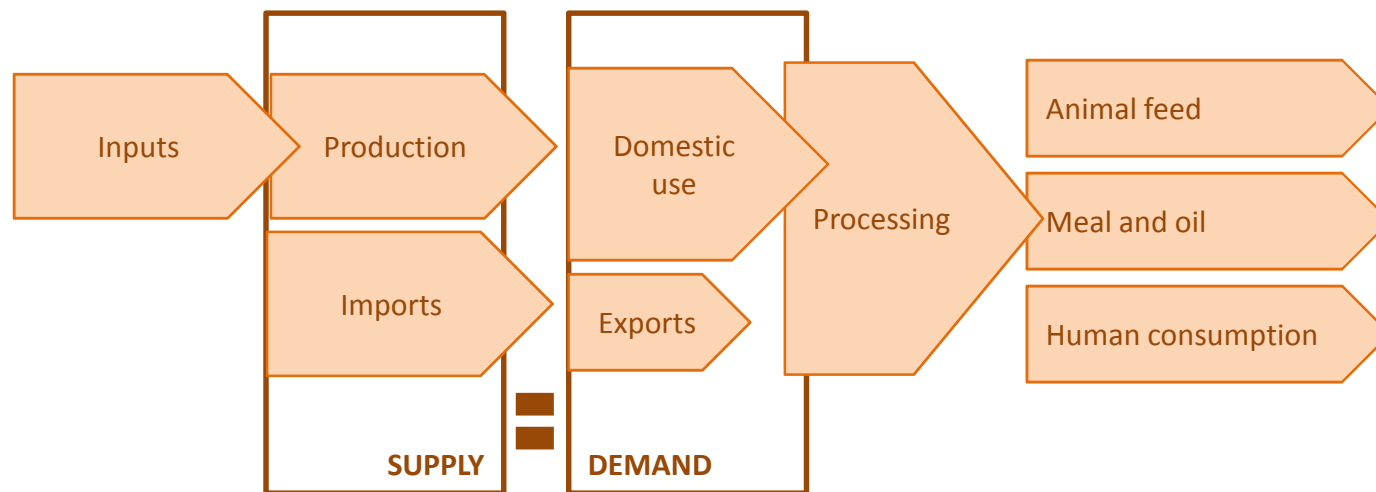
Zambia soybean value chain analysis

- The Zambian soybean market is self sufficient and growing rapidly with some exports, with production dominated by commercial farmers and considerable scope for production growth.
- With production of 112 000 ton and consumption of 90 000 ton in 2009/10, Zambia is a net exporter of soybeans, and has been so in the recent past.
- Production has grown despite volatility as the market has grown. This has been largely achieved by increasing planting area rather than increasing yields. Commercial farmers is responsible for 85 % of total production.
- In theory, there is no cap in production as Zambia has 33 million ha available for additional production.
- The price for soybeans has been volatile in the last 3 years, peaking at \$200 (R1400) above the SAFEX price in 2008 and tracking SAFEX since then; this is partly due to currency fluctuations.
- The soybean meal market (90 000 ton in 2009/10) has been driven by the growth of the poultry industry which drives demand for feed. This is expected to continue, with the soybean meal domestic market rising to 194 000 ton by 2020, driven by a rise in demand for poultry from 65 000 ton in 2010 to 140 000 ton in 2020.
- The oil market is large enough to absorb all of the soybean oil produced in the country. It is currently equivalent to 390 000 ton of soybeans, although recent imports of palm oil from East Africa may threaten the competitiveness of soybean oil in the long term.
- Zambia is well placed to export soybeans to Zimbabwe, South Africa and the DRC, but high transport cost and inconsistent policies limit traded volumes currently to around 20 000 ton soybeans and 10 000 tons soybean meal.
- Zambia currently has good quality and excess processing capacity, with more coming on line by the end of January 2011, there will be 40 % overcapacity, which would, in theory, allow Zambia to export soybean meal (and sell the soybean oil domestically), increasing the value retained in the country.
- Most processors are vertically integrated into feed manufacturers to livestock companies, so their focus is more on making sure they meet their own feed demand.

Zimbabwe soybean value chain analysis

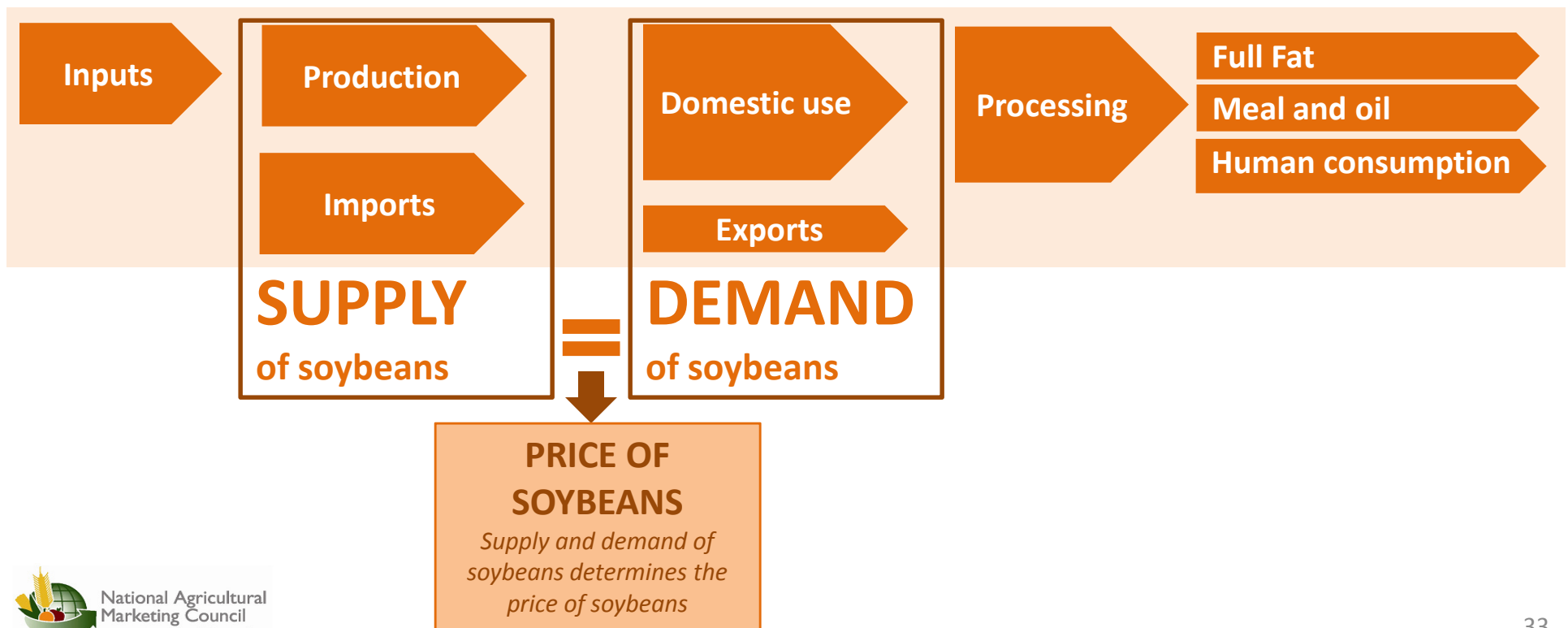
- The disruption of all non-communal agricultural land and extreme economic decline led to 58 % decrease in agricultural production from 2000 to 2010.
- As a result of the decline in agricultural production, Zimbabwe's demand for soybeans exceeds its production, with demand at 125 000 ton per annum and production 50 000 per annum.
- Soybean production has declined from 171 000 tons in 2001 due to the decline in commercial farming and a lack of financing and agronomy training, but traders are seeing a trend of smallholders substituting soybeans for maize because of the current high price.
- While private investment is unlikely to return in sufficient amounts to finance soybean production in the near term, financing could be provided by industry players through a contract farming model which would also provide an avenue for skill transfer.
- Zimbabwe is a net importer of soybeans, soybean meal and soybean oil.
- When production increases Zimbabwe is well situated to export to the region:
 - ✓ Zimbabwe's central location means it is well placed to export soybean meal and oil to South Africa.
 - ✓ Zimbabwe's sophisticated processing (\$40-50 per ton at Surface Investments vs. \$120-140 in the region) should allow Zimbabwe to import soybeans and export soybean meal competitively.
 - ✓ Zimbabwe also has some of the best highways in the region, allowing for reliable transportation.

In-depth analysis of the South African soybean industry

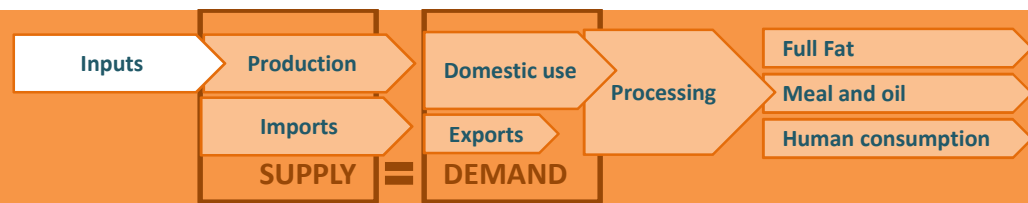


The in-depth overview of the soybean industry will follow the framework provided by the soybean value chain as well as the framework provided by the supply and demand balance sheet of soybeans. A value chain framework will ensure that all aspects of the soybean industry is covered whereas the supply and demand balance sheet will aid in the explanation of the price formation process of soybeans and soybean products.

Simple Soybean Value Chain and Balance Sheet



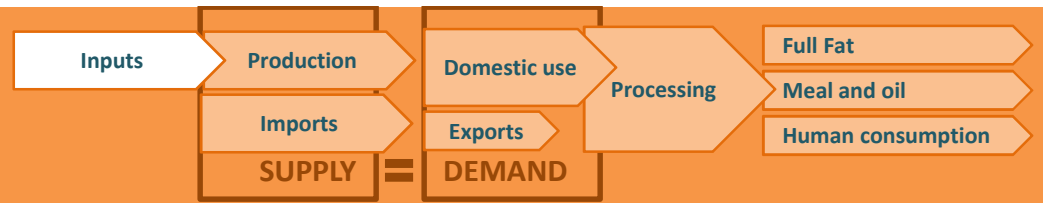
SOUTH AFRICAN SOYBEAN INDUSTRY



Inputs used in production

	Current Situation	Current Capacity	Key Players
Seed	<ul style="list-style-type: none"> 75% of commercial farmers use recycled soy seed, which is a common practice Most seed used is genetically modified (GM) that is resistant to herbicides (85-90%) 	<ul style="list-style-type: none"> 23.4 M kg* of soy seed Existing plants can deliver seed to meet market demand 	<ul style="list-style-type: none"> Pannar Pioneer Seed Link Seed.
Inoculants	<ul style="list-style-type: none"> Almost all commercial farmers use inoculants SA soil has a shortage of nitrogen-fixing bacteria, thus all soybeans must be inoculated 	<ul style="list-style-type: none"> Existing plants can deliver inoculants to meet market demand 	<ul style="list-style-type: none"> Stimuplant Soy Grower
Fertilizer	<ul style="list-style-type: none"> 40% of land used for soy production uses fertilizer, which could have scope to improve depending on soil conditions 	<ul style="list-style-type: none"> All Potassium imported Almost all phosphate and up to 60% nitrogen are locally produced 	<ul style="list-style-type: none"> Foskor (Pty) Omnia Fertilizer Sasol Nitro Yara SA (Pty) Profert
Lime	<ul style="list-style-type: none"> Lime and fertilizer represented a 23% contribution to input costs in 2008/09, indicating that there is significant use by farmers 	<ul style="list-style-type: none"> Existing plants can deliver lime to meet market demand 	<ul style="list-style-type: none"> Grasland Ondernemings SA Lime and Gypsum And more

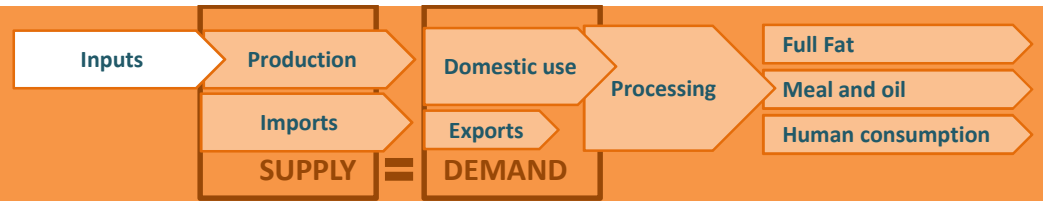
SOUTH AFRICAN SOYBEAN INDUSTRY



Inputs used in production

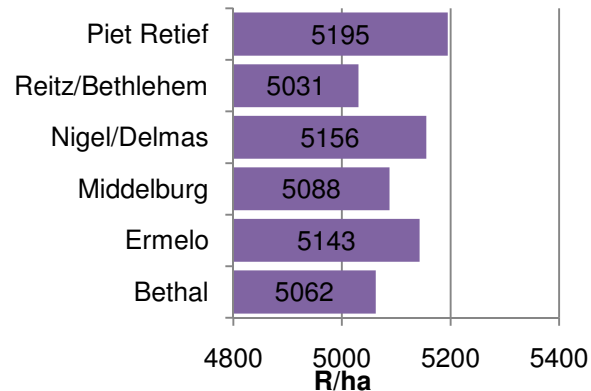
	Current Situation	Current Capacity	Key Players
Herbicide	<ul style="list-style-type: none"> Herbicides are used with GM Round-up Ready seeds From 2008-2009, total value spent on herbicides more than doubled 	<ul style="list-style-type: none"> Existing distributors have herbicides to meet market demand 	<ul style="list-style-type: none"> Syngenta South Africa (multi-national) Efko .
Pesticides	<ul style="list-style-type: none"> Pesticides are used, but generally are not used by a large number of farmers 	<ul style="list-style-type: none"> Existing distributors can deliver pesticides/ insecticides to meet market demand 	<ul style="list-style-type: none"> Syngenta South Africa (multi-national) Efko
Mechanization	<ul style="list-style-type: none"> Most commercial farmers employ mechanized equipment to prepare land and to harvest soy 	<ul style="list-style-type: none"> Equipment is usually imported 	<ul style="list-style-type: none"> N/A
Irrigation	<ul style="list-style-type: none"> Only some farmers utilize irrigation schemes, depending on the region Scope exists to increase irrigation to increase yields 	<ul style="list-style-type: none"> Equipment is usually imported 	<ul style="list-style-type: none"> N/A

SOUTH AFRICAN SOYBEAN INDUSTRY

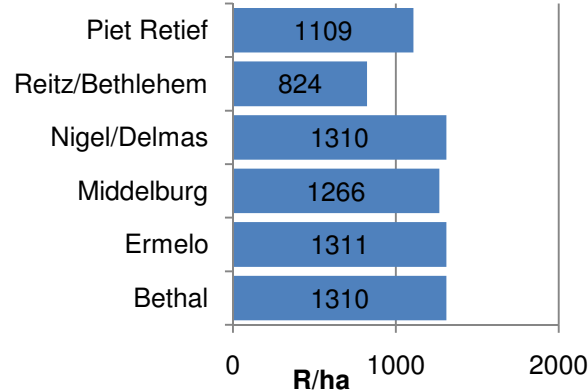


Cost production

Total production cost estimates for the 2010/11 production season



Total overhead cost estimates for the 2010/11 production season

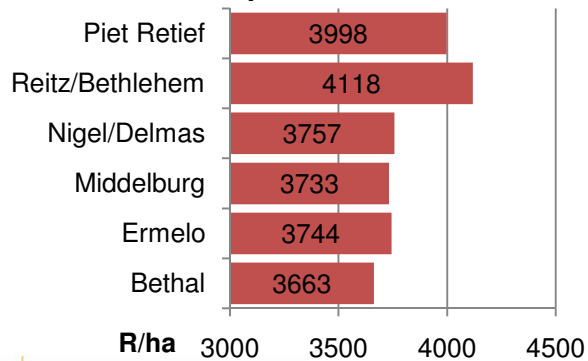


Piet Retief production area is estimated to have the highest production cost in the 2010/11 soybean production season.

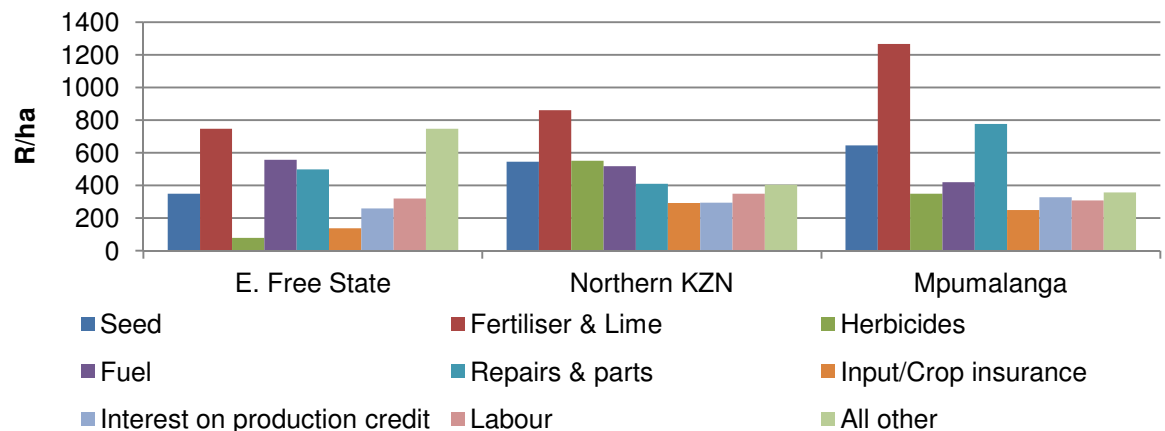
Reitz/Bethlehem production area shows the lowest overhead production cost for the 2010/11 production season but the highest variable costs for the same production season.

Total marketing cost estimates for the 2010/11 production season are constant at R88.50/ha for all production regions

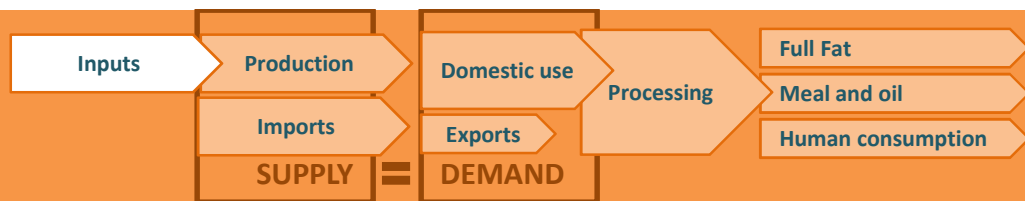
Total variable cost estimates for the 2010/11 production season



Variable cost breakdown for production regions (2008/09)



SOUTH AFRICAN SOYBEAN INDUSTRY



Directly allocated variable cost

Variable cost item	Average share of total variable cost (06/07 – 08/09)	CAGR of cost item
Fertilizer and lime	18 %	+ 25 %
All other	14 %	+ 3 %
Fuel	14 %	+ 3 %
Repairs and parts	13 %	+ 10 %
Seed	12 %	+ 7 %
Labour	8 %	+ 6 %
Herbicide	7 %	+ 9 %
Interest on production credit	7 %	13 %
Crop insurance	7 %	- 1 %

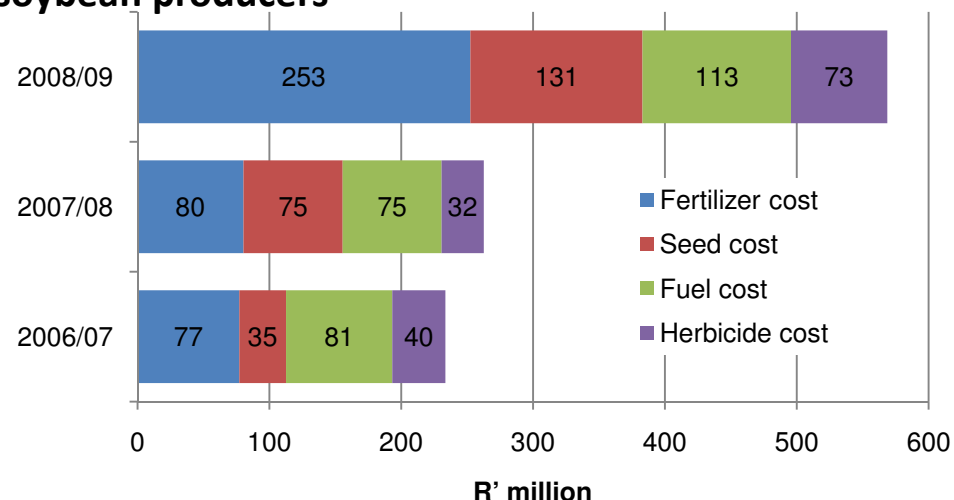
All other include: Pest control, licenses and insurance, marketing cost, drying, clearing and storage, packaging material, contract work and other costs

Fertilizer and lime showed the largest average contribution to total variable cost and also the highest CAGR.

Soybean production use only 0.2 % of the total N:P2O5:K2O applied whereas maize use 36 %.

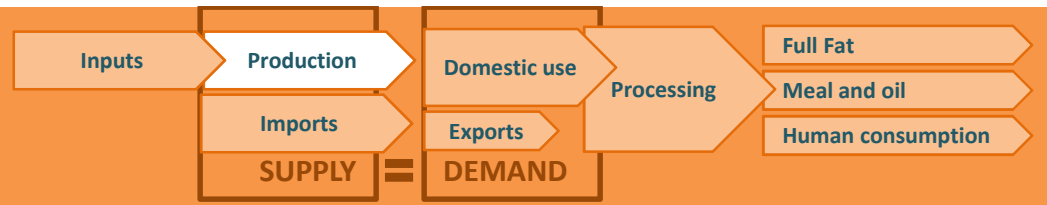
During soybean production only 40 % of the total area planted is fertilized.

Total Rand value spent on certain variable cost items by soybean producers



Variable input cost information was available for three summer production areas, Eastern Free State, Northern KwaZulu Natal and Ermelo in Mpumalanga

SOUTH AFRICAN SOYBEAN INDUSTRY



Soybean production

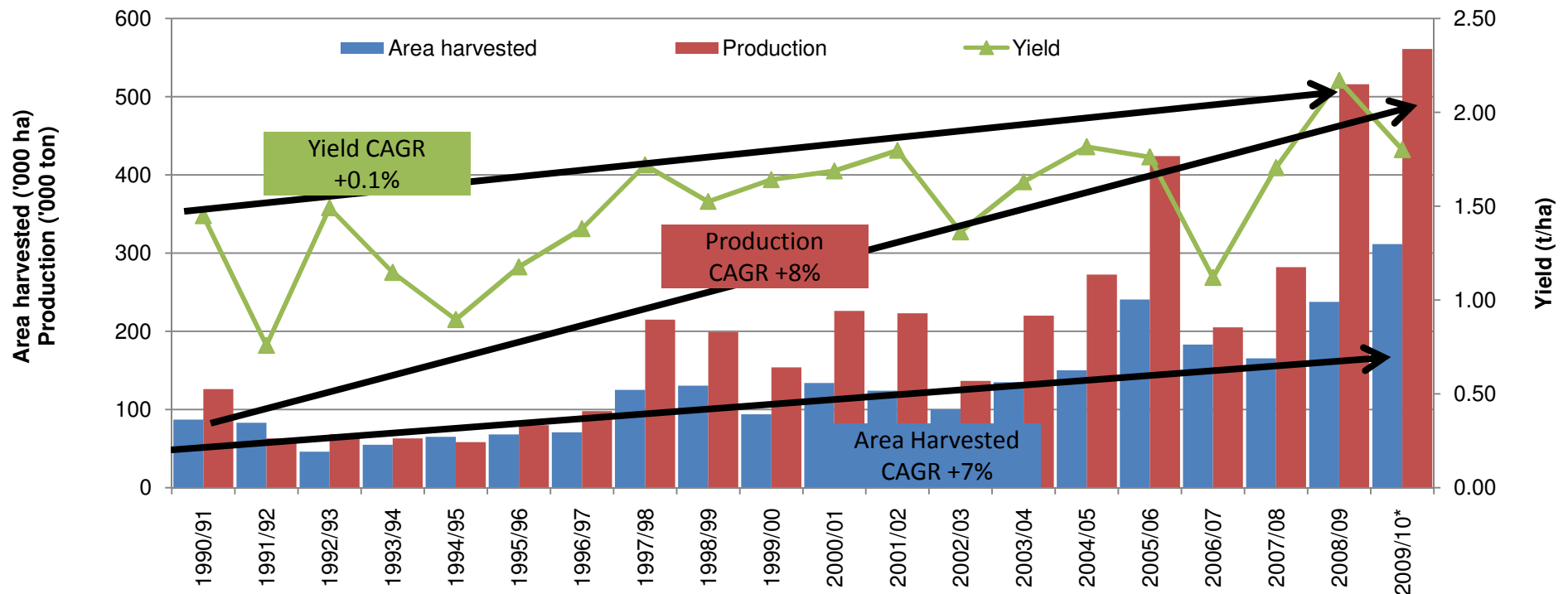
Area harvested	Production	Yield	3 Year CAGR
07/08: 165,400ha	07/08: 282,000t	07/08: 1.70t/ha	Area harvested: +5.3%
08/09: 237,750ha	08/09: 516,000t	08/09: 2.17t/ha	Production: +6%
09/10: 311,450ha	09/10: 566,000t	09/10: 1.80t/ha	Yield: +0.4%

Farmer's decision to plant soybeans depends largely on the price of substitute crops such as maize in the case of South Africa

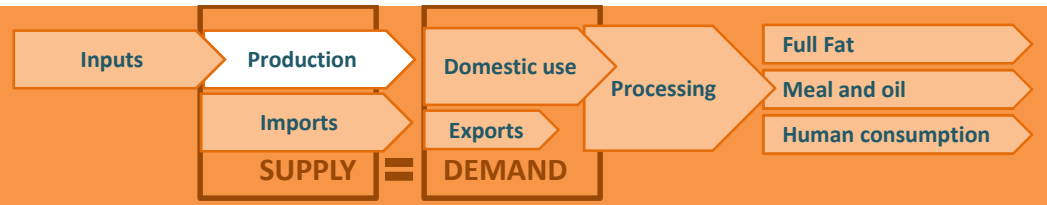
Other aspects that will influence decision making include:

Diversification strategies

Benefits from crop rotation practises and adoption thereof

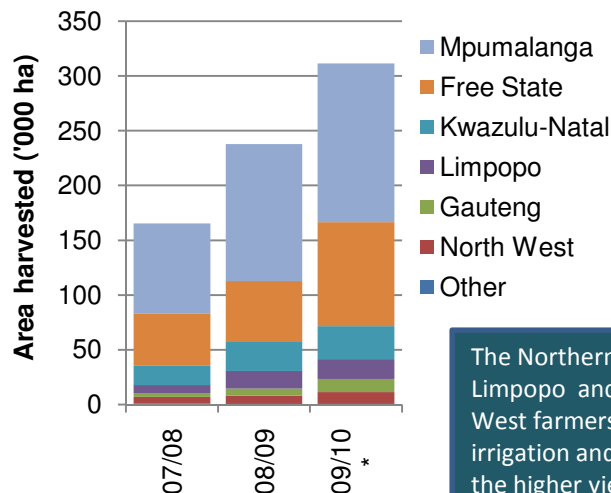


SOUTH AFRICAN SOYBEAN INDUSTRY



Soybean production areas

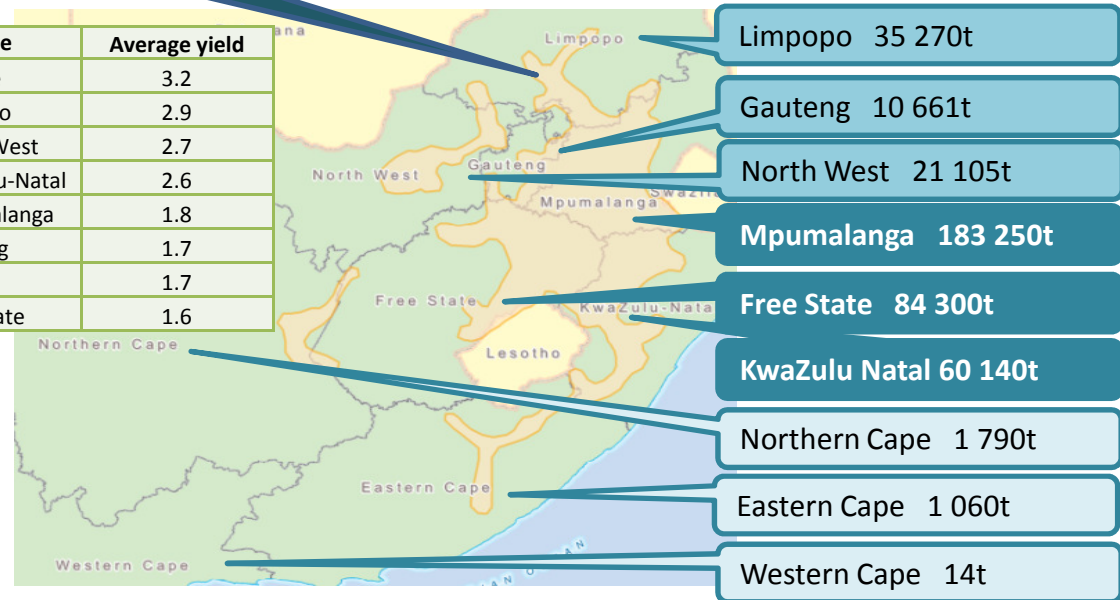
Area harvested per province



The Northern Cape, Limpopo and the North West farmers use irrigation and therefore the higher yields

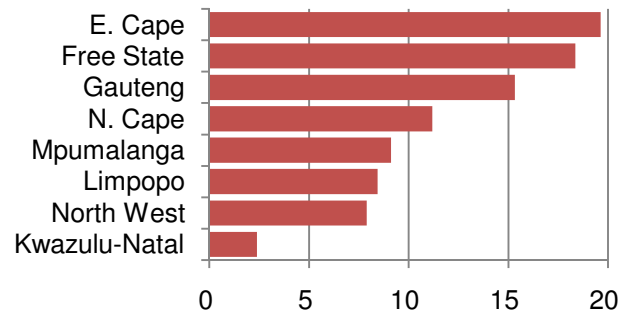
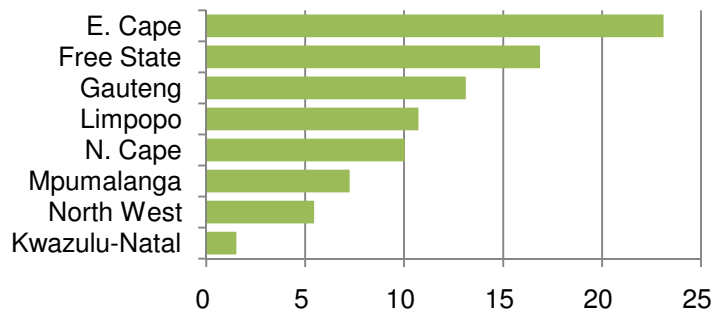
Province	Average yield
N. Cape	3.2
Limpopo	2.9
North West	2.7
Kwazulu-Natal	2.6
Mpumalanga	1.8
Gauteng	1.7
E. Cape	1.7
Free State	1.6

Production per province (5 year average)



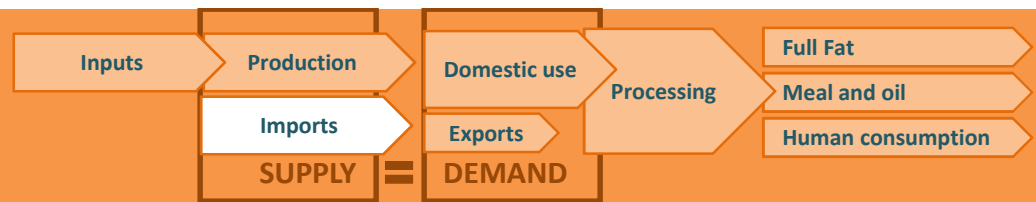
■ Growth in area harvested per province (2000-2010)

■ Growth in production per province (2000-2010)

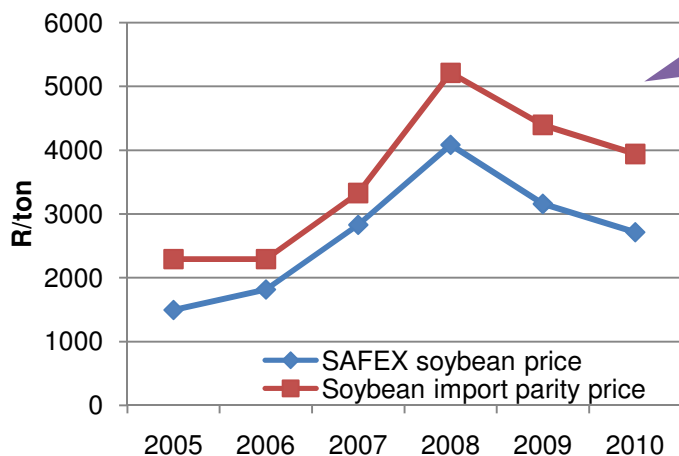
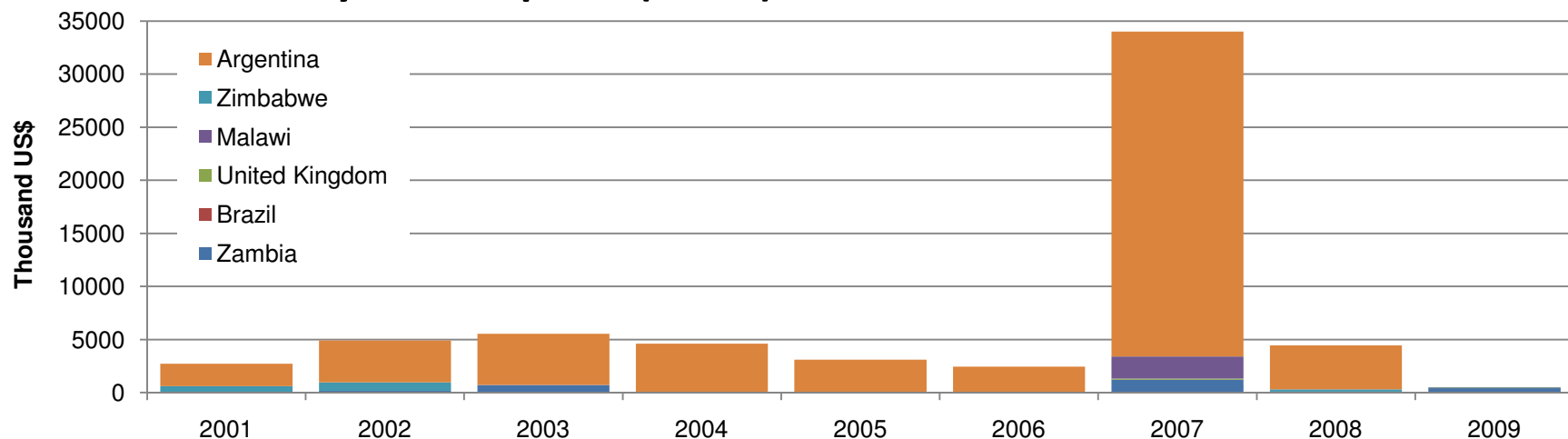


Final production estimates	2009/2010
Mpumalanga	239 250t
Free State	147 250t
Kwazulu-Natal	73 250t
Limpopo	50 400t
North West	27 000t
Gauteng	20 400t
Other	3 150t

SOUTH AFRICAN SOYBEAN INDUSTRY

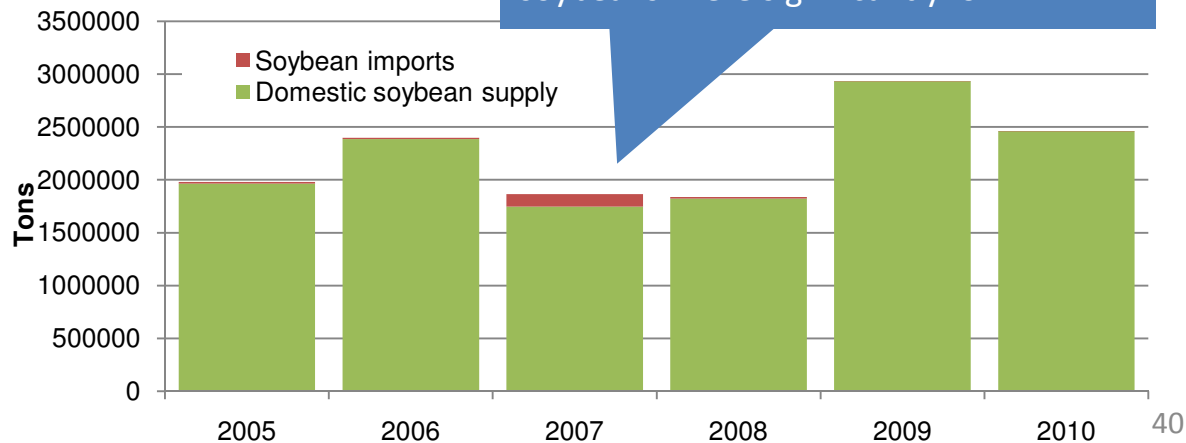


South African soybean imports (value)

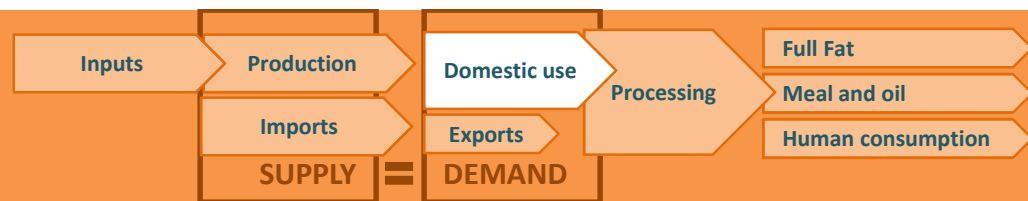


Domestically produced soybeans are less expensive than imported soybeans

South Africa usually imports an insignificant amount of soybeans except for 2007 when domestic supply of soybeans were significantly low



SOUTH AFRICAN SOYBEAN INDUSTRY

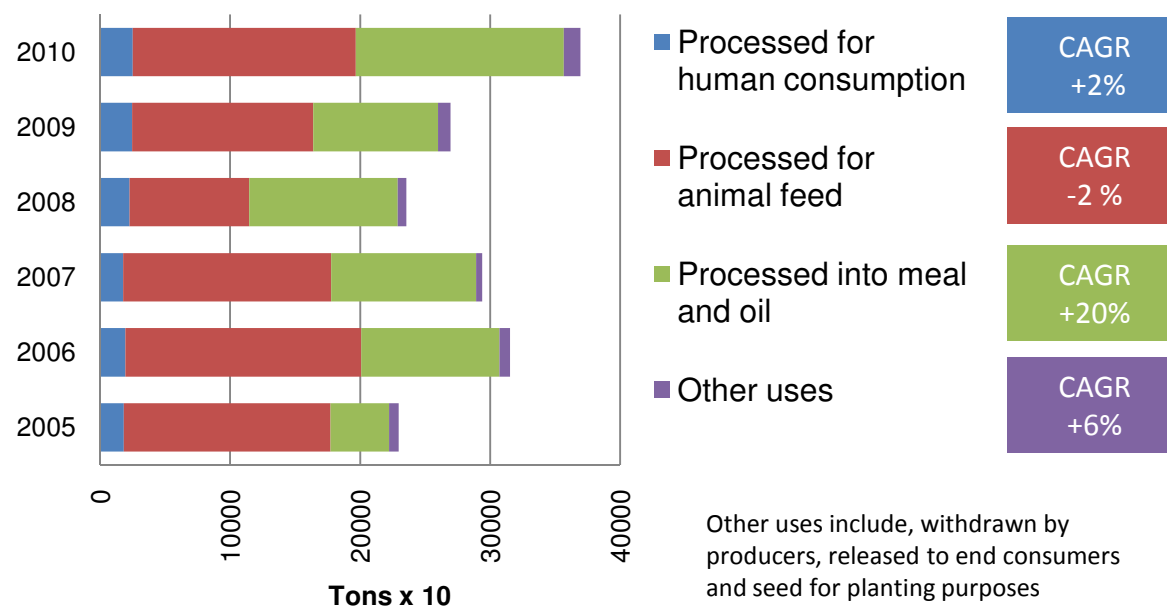


Domestic use of soybeans from domestically produced soybeans

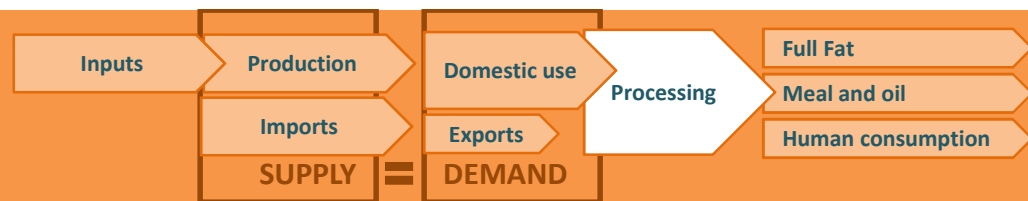
	DOMESTIC USE OF DOMESTIC PRODUCTION	=	PROCESSED FOR HUMAN CONSUMPTION	+	PROCESSED FOR ANIMAL FEED (Full fat)	+	PROCESSED INTO MEAL & OIL	+	OTHER USES
6 year period	100 %	=	7 %	+	53 %	+	37 %	+	3 %
3 year period	100 %	=	9 %	+	46 %	+	42 %	+	3 %

Domestic use of locally produced soybeans 2008: 282 700t 2009: 323 300t 2010: 369 400t	CAGR of domestic use + 5 %
Processed: Human consumption 2008: 27 300t 2009: 29 600t 2010: 25 000t	Processed: Animal feed 2008: 110 400t 2009: 167 100t 2010: 171 700t
Processed: Meal & oil 2008: 137 000t 2009: 115 200t 2010: 159 900t	Other uses 2008: 8 000t 2009: 11 400t 2010: 12 800t

Breakdown of soybean domestic use over time



SOUTH AFRICAN SOYBEAN INDUSTRY



Processing capacity

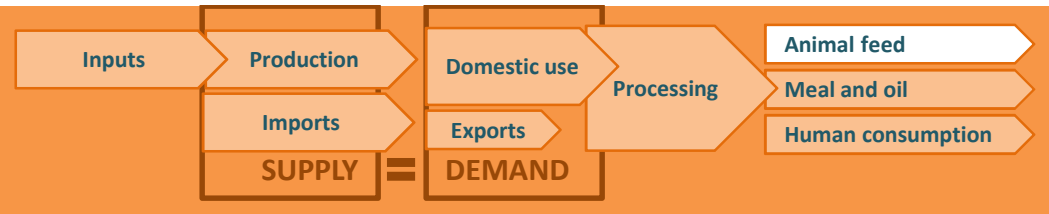
Only 364 000 tons capacity was utilized for soybeans in the past in dual processing plants

Type	Key Players/ Locations	Current capacity	Estimated additional capacity	Total capacity
Dual processing plants (sunflower/soy)	<ul style="list-style-type: none"> Key Players: Willowton, Epko, and Conti-Oil Locations: Pietermaritzburg, Gauteng, Cape Town, Lichtenburg, Randfontein 	1 100k	1 182 (6 plants)	2 282k
Full fat soy processing	<ul style="list-style-type: none"> Key Players: Majesty Oil, Meadows, Prodsure, Afgri Foods, Sovereign Foods Rockland, 	534k	33k	567k
Soy High Protein Meal (Animal)	<ul style="list-style-type: none"> Key Players: Majesty Oil, Nedan Oils, Gauteng Oils, Specialized Protein Products Locations: Krugersdorp, Potgietersrus, Gauteng, Potchefstroom 	127k	200	327k
Soy High Protein Meal & other (Human)	<ul style="list-style-type: none"> Key Players: Majesty Oil, Nedan Oils, Gauteng Oils, Specialized Protein Products Locations: Krugersdorp, Potgietersrus, Gauteng, Potchefstroom 	104k	N/A	104k
Total Capacity		1 865k	1 415k	3 280 k

Additional capacity is expected by 2012 +

Current utilization is estimated at 540k metric ton of soybean input, which is only 29% of the total processing capacity available (Calculated from SAGIS data)

SOUTH AFRICAN SOYBEAN INDUSTRY



Soybeans processed for animal feed

**PROCESSED FOR
ANIMAL FEED
(Full fat)**

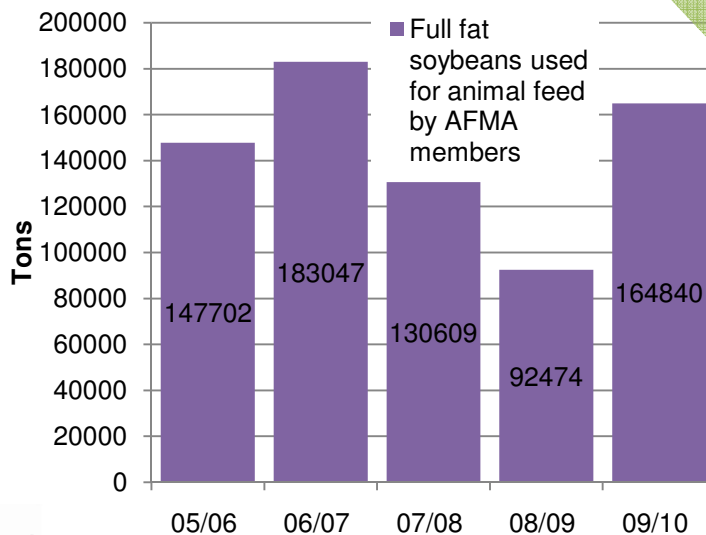
53 %

- The majority of soybeans grown in South Africa are fed to livestock as full-fat beans.
- The animal feed industry is the largest consumer of soybeans in South Africa.
- Full fat soybeans are made from whole soybeans and therefore has the same fat, protein and dietary fibre content as the bean.
- Full fat soybeans contain not only the high quality protein but also have the potential to provide significant amounts of energy due to its high oil content.
- Full-fat soybeans can only be stored for about three weeks, and it not possible to import or export the product.

**CAGR for full
fat soybeans
used for
animal feed by
AFMA
members
+ 2 %**

**Full fat
soybeans used
in animal feed
represents on
average 3 % of
the total raw
material used
in animal feed**

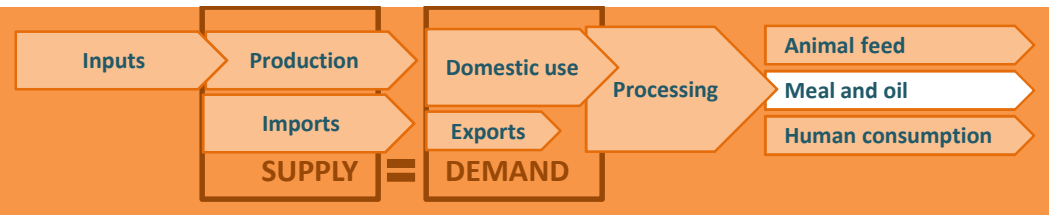
Full fat soybeans used for animal feed by AFMA members



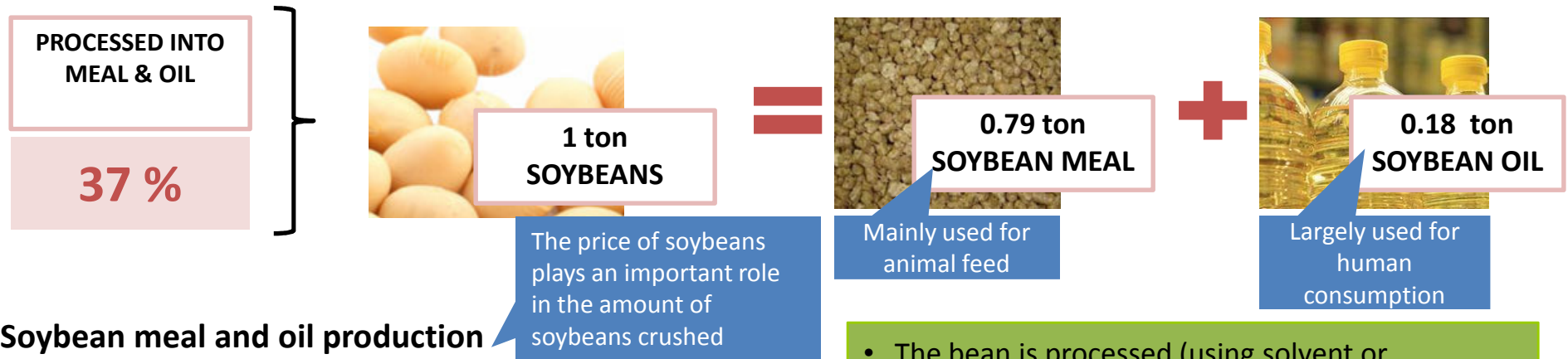
South Africa's Animal Feed and Additives Industry:

- The organised animal feed manufacturers (AFMA members) produce 5.8 million ton per annum, whilst the informal or on-farm producers produce 5 million tons of animal feed.
- AFMA members are responsible for 54% of national estimated feed production.
- The CAGR from 2008 to 2015 is expected to be 4.4 per cent. It is an indicator of the general growth of the market, based on revenues, by the end of 2015.

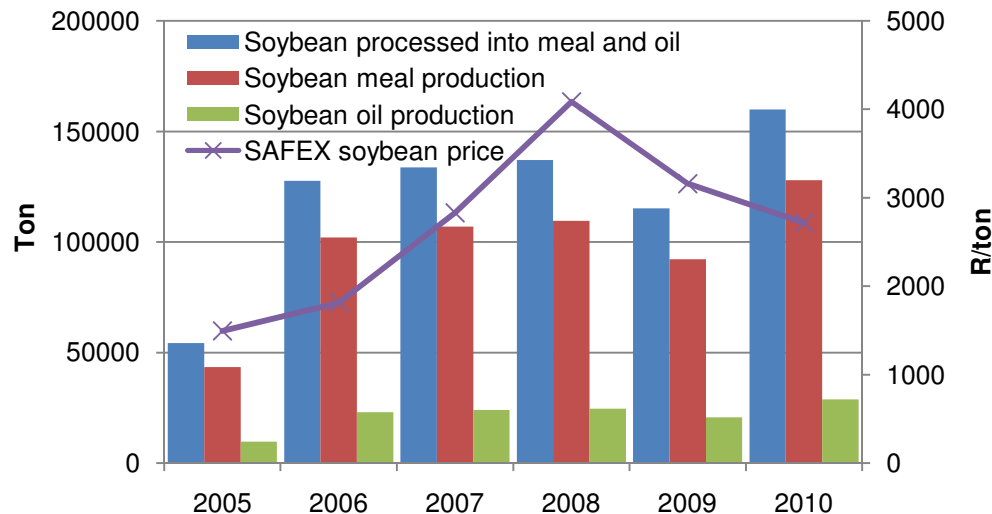
SOUTH AFRICAN SOYBEAN INDUSTRY



Soybeans processed into meal and oil

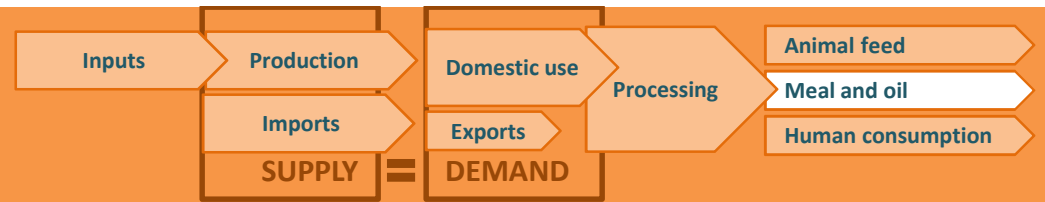


Soybean meal and oil production



- The bean is processed (using solvent or mechanical extraction) to extract the oil and produce low fat cake in either **soy only** or **dual extraction** plants (the latter can process either soy or sunflower).
- 1 ton of beans typically produces 0.18 ton of oil and 0.79 ton of soybean meal(cake).
- Thus, demand for 1 ton of soybean oil is **equivalent to 5.56 ton of soybeans** and demand for 1 ton of soy cake/meal is **equivalent to 1.25 ton of soybeans**, that must be processed.
- It is not possible to produce one without the other, i.e. processors should have a market for both soybean oil and meal.

SOUTH AFRICAN SOYBEAN INDUSTRY



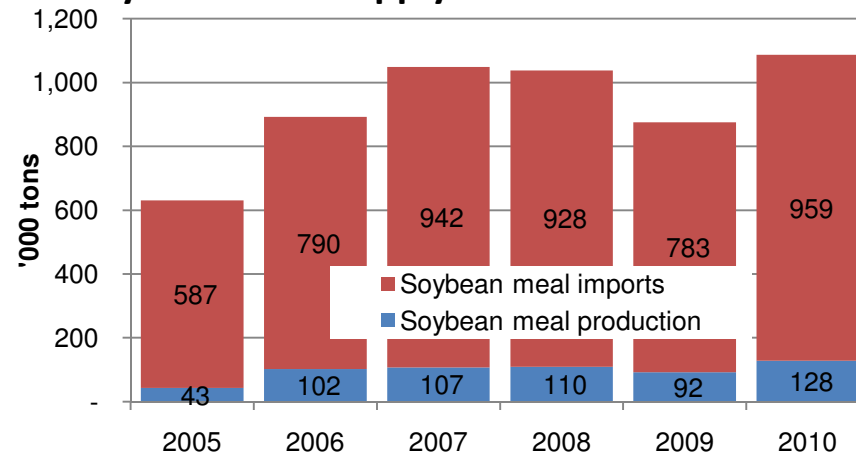
Soybean meal supply and demand

- Soybean meal demand is derived from demand by the animal feed industry, especially feed for the poultry industry.
- Soybean meal is imported, mainly from Argentina due to a lack of supply, as well as reported inconsistencies in protein content of the local supply of soybean meal (cake) (note that some feed manufacturers indicated that they are able to source soybeans with the desired protein content in South Africa).
- While sunflower oilcake is cheaper per unit of protein, it is not a direct substitute.
 - Sunflower cake are too fibrous, so very little is used in poultry or pig feed.
 - However, sunflower cake is used for cattle feed.

Soybean meal demand =
Soybean meal production
+ Soybean meal imports
- Soybean meal exports

Source: SAGIS, ITC and own calculations

Soybean meal supply

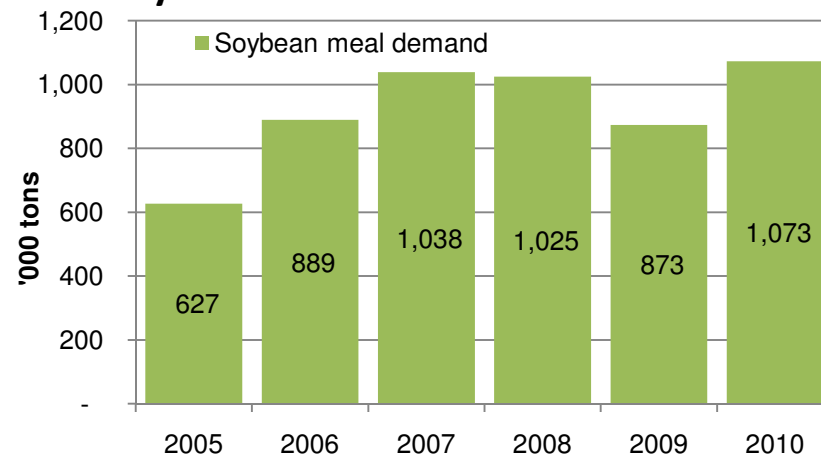


CAGR of SA soybean meal production (2005-2010)
+20%

CAGR of SA soybean meal imports (2005-2010)
+9%

On average (2005 – 2010) 90 % of soybean meal domestically consumed is imported.

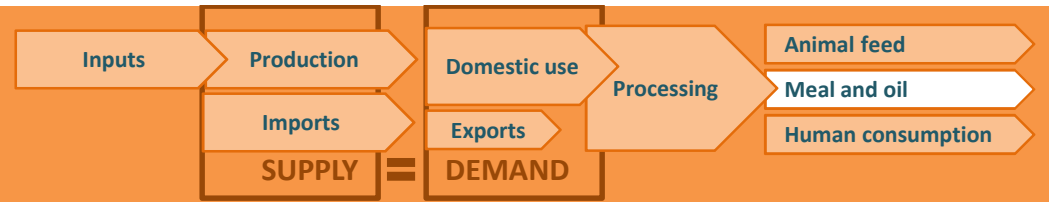
Soybean meal demand



CAGR of SA soybean meal demand (2005-2010)
+9%

Soybean meal imports CAGR =
Soybean meal demand CAGR

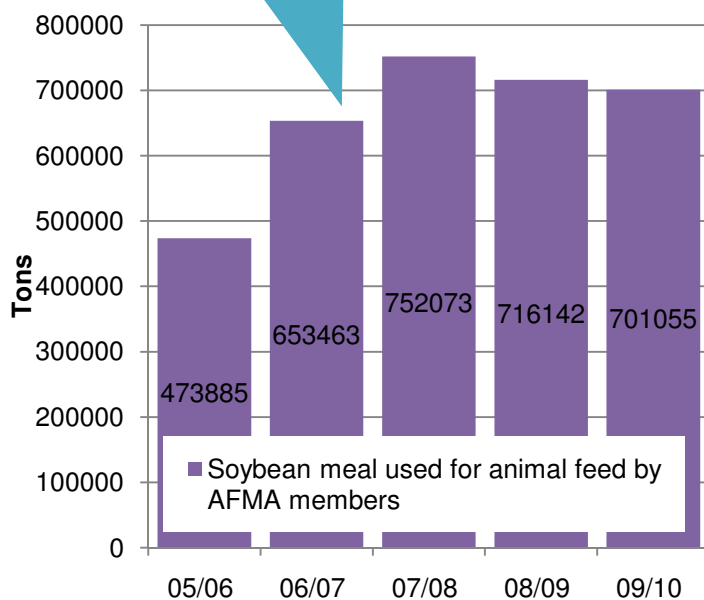
SOUTH AFRICAN SOYBEAN INDUSTRY



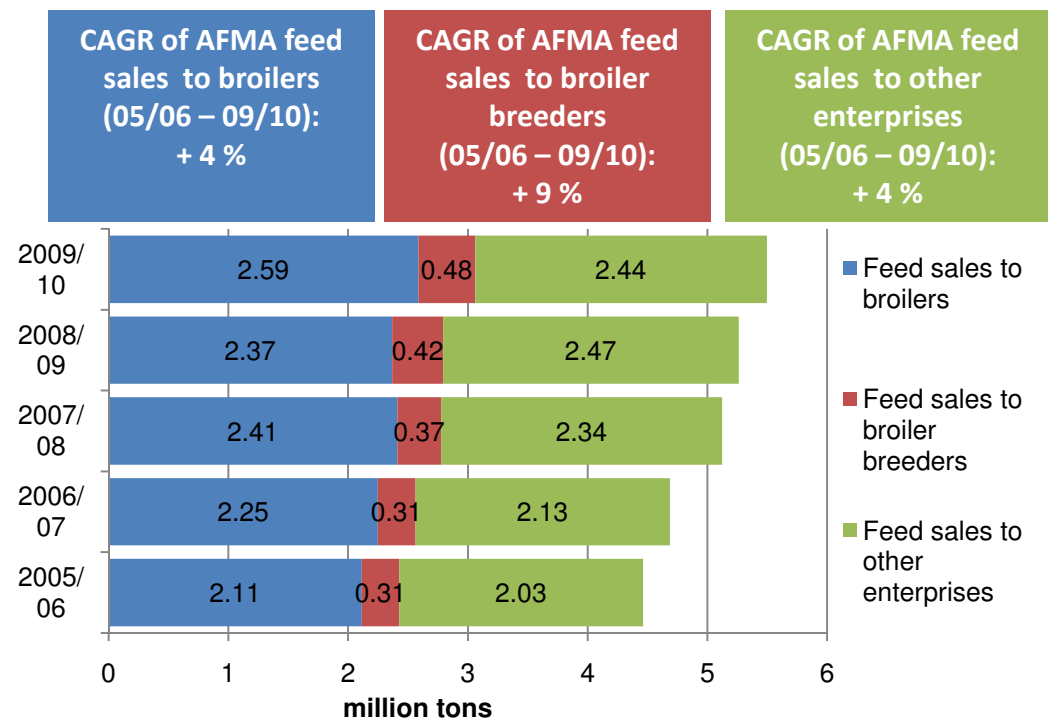
Soybean meal used in animal feed

This data represent 54% of the animal feed industry in South Africa

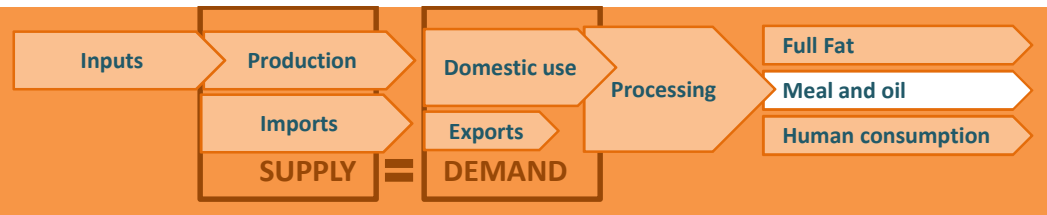
CAGR of soybean meal used in animal feed by AFMA members: 8 %



- Soybean meal represents on average 13.6% of the total raw materials used for animal feed.
- AFMA members produce the most poultry feed, making them the largest user of soybean meal.
- During 2009/2010, 79.9% of the total available soybean meal was used by AFMA members.
- Local production of soybean meal contribute on average 22.3% to total soybean meal used by AFMA members.

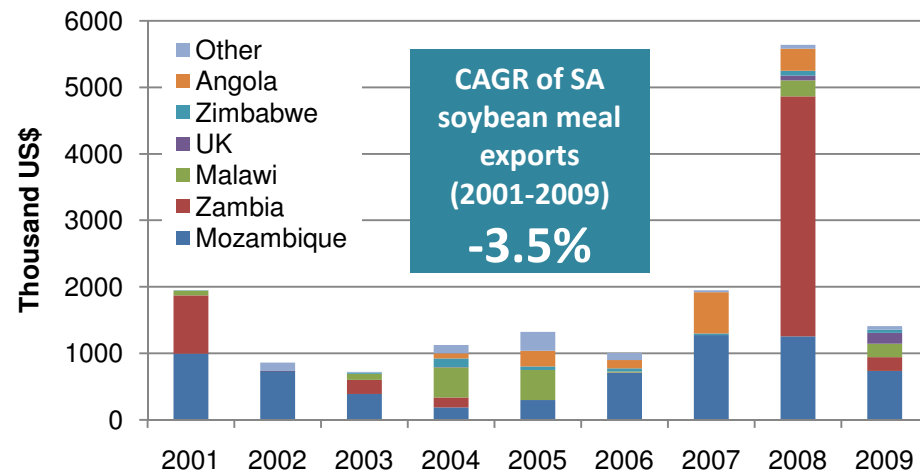


SOUTH AFRICAN SOYBEAN INDUSTRY

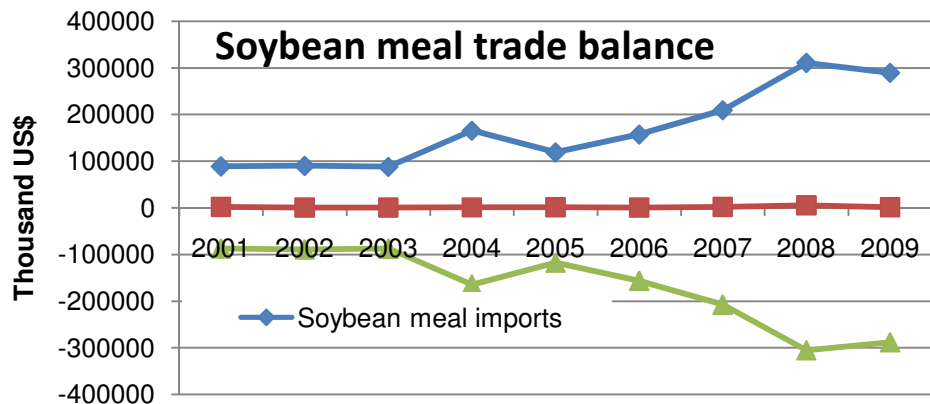
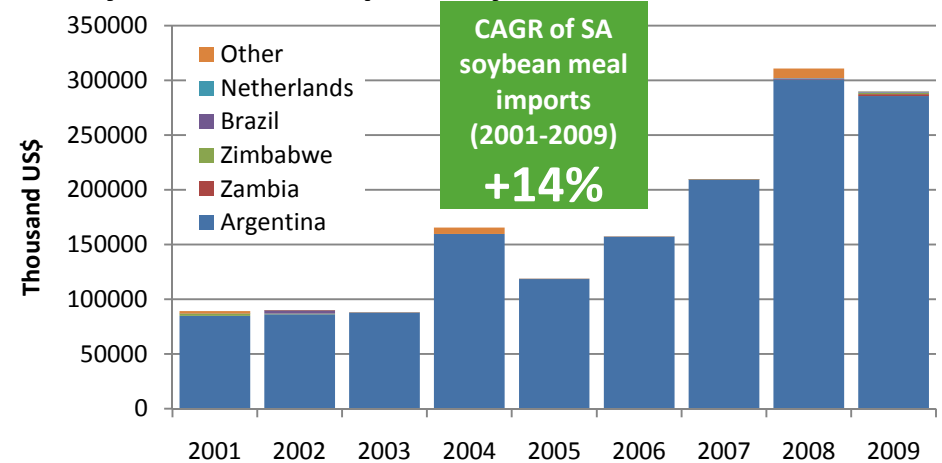


Soybean meal trade

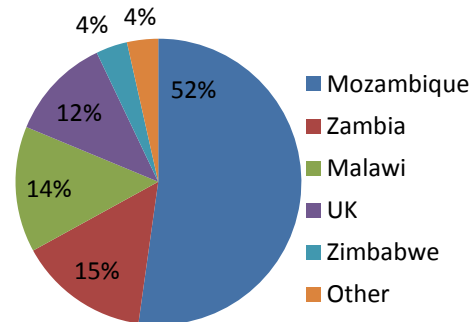
Soybean meal exports by South Africa



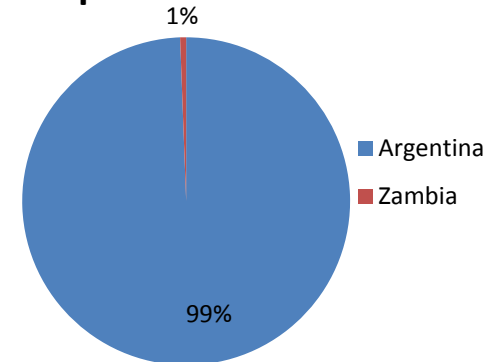
Soybean meal imports by South Africa



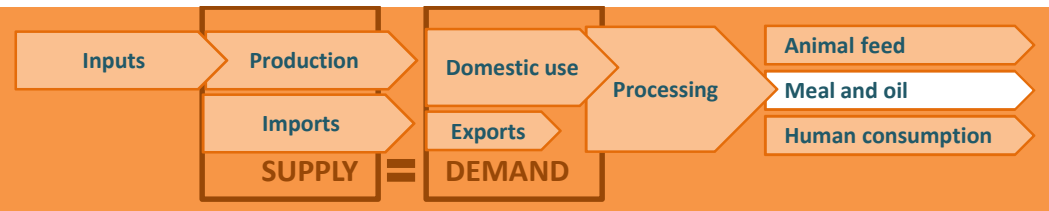
Markets South Africa exported to in 2009



Markets South Africa imported from in 2009



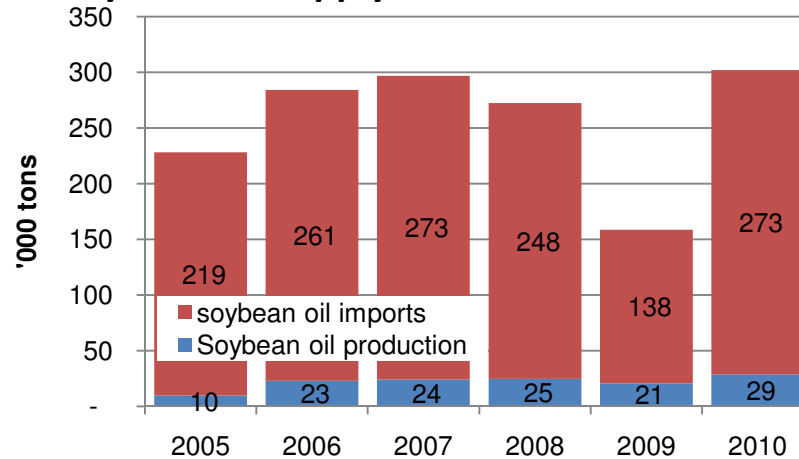
SOUTH AFRICAN SOYBEAN INDUSTRY



Soybean oil supply and demand

- The soybean oil market lags behind the sunflower oil market in South Africa, and soybean oil is mainly sourced from imports.
- The South African consumer market generally prefers sunflower oil; soybean oil is usually used for cooking oil blends.
- Refineries focus on sunflower oil rather than soybean oil due to its preference in the market, which affects oilseed processing decisions.
- Use of oilseeds for biofuels as part of SA's Biofuel Industry Strategy could increase demand for soybean and sunflower, but biodiesels is still a small market currently.

Soybean oil supply

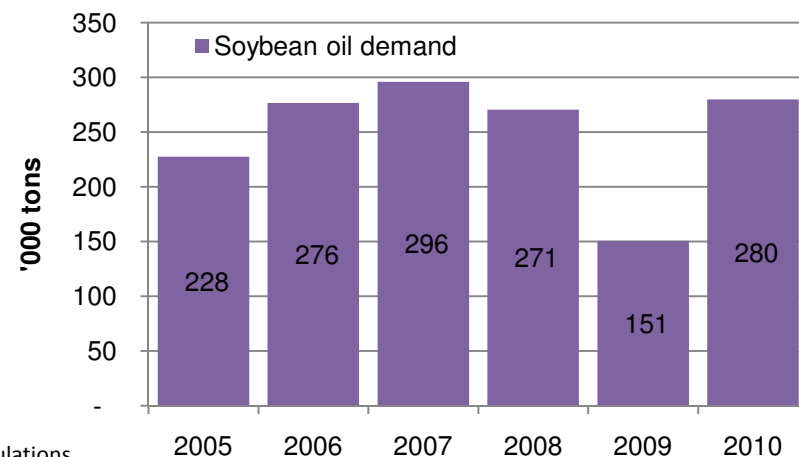


CAGR of SA soybean oil production (2005-2010)
+20%

CAGR of SA soybean oil imports (2005-2010)
+4%

On average (2005 – 2010) 94 % of soybean oil domestically consumed is imported.

Soybean oil demand



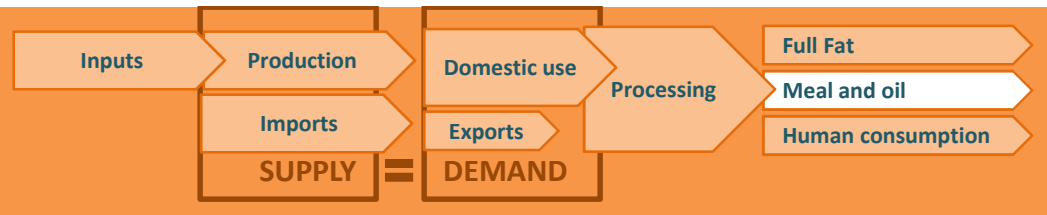
CAGR of SA soybean oil demand (2005-2010)
+4%

Soybean oil imports CAGR = Soybean oil demand CAGR

Soybean oil demand =
Soybean oil production
+ Soybean oil imports
- Soybean oil exports

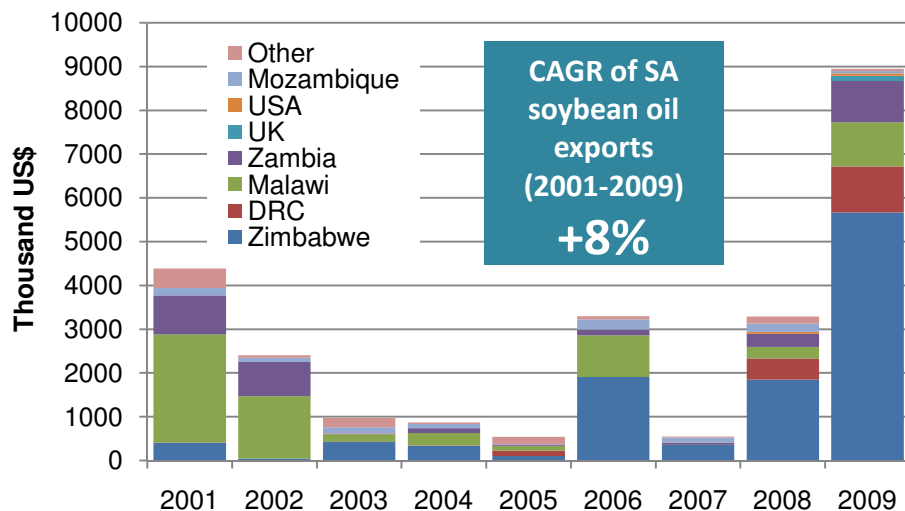
Source: SAGIS, ITC, TechnoServe and own calculations

SOUTH AFRICAN SOYBEAN INDUSTRY

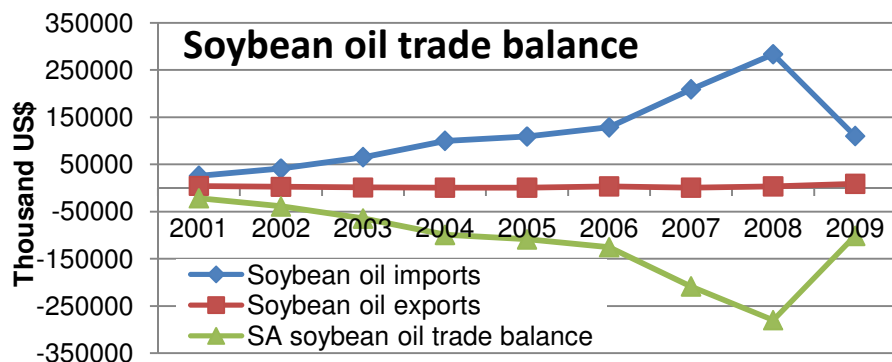
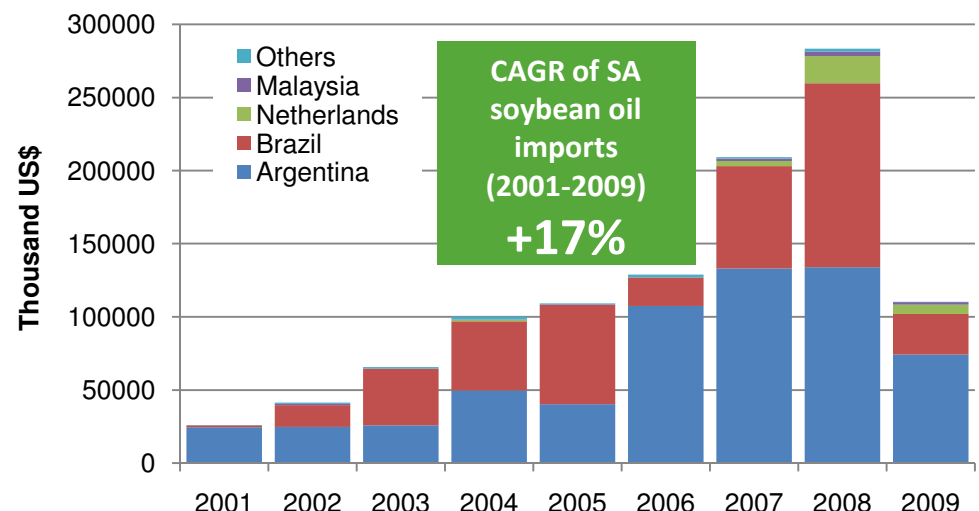


Soybean oil trade

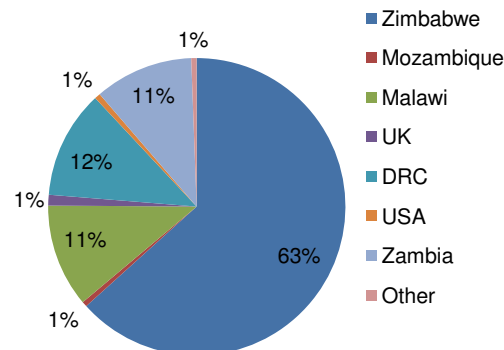
Soybean oil exports by South Africa



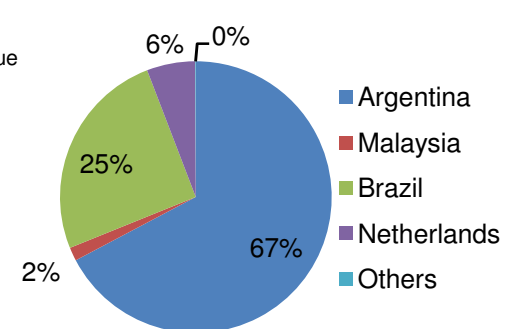
Soybean oil imports by South Africa



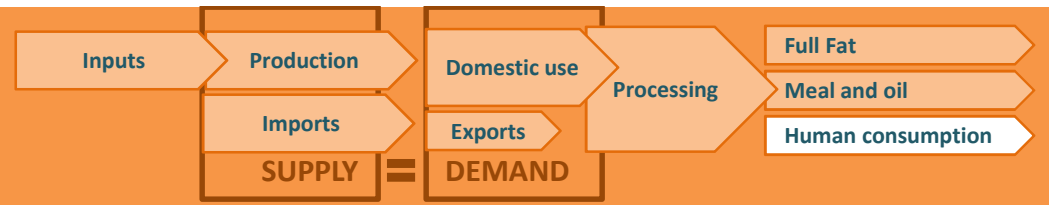
Markets South Africa exported to in 2009



Markets South Africa imported from in 2009



SOUTH AFRICAN SOYBEAN INDUSTRY



Soybeans processed for human consumption

PROCESSED FOR HUMAN CONSUMPTION

7 %

CAGR of soybeans processed for human consumption: + 2 %

- The bean is processed to produce soy chunks or other food.
- Also includes processing for soy milk.
- Demand for 1ton of human solid consumption is **equivalent to 1 ton of soybeans**

Other uses of soybeans

OTHER USES

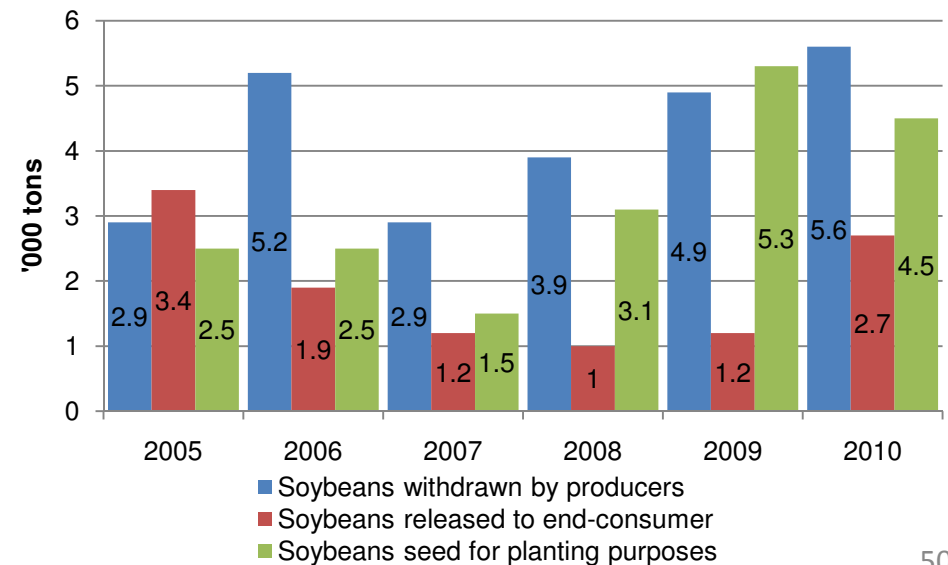
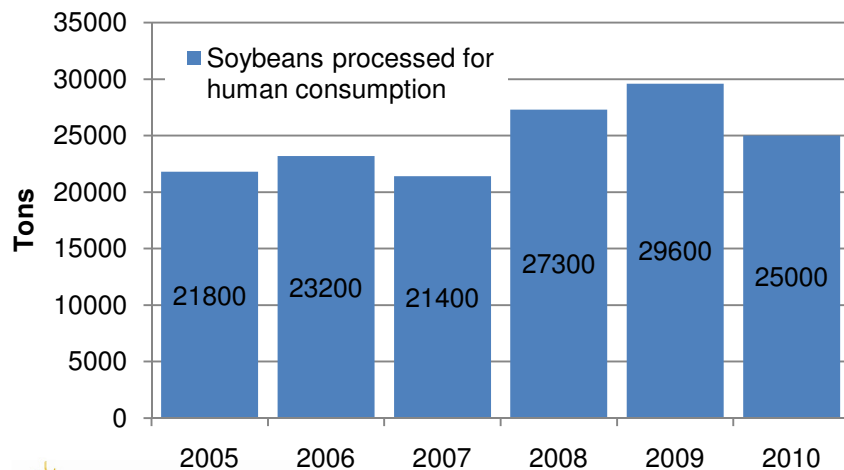
3 %

Other uses include, withdrawals by producers, released to end consumers and seed for planting purposes.

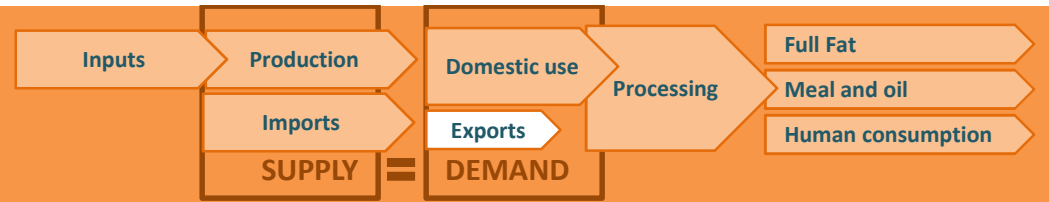
CAGR of soybeans withdrawn by producers: + 12 %

CAGR of soybeans released to end-consumers: - 4 %

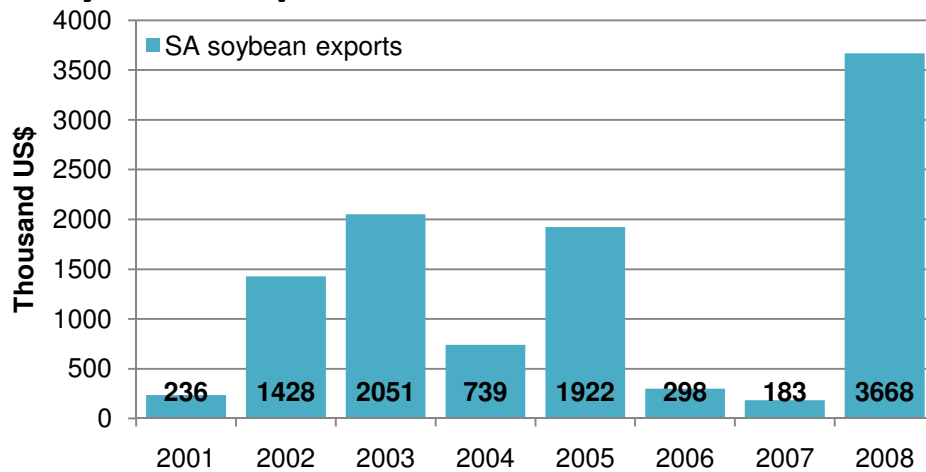
CAGR of soybeans used for planting purposes: + 10 %



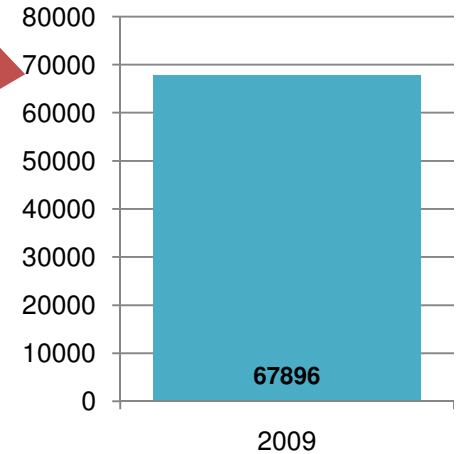
SOUTH AFRICAN SOYBEAN INDUSTRY



Soybean exports

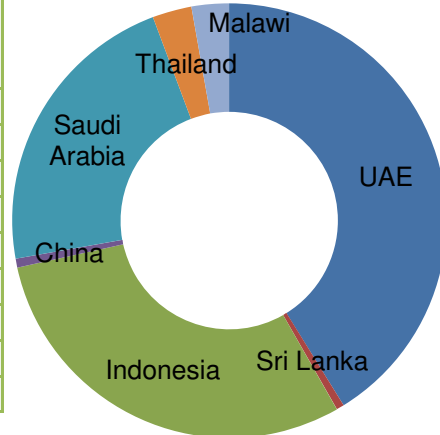


South Africa's exports of soybeans increased by 1751% from 2008 to 2009 due to growth in production motivated by the benefits of crop rotation of soybeans which was accompanied by a much lower growth in the domestic demand for processing.

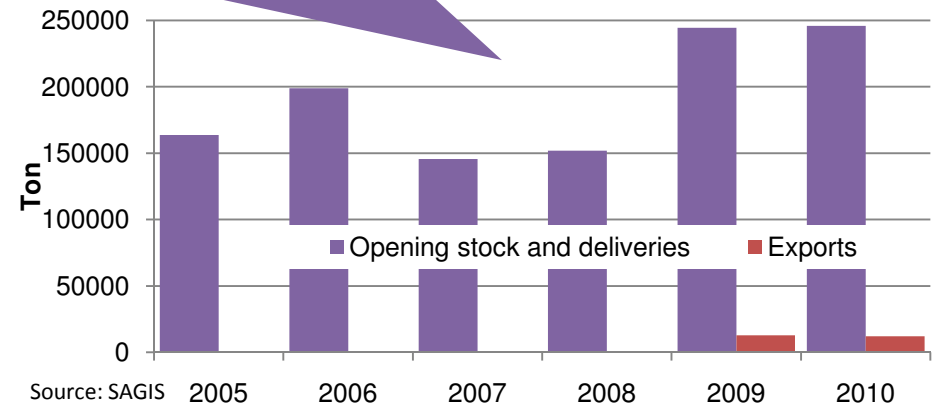


South Africa's export markets in 2009

Country	Value exported ('000 US\$) 2009
UAE	27791
Indonesia	20095
Saudi Arabia	14913
Thailand	1983
Malawi	1880
China	452
Sri Lanka	390
Zimbabwe	200
Zambia	108

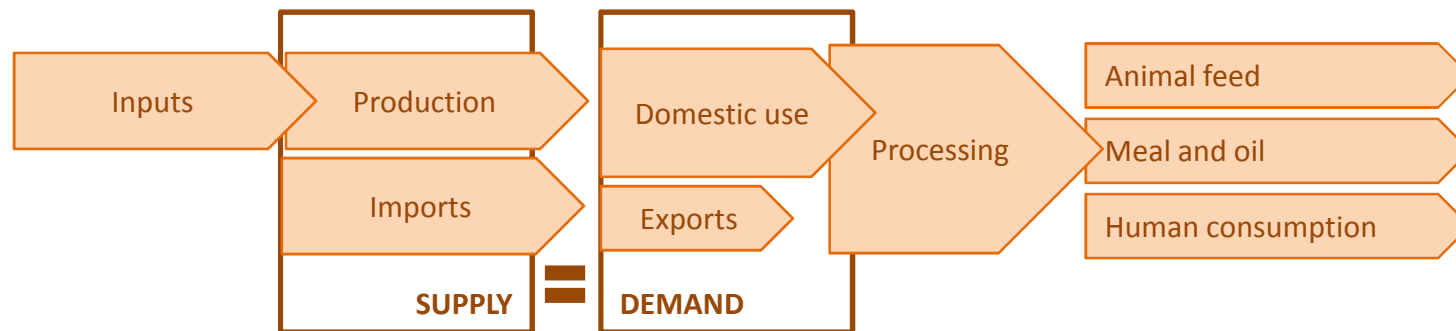


South Africa exported higher volumes of soybeans in 2009 and 2010 due to higher production volumes



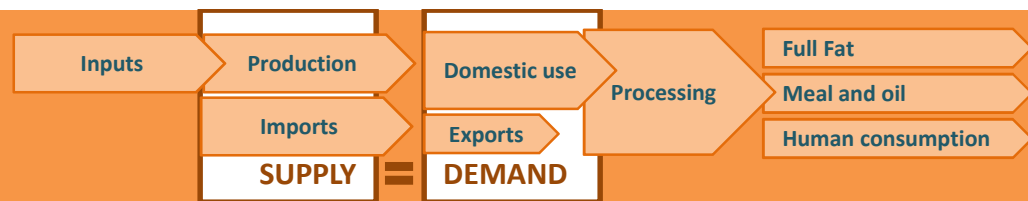
Source: SAGIS

In-depth analysis of the South African soybean industry



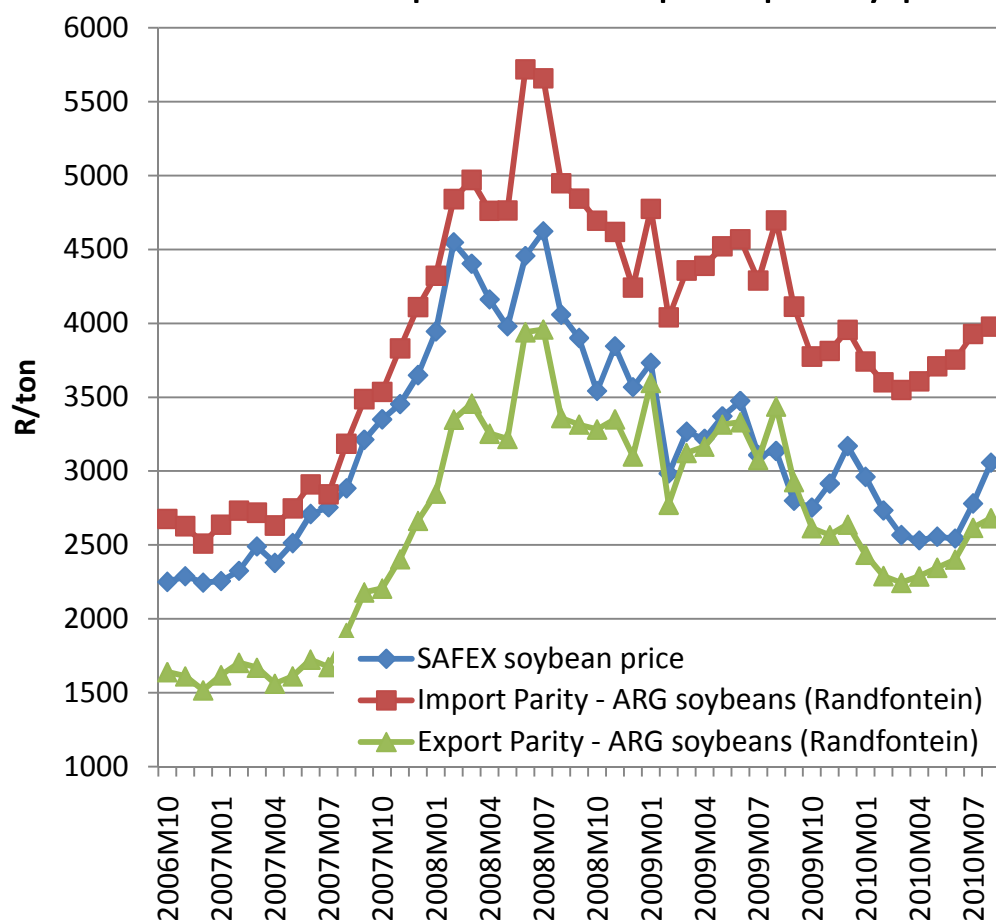
Price formation and future scenarios...

SOUTH AFRICAN SOYBEAN INDUSTRY



The local soybean price is well below the import parity price of soybeans

Import and export parity price of soybeans - calculations



IMPORT PARITY PRICE		ARG Soybeans
International Price (FOB)	\$/ton	485.00
+ Freight	\$/ton	40.00
+ Insurance	\$/ton	1.46
= Cost, Insurance and Freight (CIF)	\$/ton	526.46
Exchange rate (R6.86 / US\$)		3611.48
+ Financing cost (30 days)	R/ton	28.20
+ Discharging cost	R/ton	118.00
+ Import tariff	R/ton	266.17
= FOR Durban	R/ton	4023.85
+ Railage (Durban - Randfontein)	R/ton	254.00
= Price in Randfontein	R/ton	4277.85

EXPORT PARITY		ARG Soybeans
International Price (FOB)	\$/ton	485.00
+ SA premium	\$/ton	0.00
= Durban Price (FOB)	\$/ton	485.00
Exchange rate (R6.86 / US\$)	R/ton	3327.10
- Loading cost	R/ton	118.00
= FOR Durban	R/ton	3209.10
- Railage	R/ton	254.00
= Price in Randfontein	R/ton	2955.10

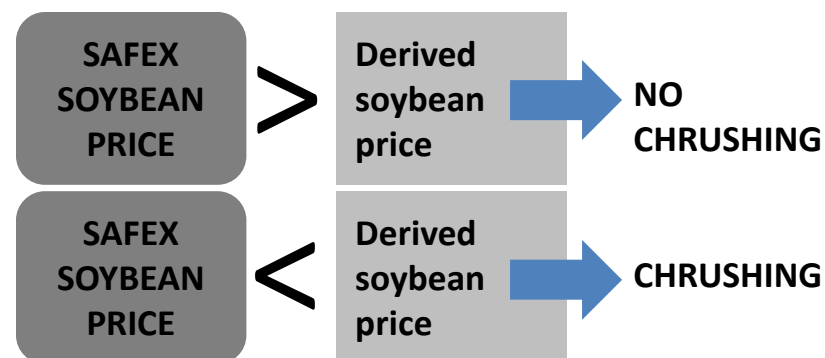
Current situation and options...

...looking at 3-year averages...

Can locally produced soybean meal be used to replace imported soybean meal and is it economically profitable enough for the local crushers to crush soybeans ?

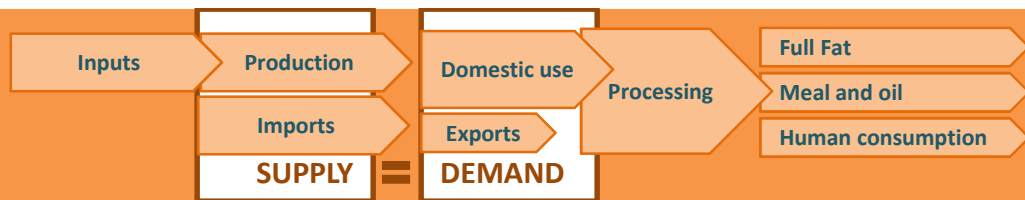
How to calculate the
derived soybean price:

Import parity price of meal x 0.79
+
Import parity price of oil x 0.18
+
Operational cost



ANSWER: Depends on local and international soybean and soybean product prices

SOUTH AFRICAN SOYBEAN INDUSTRY



Snap shot of the economics of crushing 8 November 2010 – Price derivation

The local soybean price is derived from the import parity prices of soybean meal and oil, and also taking into account the cost of processing.

$$\text{Soybean meal price} \times 0.79 + \text{Soybean oil price} \times 0.18$$

Price at Durban Harbour	R/ton	3415.00	International price (Arg. FOB)	\$/ton	1136.00
Transport cost - Durban to Randfontein	R/ton	254.00	Insurance (0.3 % of FOB)	\$/ton	3.41
Price of imported soybean meal in Randfontein	R/ton	3415.00	Import tariff (10 % of FOB)	\$/ton	113.60
			Freight	\$/ton	81.00
			Exchange rate (R/US\$)	7.05	1334.01
			Harbour cost	R/ton	160.00
			Total cost at Durban harbour	R/ton	9564.76
			Transport cost - Durban to Randfontein	R/ton	332.00
			Price of imported soybean oil in Randfontein	R/ton	9896.76

INCOME RECEIVED FROM
PROCESSED END PRODUCTS

$$\text{Meal price R 2 698} + \text{Oil price R 1 781} = +\text{R 4479.00}$$

COST OF RAW MATERIAL

SAFEX soybean price

-R 3420.00

COST OF CRUSHING

Crushing cost

-R 727.31

OTHER COSTS

Other costs

Storage costs	R/t	43.20
Transport cost	R/t	131.00
Financing cost	R/t	103.11
Crushing cost	R/t	450.00
Total Costs	R/t	727.31

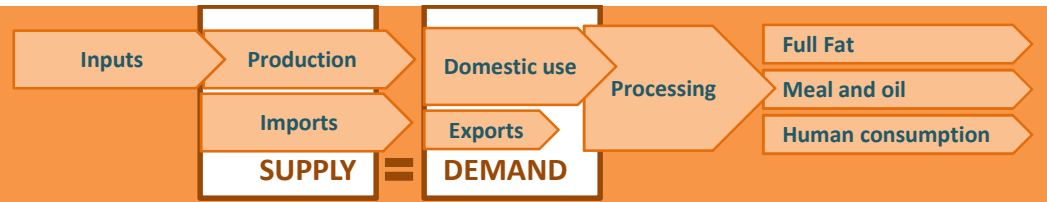
PROFIT/LOSS

PROFIT

LOSS

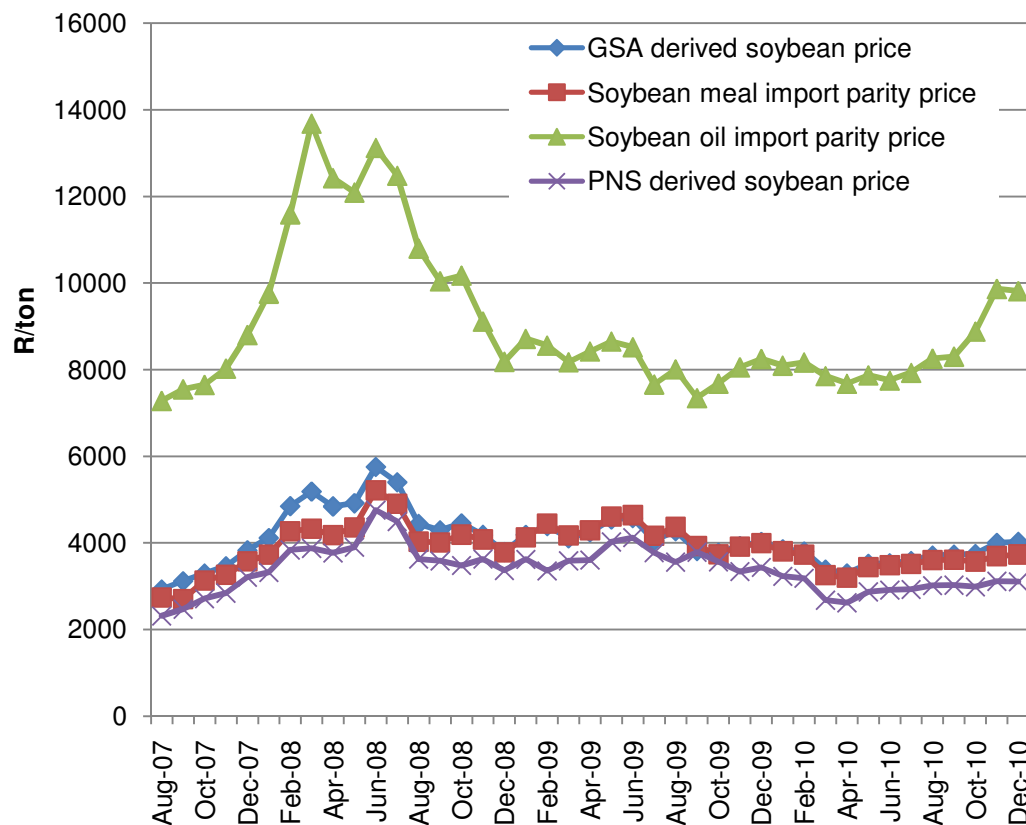
R 331.69*

SOUTH AFRICAN SOYBEAN INDUSTRY



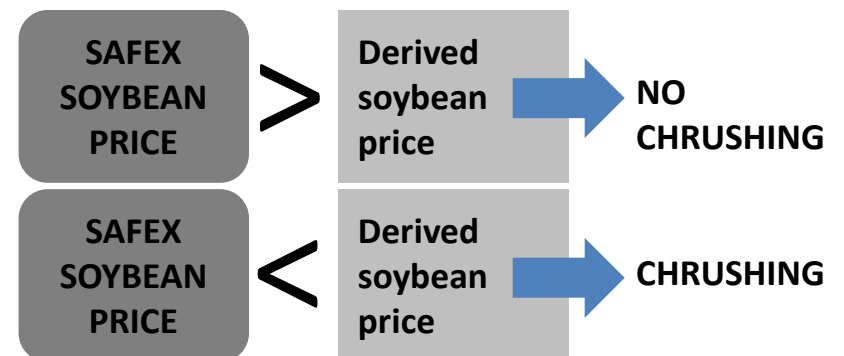
Economics of crushing

DERIVED SOYBEAN PRICE of GSA

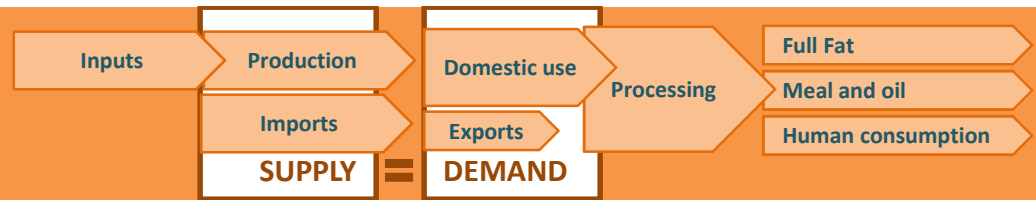


How to calculate the derived soybean price:

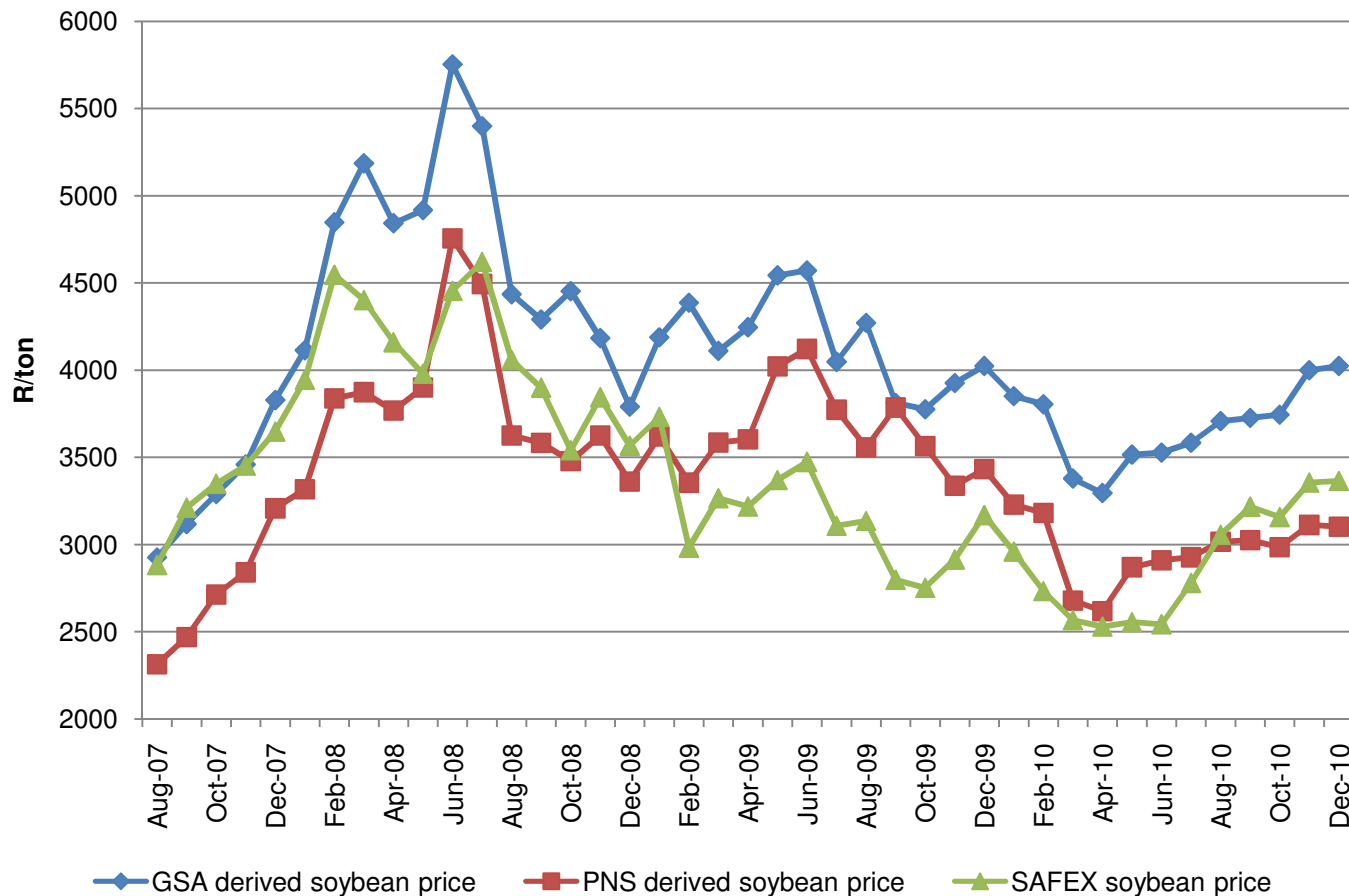
$$\begin{aligned} &\text{Import parity price of meal} \times 0.79 \\ &+ \\ &\text{Import parity price of oil} \times 0.18 \\ &+ \\ &\text{Operational cost} \end{aligned}$$



SOUTH AFRICAN SOYBEAN INDUSTRY



Derived soybean price vs SAFEX soybean price



GSA derived soybean price is derived from the **meal and oil price**

PNS derived soybean price is derived from the **full fat price**

This section will look at the future of soybean production and processing in South Africa by making different assumptions and looking at different scenario's based on the different assumptions.

Economic ideal in current situation:

1. Increase soybean production by moving area planted with maize to area planted with soybeans
2. Use increased production of soybeans to substitute soybean meal imports with domestically produced soybean meal – reach full import substitution

Yes, it is doable.....

...but will full import substitution be sustainable in the future ??

FEASIBILITY ?

1. Will South Africa still meet its domestic demand for maize if less hectares are planted with maize?
2. Can locally produced soybean meal be used to replace imported soybean meal and is it economically profitable enough for the local crushers to crush soybeans ?

It is important to take note the following factors which will influence producer's decisions to produce soybeans

- Inverse relationship between production volumes and price
- Maize and soybean are substitute commodities in terms of production

ILLUSTRATION:

-
- Due to maize surpluses, **maize prices have decreased**, despite international maize price increases, which makes **soy more attractive** (and maize less attractive)
 - As farmers **reallocate land from maize to soy** through crop rotation, **maize prices will rise** as the surplus shrinks
 - **Increases in maize prices** in South Africa, makes **soy less attractive** (and maize more attractive)
 - Farmers will then **switch from soy back to maize**, which would repeat this cycle

Economics that will influence decisions

A producer's final decision to plant soybeans will depend on the profitability and the price relations with other suitable crops.

Other factors that will influence decisions

The benefits from crop rotation practices which ranges from lower input costs and higher yields for the following crop

Diversification strategies

Determining whether full import substitution will be sustainable in the future...

...but will full
import
substitution be
sustainable in
the future ??

In order to determine this, look at the following...

1. Determine the future demand of soybeans (3 scenarios)

Historic CAGR

BFAP projections

TNS projections

2. Look at different ways to address the future demand

**Full import substitution,
i.e. produce soybeans to
satisfy total soybean
meal demand**

**Minimum import
substitution , i.e.
produce soybeans to
satisfy total soybean oil
demand**

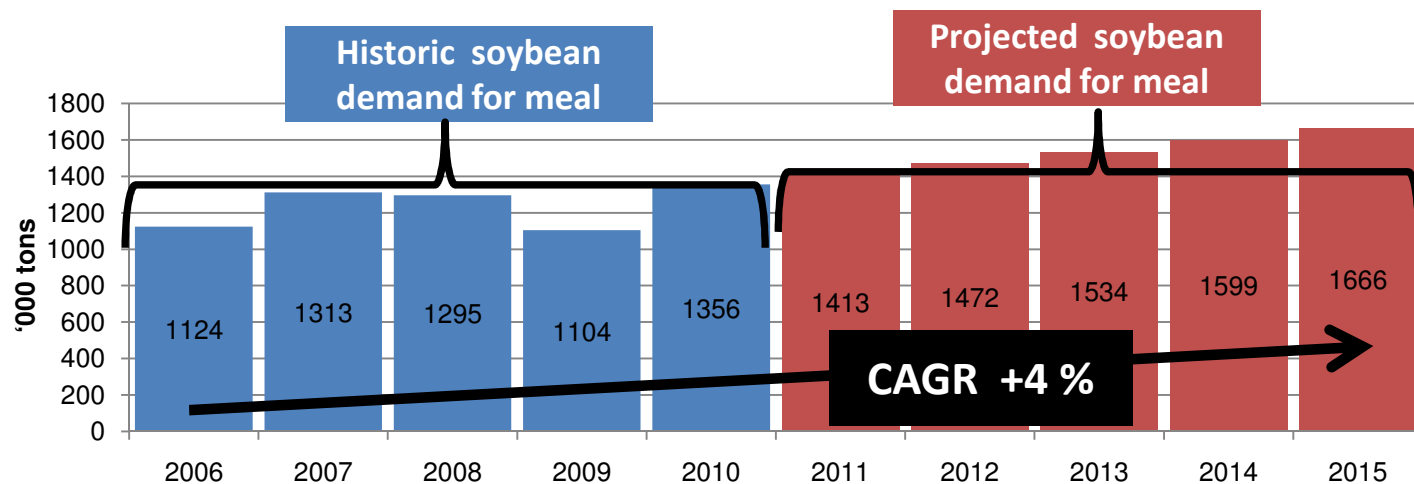
3. Look at the implications of the different scenario's on **land availability** and **crushing capacity**

SOUTH AFRICAN SOYBEAN INDUSTRY

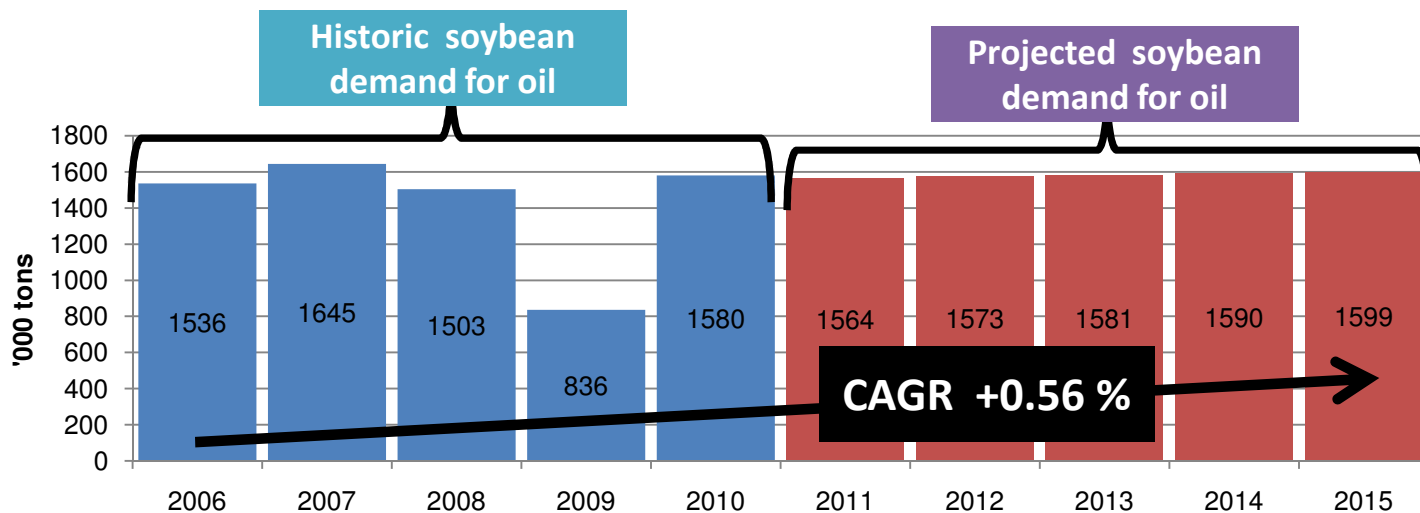
Determine the future demand of soybeans

The future demand for soybeans based on historic CAGR

Projected demand for soybeans in 2015 determined by meal demand 1 666 000 ton

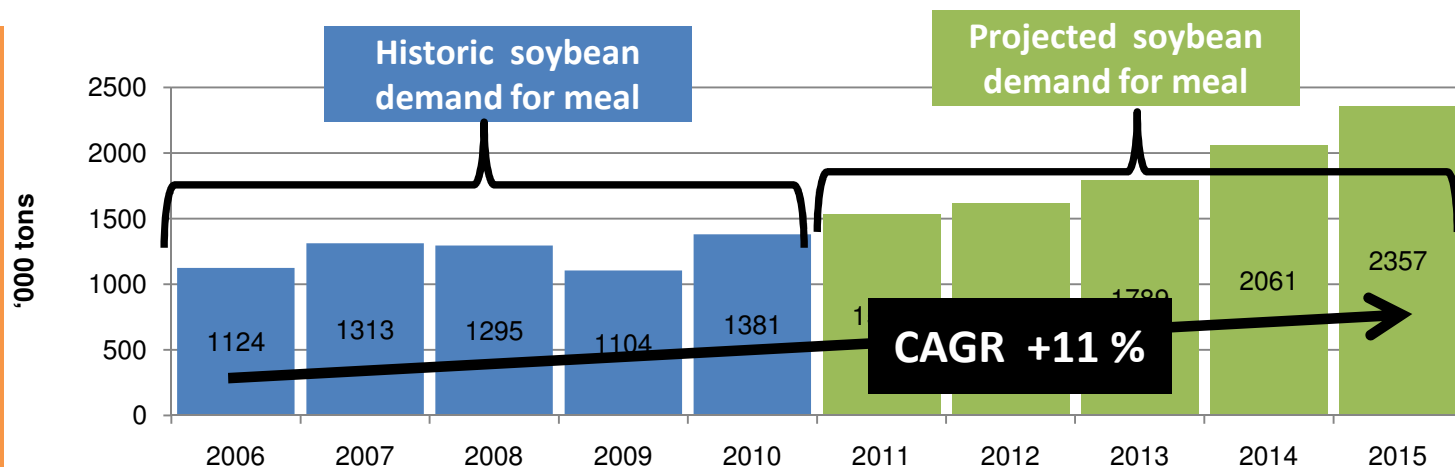


Projected demand for soybeans in 2015 determined by oil demand 1 599 000 ton

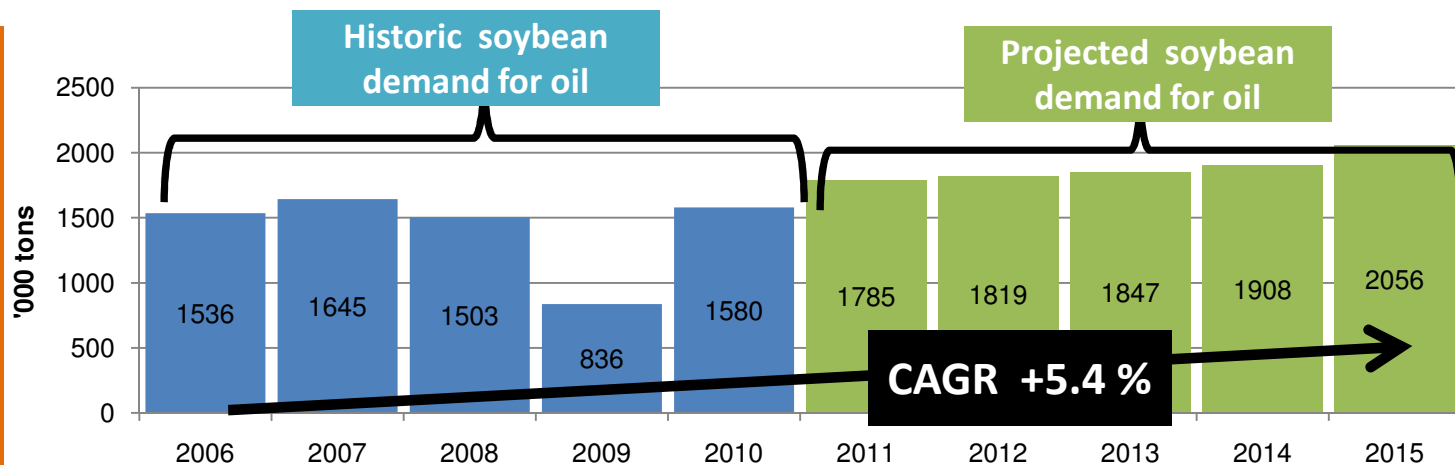


The future demand for soybeans based on BFAP projections

Projected demand for soybeans in 2015 determined by meal demand 2 357 000 ton

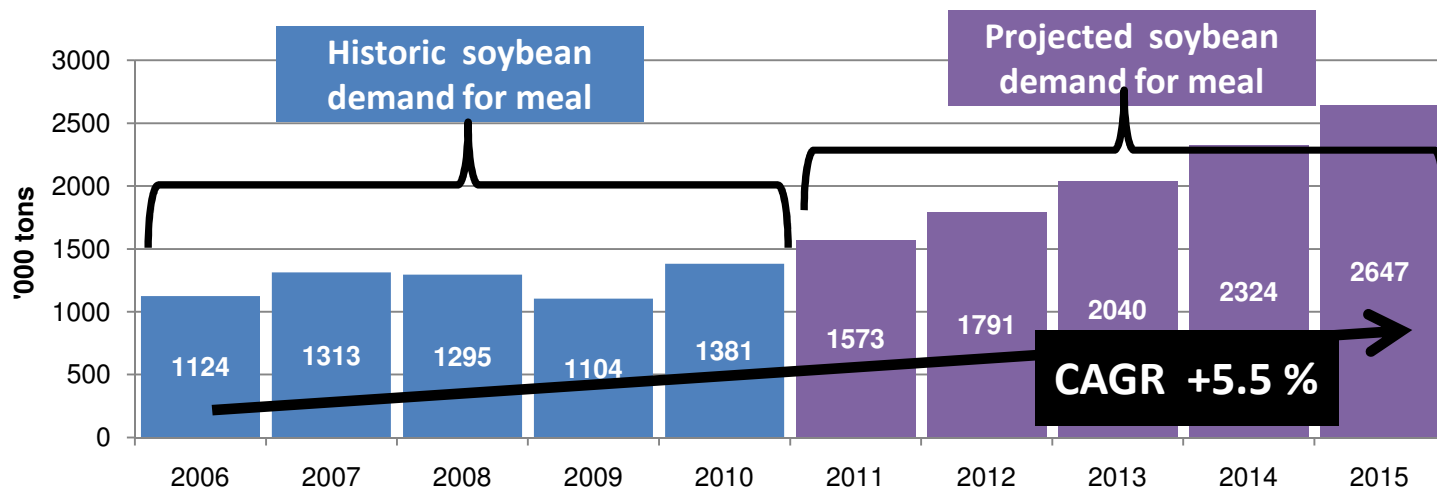


Projected demand for soybeans in 2015 determined by oil demand 2 056 000 ton

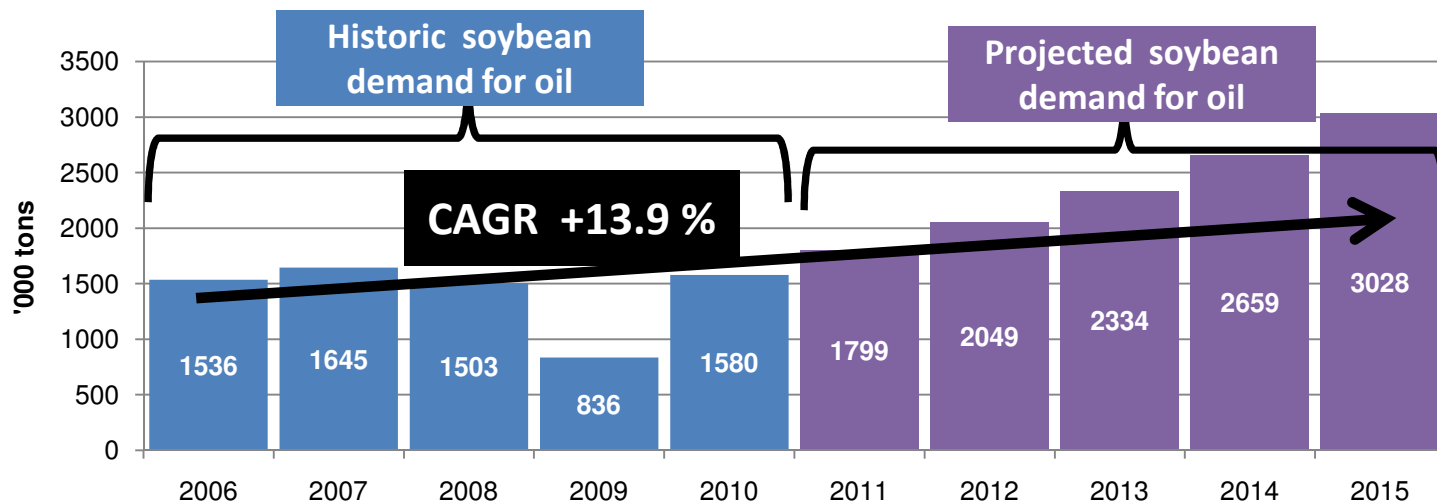


The future demand for soybeans based on TNS projections

Projected demand for soybeans in 2015 determined by meal demand 2 647 000 ton

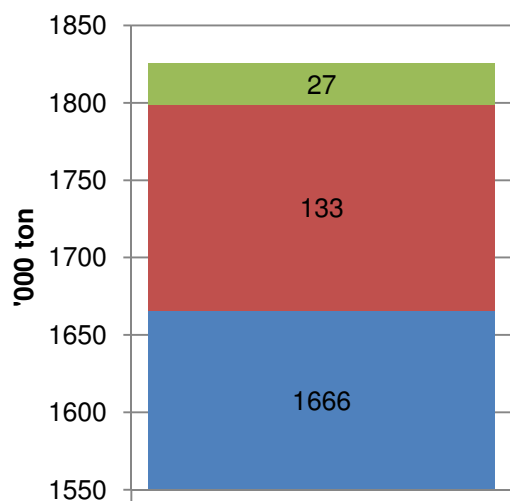


Projected demand for soybeans in 2015 determined by oil demand 3 028 000 ton



**South Africa has two options to address the projected 2015 demand...
Using the historic CAGR**

A. Total soybean demand in case of full import substitution: 1 825 000 ton

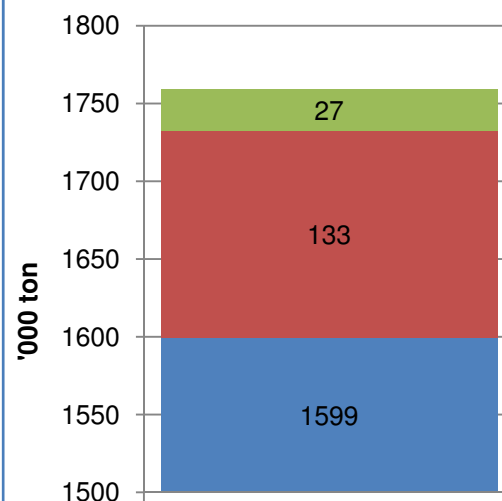


Full import substitution

- Meal demand
- Full fat demand
- Human consumption demand

Full Import Substitution – as South Africa requires more soy beans for meal than it needs for oil, full import substitution implies that it produces to its meal demand and exports its excess oil

B. Total soybean demand in case of minimum import substitution: 1 759 000 ton



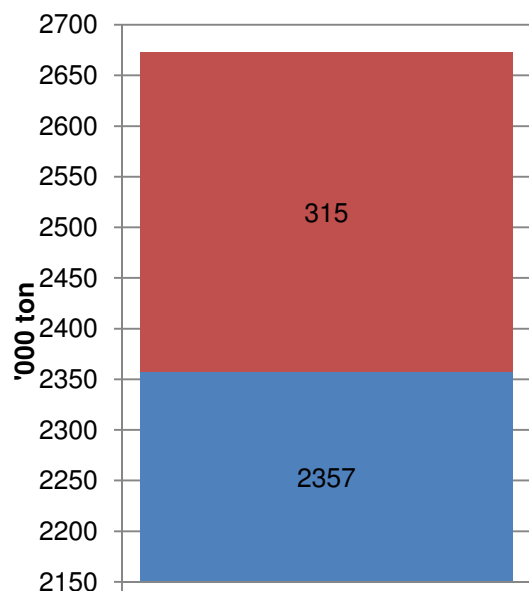
Minimum import substitution

- Oil demand
- Full fat demand
- Human consumption demand

Minimum Import Substitution – as South Africa requires less beans for its oil demand than it does for its meal demand, minimum import substitution implies that it produces to its oil demand and imports any shortfall in meal

South Africa has two options to address the projected 2015 demand...
Using BFAP projections

A. Total soybean demand in case of full import substitution: 2 673 000 ton

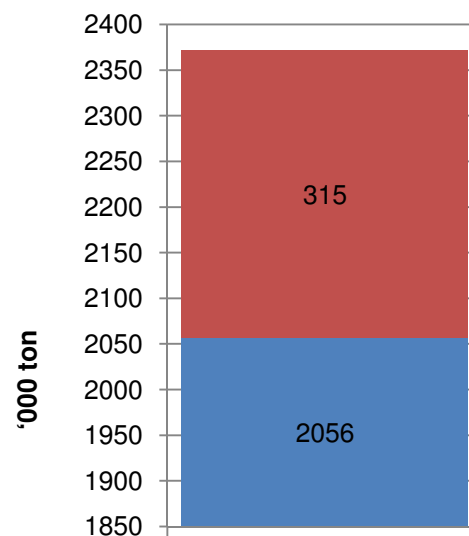


Full import substitution

■ Meal demand ■ Full fat demand

Full Import Substitution – as South Africa requires more soy beans for meal than it needs for oil, full import substitution implies that it produces to its meal demand and exports its excess oil

B. Total soybean demand in case of minimum import substitution: 2 371 000 ton



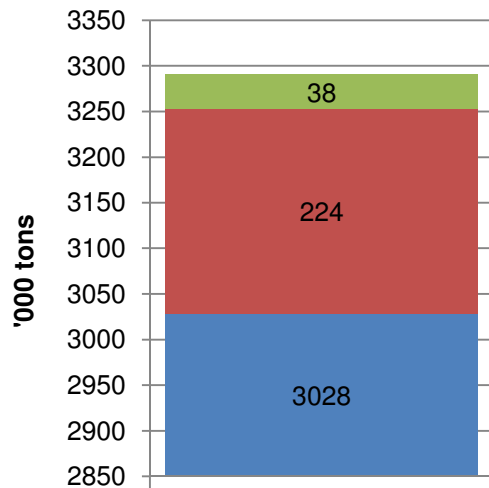
Minimum import substitution

■ Oil demand ■ Full fat demand

Minimum Import Substitution – as South Africa requires less beans for its oil demand than it does for its meal demand, minimum import substitution implies that it produces to its oil demand and imports any shortfall in meal

South Africa has two options to address the projected 2015 demand...
Using TNS projections

A. Total soybean demand in case of full import substitution: 3 290 000 ton

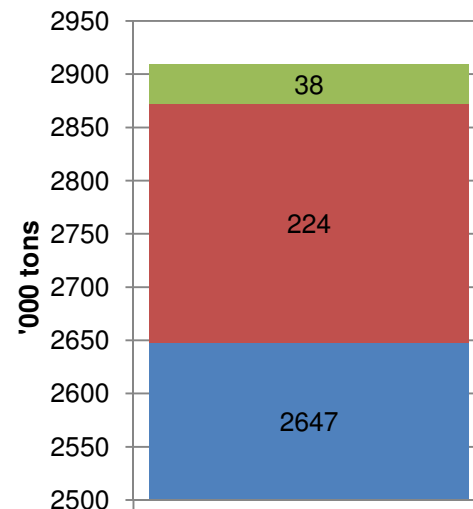


Full import substitution

- Oil demand
- Full fat demand
- Human consumption demand

Full Import Substitution – as South Africa requires more soy beans for oil than it needs for cake, full import substitution implies that it produces to its oil demand and exports its excess cake

B. Total soybean demand in case of minimum import substitution: 2 909 000 ton



Minimum import substitution

- Meal demand
- Full fat demand
- Human consumption demand

Minimum Import Substitution – as South Africa requires less beans for its cake demand than it does for its oil demand, minimum import substitution implies that it produces to its cake demand and imports any shortfall in oil

South Africa has two options to address the projected 2015 demand...

	Full import substitution	Minimum import substitution
Processed for full fat cake	Produce and process sufficient beans to meet all of South Africa's full fat needs	Produce and process sufficient beans to meet all of South Africa's full fat needs
Processed for human solid consumption	Produce and process sufficient beans to meet all of South Africa's human solid consumption needs	Produce and process sufficient beans to meet all of South Africa's human solid consumption needs
Processed into cake and oil	Produce and process sufficient beans to meet ALL of South Africa's soybean meal/cake demand (or oil demand – TNS scenario).	Produce and process sufficient beans to meet the LESSER of South Africa's cake OR oil demand, importing any shortfall.

Area available for soybean production

Possible substitution of maize area to soybeans on the basis of reducing current surplus production of maize.

Domestic demand for maize	9 000 000 ton
Maize yield	<u>/ 4.7</u> ton/ha
Hectares needed to be allocated to maize	= 1 914 894 ha
Current ha planted with maize	2 383 300 ha
Maize hectares that can be moved to soybeans:	468 406 ha
Current hectares planted with soybeans:	<u>418 000 ha</u>
Potential area available for soybean production:	886 406 ha

SOUTH AFRICAN SOYBEAN INDUSTRY

Look at the implications of the different scenario's on **land availability** and **crushing capacity**

Future soybean demand and land availability

	Historic CAGR	BFAP	TNS
Full import substitution	Demand: 1 825 000 ton Area needed: 960 786 ha	Demand: 2 673 000 ton Area needed: 1 406 689 ha	Demand: 3 290 000 ton Area needed: 1 731 731 ha
Minimum import substitution	Demand: 1 759 000 ton Area needed: 925 839 ha	Demand: 2 371 000 ton Area needed: 1 248 128 ha	Demand: 2 909 000 ton Area needed: 1 531 137 ha

**Area available:
886 406 ha**

Assuming soybean yield of 1.9 ton/ha

NOTE: CALCULATIONS IN SOYBEAN EQUIVALENTS

Area available for soybean production

Removal of maize surpluses:

Substitute land used to
produce the surplus maize
with soybean production

886 406 ha

PNS:

The total existing area
under both dry land and
irrigation conditions, which
is suitable for commercial
soybean production is
estimated at

2 610 346 ha

GSA:

Area suitable for the
production for dry land
soybeans based on crop
rotation practices in
different provinces
estimated at

874 528 ha

**Area needed to meet minimum soybean
demand 925 839 ha**

Future soybean demand and crushing capacity

	Historic CAGR	BFAP	TNS
Full import substitution	Demand: 1 825 000 ton Crushing capacity needed: 1 666 000 ton	Demand: 2 673 000 ton Crushing capacity needed: 2 357 000 ton	Demand: 3 290 000 ton Crushing capacity needed: 3 028 000 ton
Minimum import substitution	Demand: 1 759 000 ton Crushing capacity needed: 1 599 000 ton	Demand: 2 371 000 ton Crushing capacity needed: 2 056 000 ton	Demand: 2 909 000 ton Crushing capacity needed: 2 647 000 ton

CURRENT CRUSHING CAPACITY AVAILABLE ?

CURRENT CRUSHING CAPACITY AVAILABLE?

Meal and oil processing capacity

Only 364 000 tons capacity was utilized for soybeans in the past

Type	Key Players/ Locations	Current capacity	Estimated additional capacity	Total capacity
Dual processing plants (sunflower/soybean)	<ul style="list-style-type: none"> Key Players: Willowton, Epko, and Conti-Oil Locations: Pietermaritzburg, Gauteng, Cape Town, Lichtenburg, Randfontein 	1 100 000	1 182 000 (6 plants)	2 282 000
Soy High Protein Meal (Animal)	<ul style="list-style-type: none"> Key Players: Majesty Oil, Nedan Oils, Gauteng Oils, Specialized Protein Products Locations: Krugersdorp, Roedtan, Gauteng, Potchefstroom 	127 000	200 000	327 000
Total Capacity		1 227 000	1 382 000	2 666 000

Considering the different current and future meal and oil processing capacities...

1

The current dedicated soybean meal capacity is 491 000 ton

(364 000 ton in dual plants currently dedicated to soybeans + 127 000 ton at the soy high protein meal plants)

2

The future dedicated soybean meal capacity is 691 000 ton

(364 000 ton in dual plants currently dedicated to soybeans + 327 000 ton at the soy high protein meal plants)

3

The current dedicated soybean meal capacity plus half of dual capacity is 859 000 ton

(364 000 ton in dual plant currently dedicated to soybeans + 368 000 ((1 100 000 - 364 000)/2) addition dual plant capacity allocated to soybeans + 127 000 ton at the soy high protein meal plants)

4

The current dedicated soybean meal capacity plus half of dual capacity is 1 650 000 ton

(364 000 ton in dual plant currently dedicated to soybeans + 959 000 ((2 282 000 - 364 000)/2) addition dual plant capacity allocated to soybeans + 327 000 ton at the soy high protein meal plants)

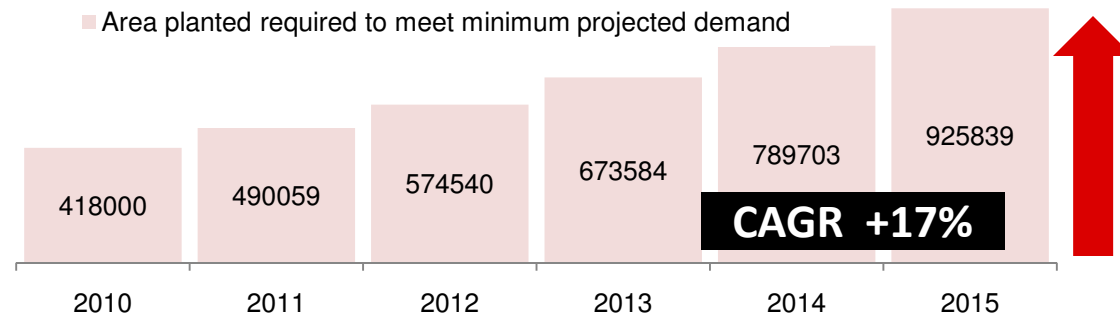
SOUTH AFRICAN SOYBEAN INDUSTRY

Look at the implications of the different scenario's on **land availability** and **crushing capacity**

In order to meet the projected demand: **Historic CAGR** **minimum import substitution**

Total soybean demand:
1 759 000 ton

Area needed:
925 839 ha

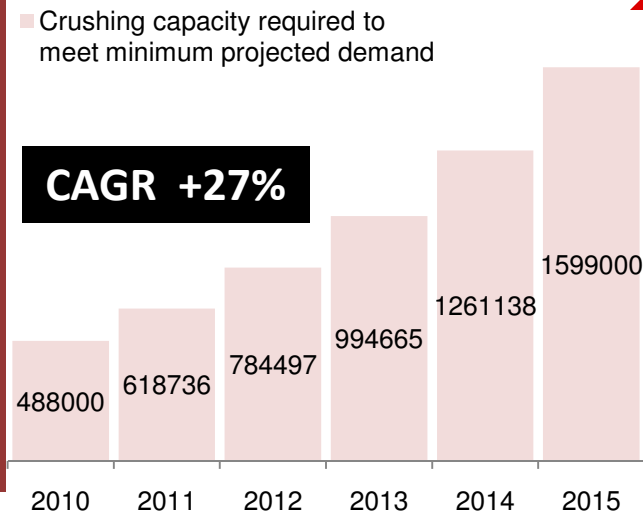


121 %

increase in
area planted
with soybeans

Total soybean demand:
1 759 000 ton

Crushing capacity needed to meet oil demand:
1 599 000 ton



1

The current dedicated soybean meal capacity utilized is 491 000 ton

226 %

increase needed in soybean crushing capacity

2

The future dedicated soybean meal capacity is 691 000 ton

131 %

increase needed in soybean crushing capacity

3

The current dedicated soybean meal capacity plus half of dual capacity is 859 000 ton

86 %

increase needed in soybean crushing capacity

4

The future dedicated soybean meal capacity plus half of dual capacity is 1 650 000 ton

0 %

increase needed in soybean crushing capacity

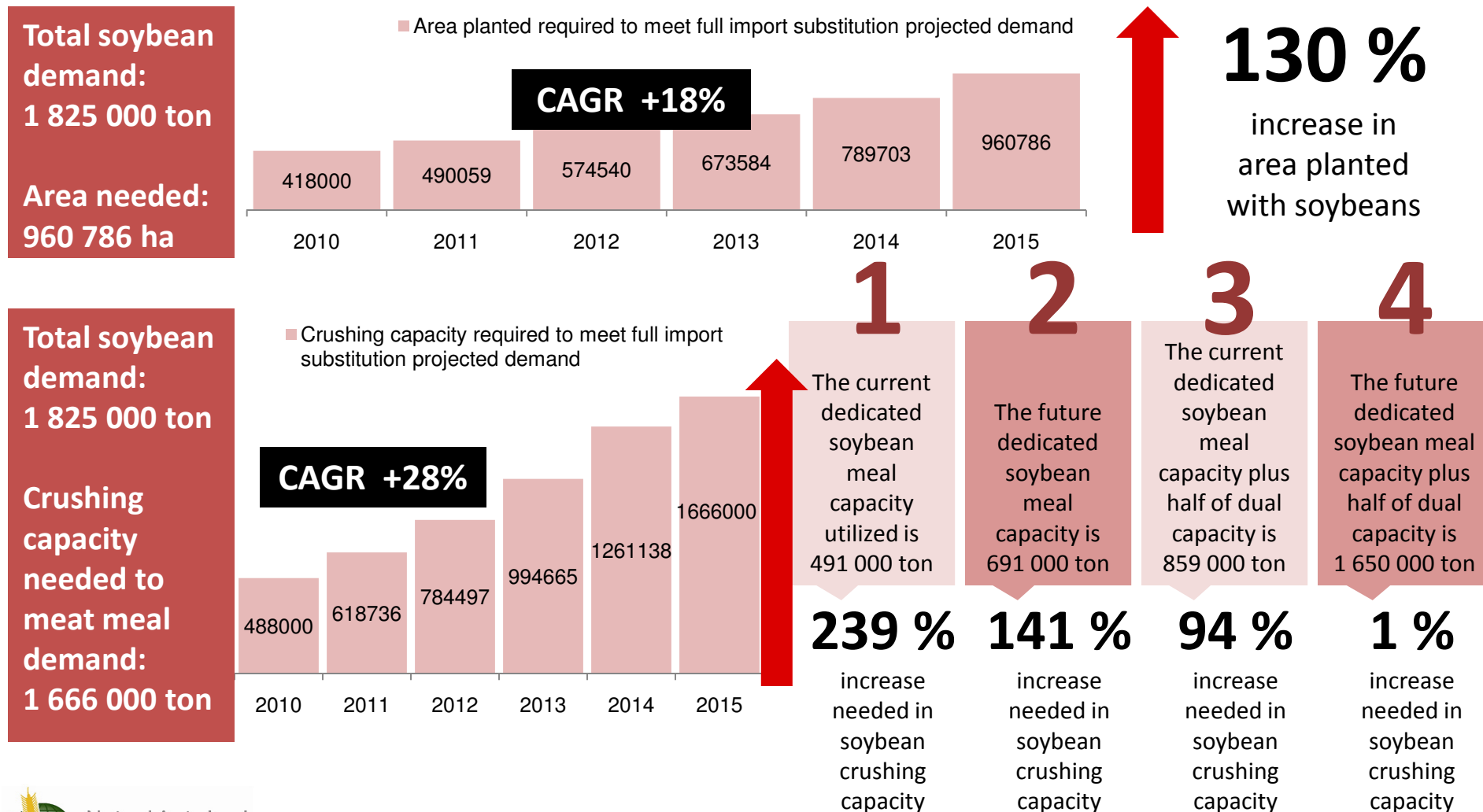
NOTE: CALCULATIONS IN SOYBEAN EQUIVALENTS

SOUTH AFRICAN SOYBEAN INDUSTRY

Look at the implications of the different scenario' on **land availability** and **crushing capacity**

In order to meet the projected demand: **Historic CAGR**

Full import substitution

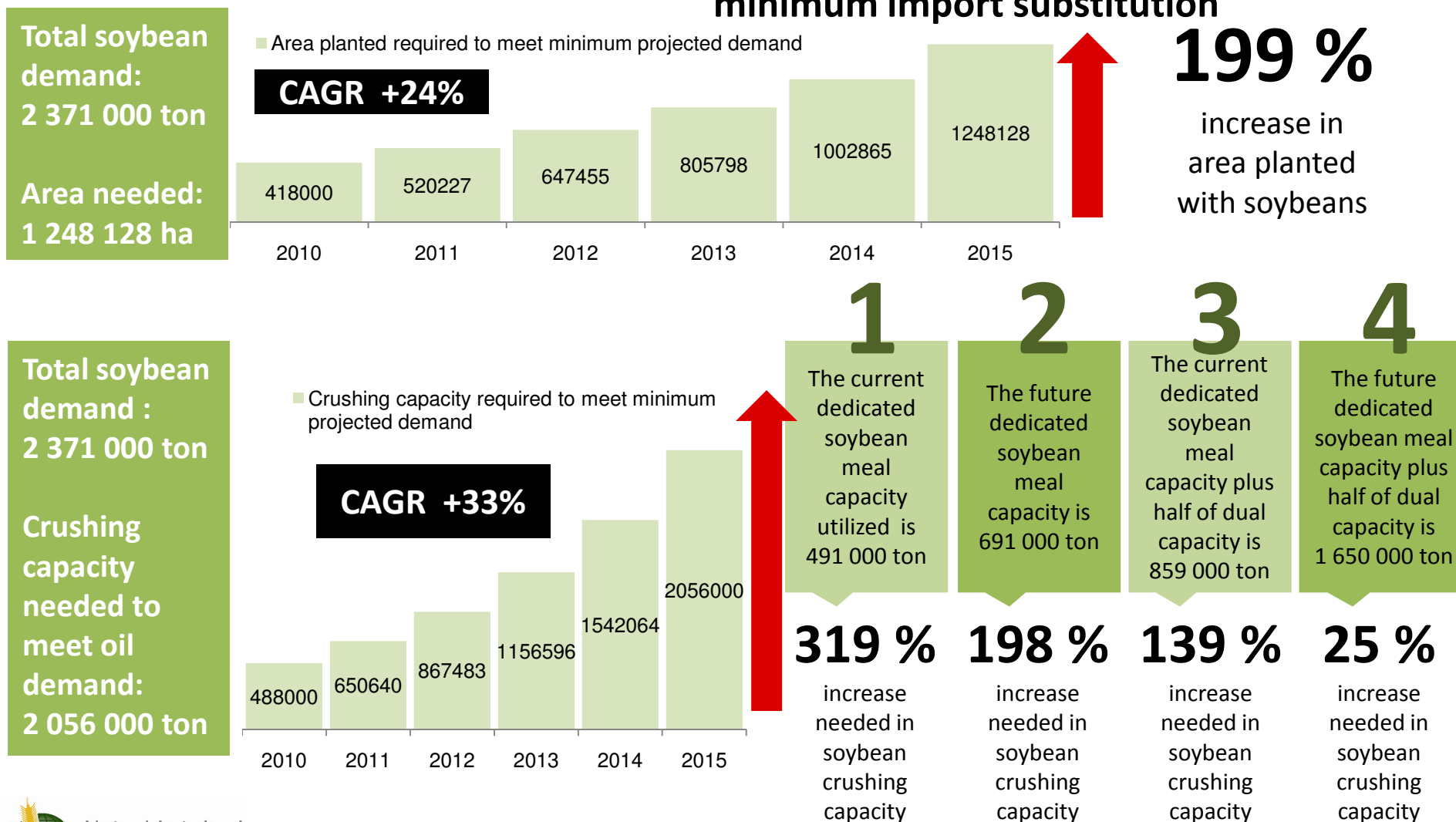


NOTE: CALCULATIONS IN SOYBEAN EQUIVALENTS

SOUTH AFRICAN SOYBEAN INDUSTRY

Look at the implications of the different scenario's
on **land availability** and **crushing capacity**

In order to meet the projected demand: BFAP projections,
minimum import substitution

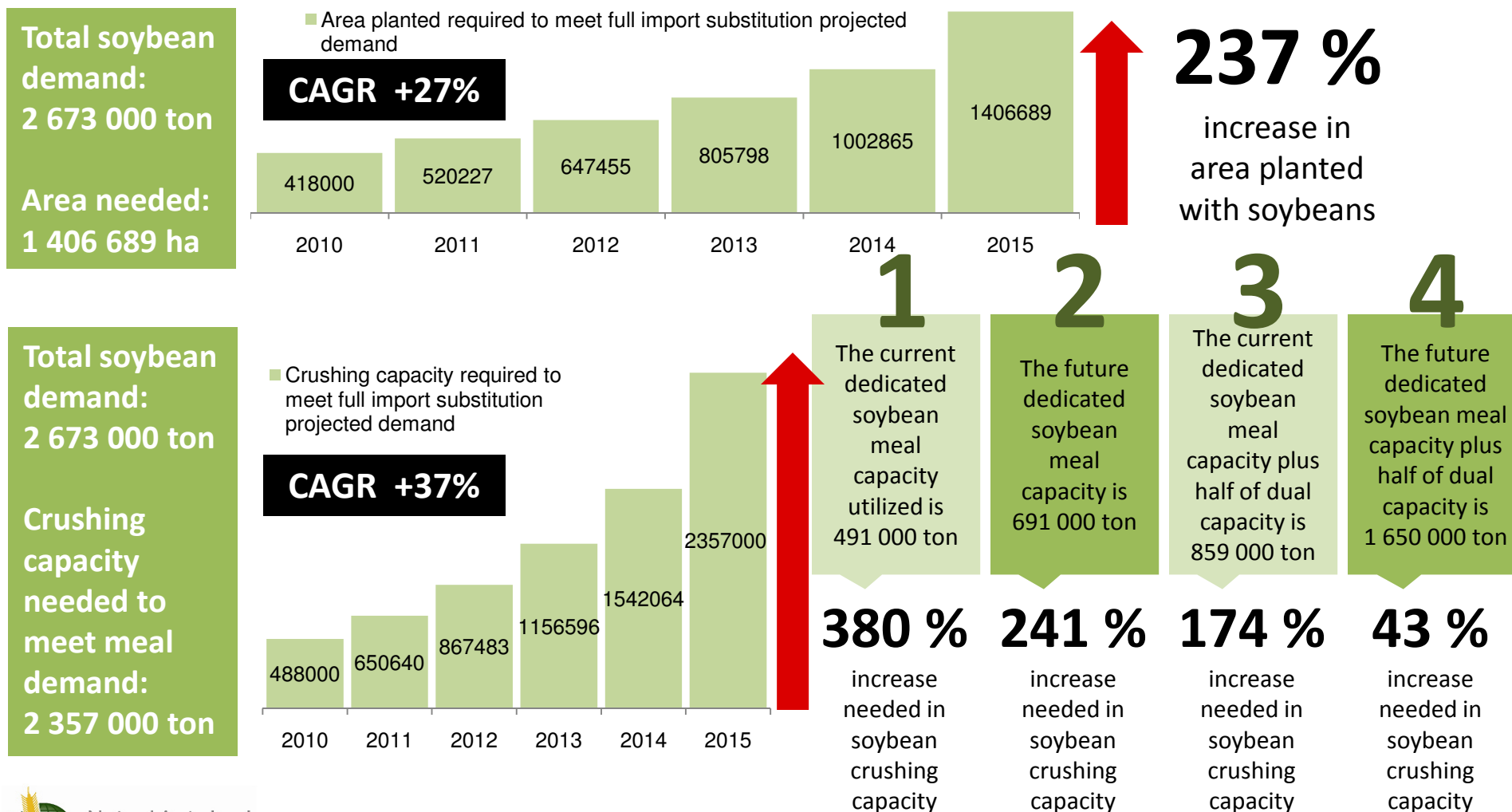


NOTE: CALCULATIONS IN SOYBEAN EQUIVALENTS

SOUTH AFRICAN SOYBEAN INDUSTRY

Look at the implications of the different scenario's
on **land availability** and **crushing capacity**

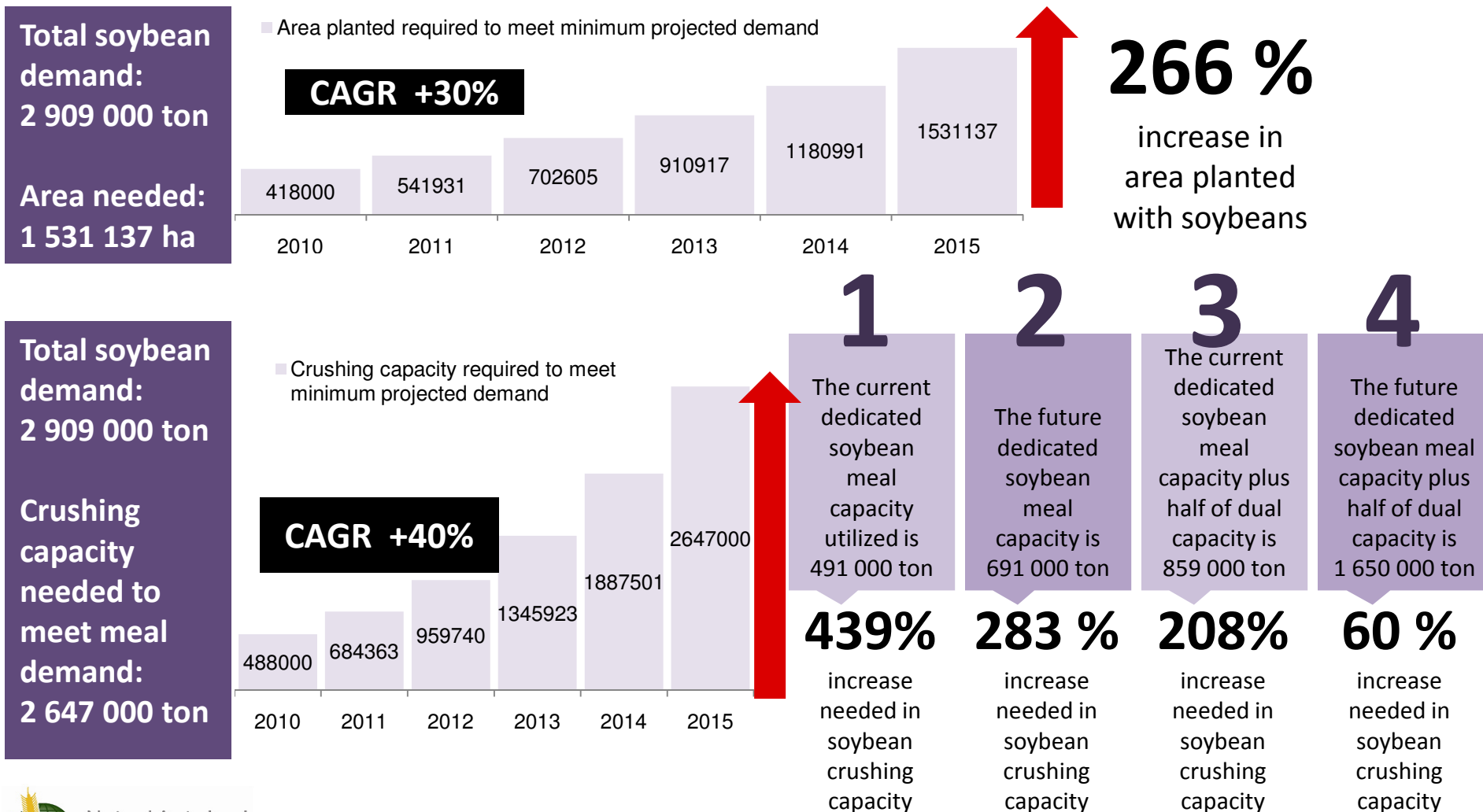
**In order to meet the projected demand: BFAP projections,
full import substitution**



SOUTH AFRICAN SOYBEAN INDUSTRY

Look at the implications of the different scenario's
on **land availability** and **crushing capacity**

**In order to meet the projected demand: TNS projections,
minimum import substitution**

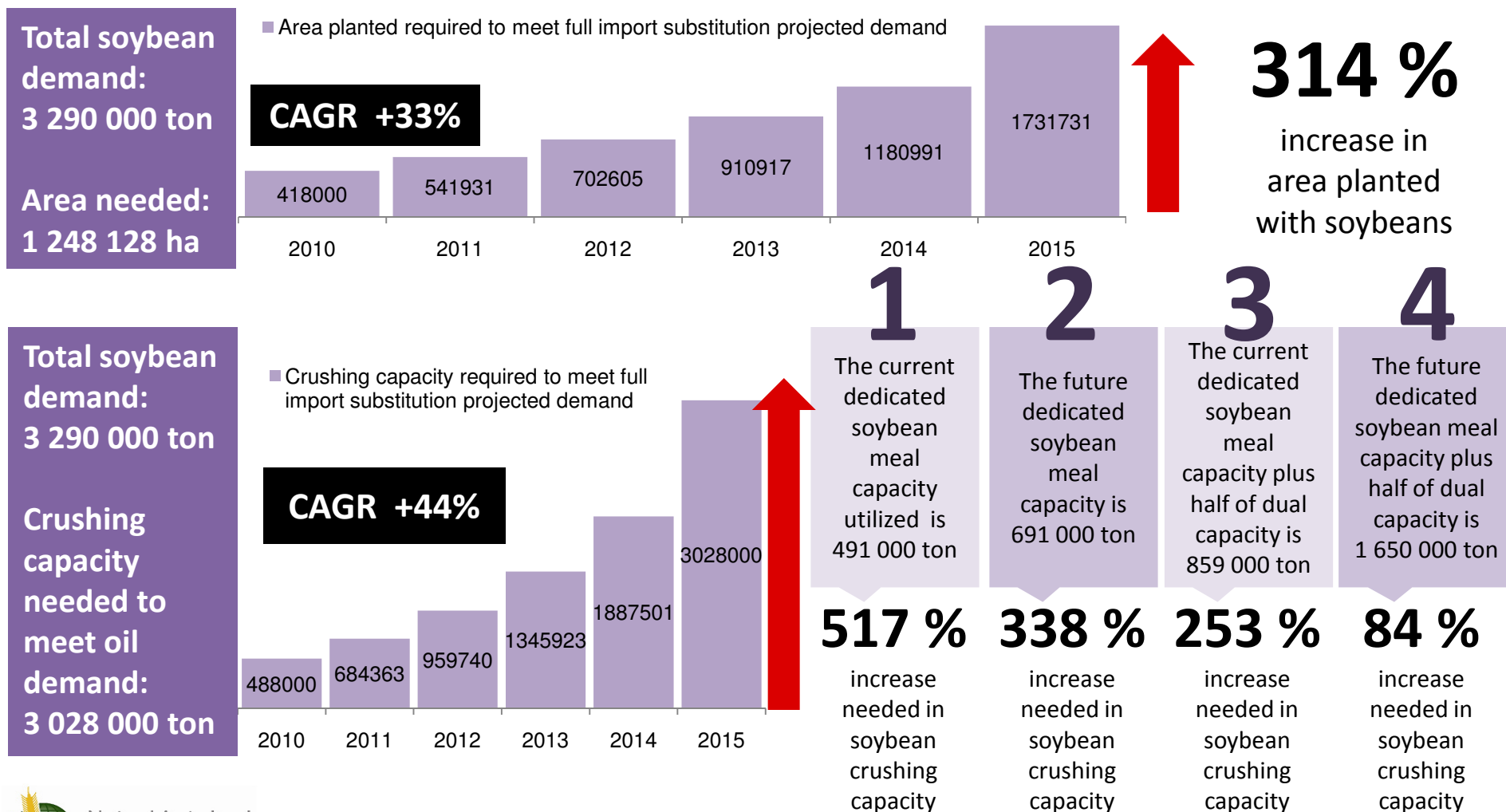


NOTE: CALCULATIONS IN SOYBEAN EQUIVALENTS

SOUTH AFRICAN SOYBEAN INDUSTRY

Look at the implications of the different scenario's
on **land availability** and **crushing capacity**

**In order to meet the projected demand: TNS projections,
full import substitution**



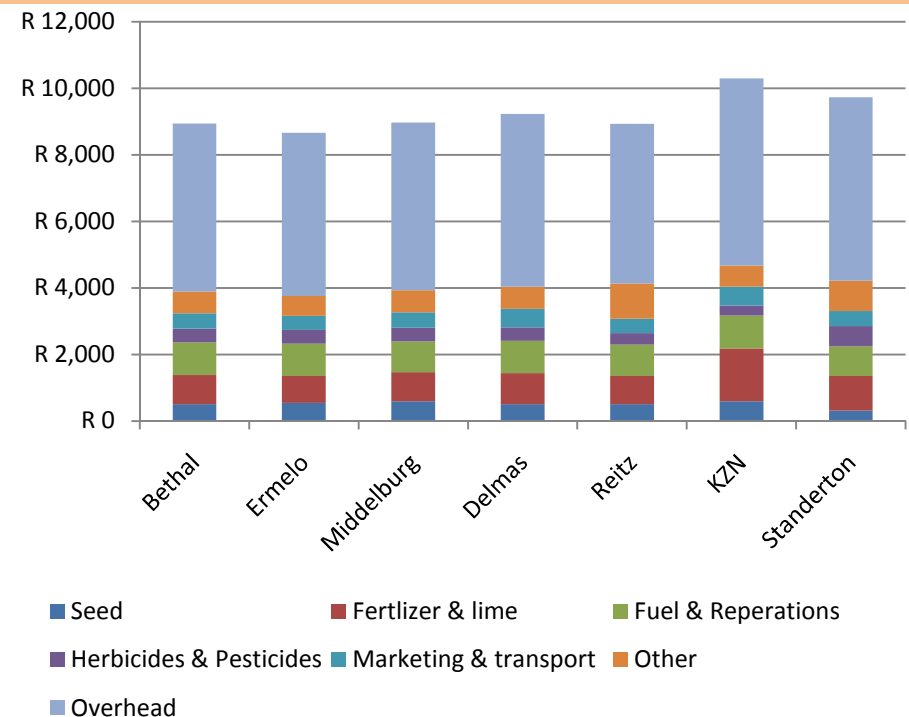
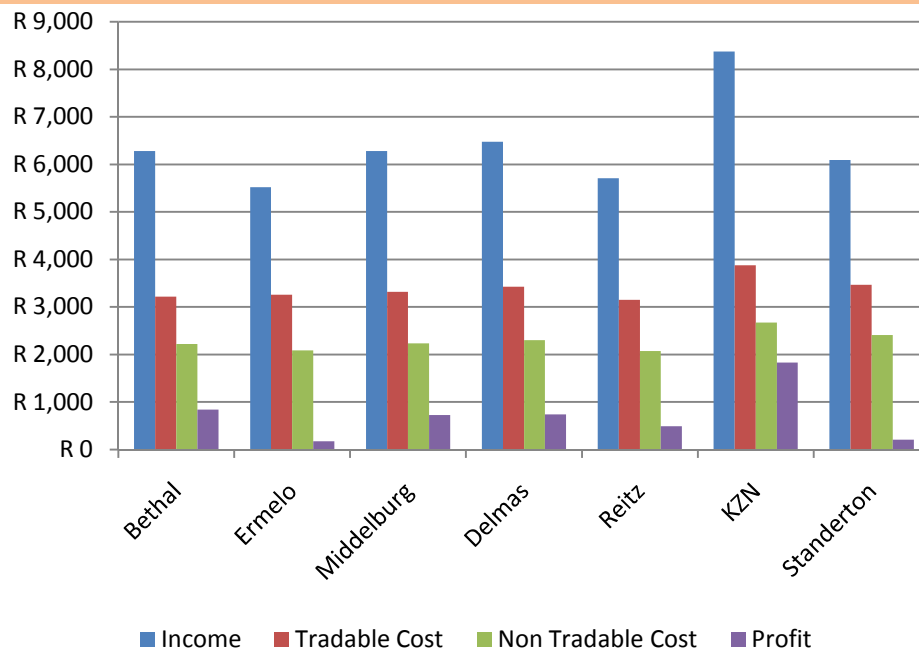
Comparative advantage of the primary soybean industry



SOUTH AFRICAN SOYBEAN INDUSTRY

Market Income, Cost & Profitability

- Market profit = Income – cost
- Market profitability shows the profitability at current market prices for outputs and inputs for the primary soybean industry per hectare.
 - Kwazulu-Natal performed relatively well compared to other regions.
 - The higher profit level in KwaZulu-Natal can be attributed to higher yields and relatively lower overhead costs than the average for the other regions.
 - The total direct costs for the KwaZulu-Natal region is the highest of all the regions. This can be attributed to higher fertilizer cost and also higher cost for fuel.



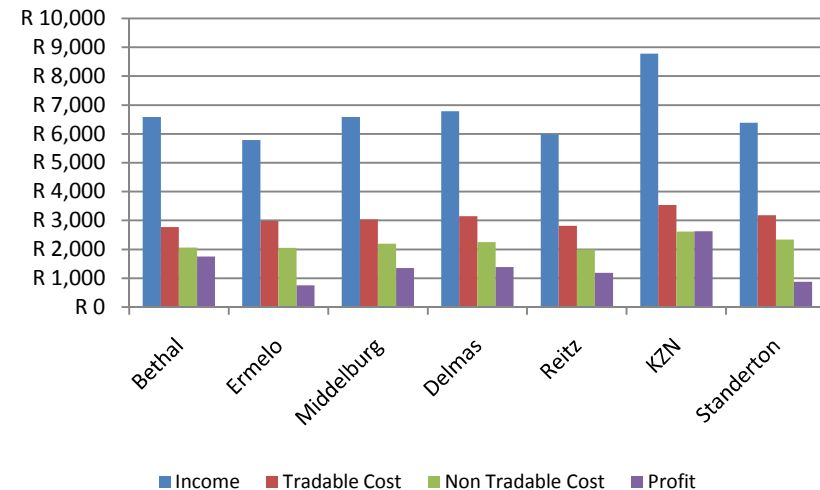
Market profitability

Source: Own calculation & GrainSA, 2010

SOUTH AFRICAN SOYBEAN INDUSTRY

Economic Income, Cost & Profitability

- Economic profit = Economic Income – Economic Cost
 - I.e. removal of policy distortions
- Market distortions, will cause economic prices and market prices to differ and therefore the profits will also differ.
- Therefore, economic profits measure efficiency or comparative advantage.
- Economic profitability in all the regions is fairly good, with Kwazulu-Natal performing the best.



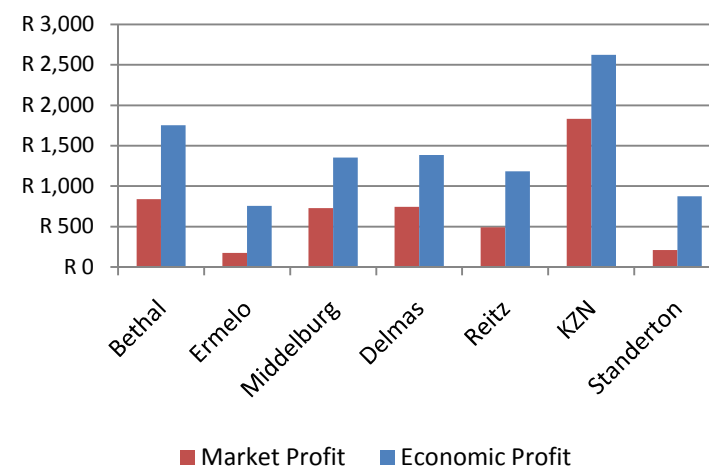
Market Income, cost & profitability

Source: Own calculation, 2010

SOUTH AFRICAN SOYBEAN INDUSTRY

Comparison between Market & Economic profitability

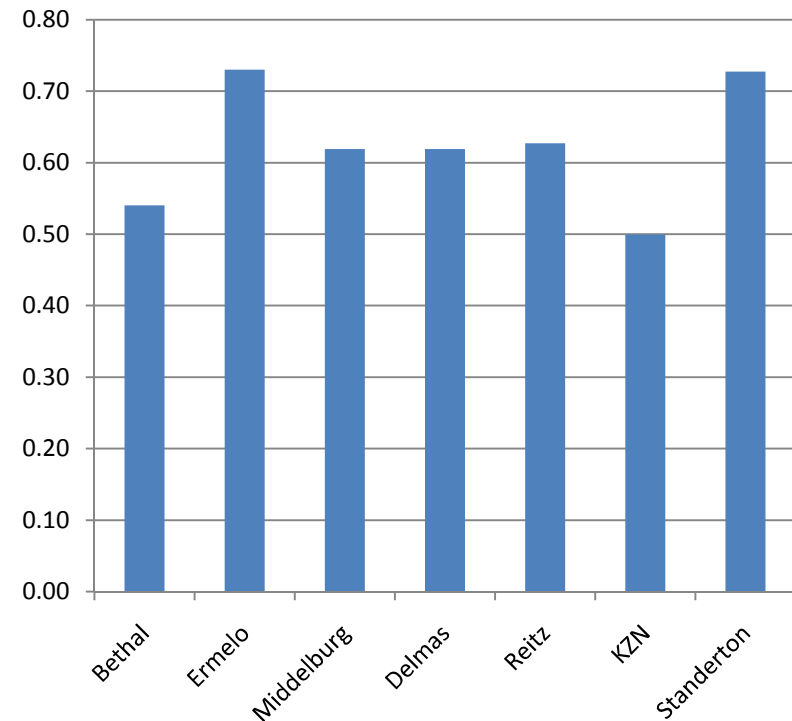
- Policy interventions causing market and economic profitability to differ significantly.
- This could constrain growth in the primary soybean industry



Market Income, cost & profitability

Source: Own calculation, 2010

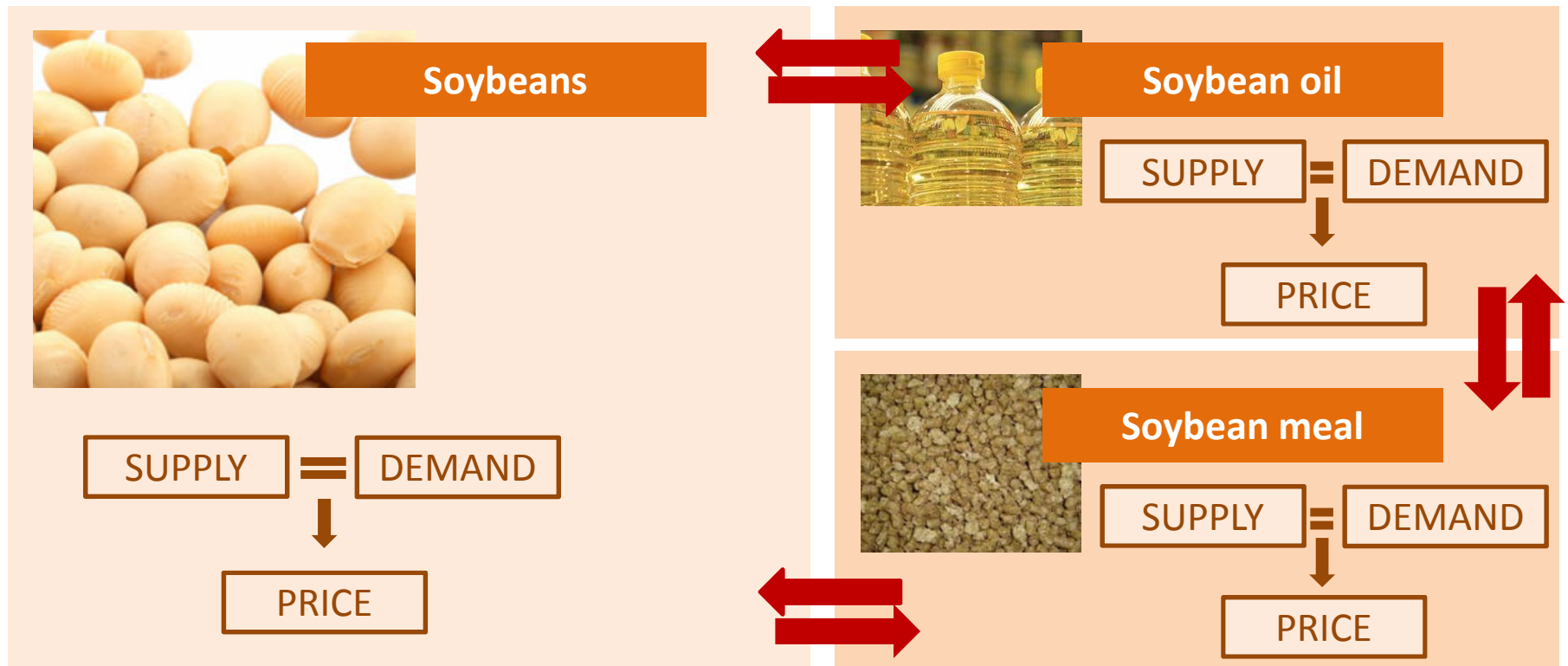
- The DRC is used to determine if a product has a comparative advantage, i.e. whether it used domestic resources efficiently.
- A DRC of smaller than 1 indicates that a product has a comparative advantage.
- The smaller the DRC the higher the comparative advantage.
- The DRC's for different soybean production regions range between 0.50 to 0.92.
- KZN have the highest comparative advantage of all production regions in South Africa.



Domestic Resource Cost ratio for South Africa

Source: Own calculation, 2010

Factors affecting competitiveness of the soybean industry



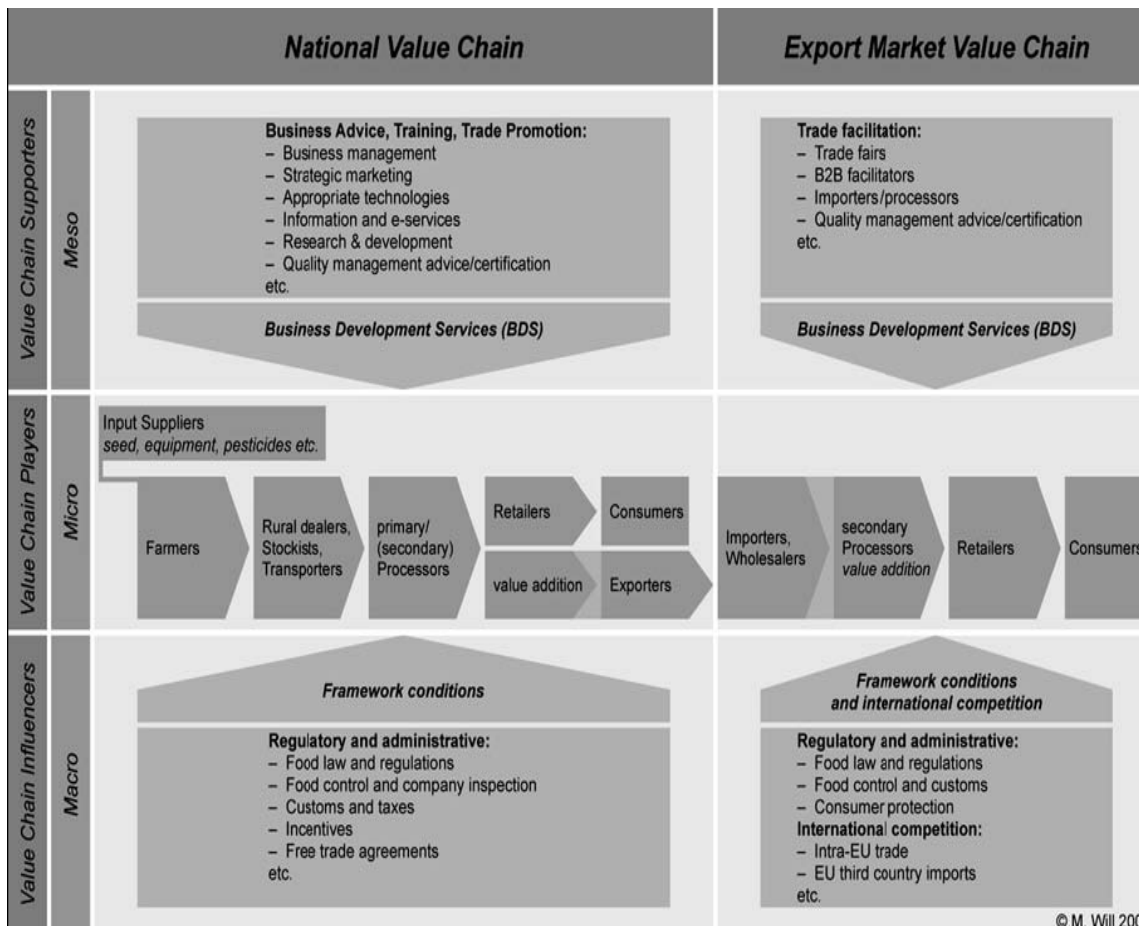
Soybean industry survey

An inclusive soybean industry executive survey was conducted to create a basis to analyse the impact of different macro-, meso- and micro-environment forces on structure, conduct, efficiency and performance of the industry. The forces with the highest probability of affecting the competitiveness, both negatively and positively, are identified.

The focus of the survey was based on soybean for animal consumption and for the production of oil. The results identify the forces and prioritise the most constraining and enhancing forces in the industry as experienced by role players in the industry.

Methodologies applied | Meso-, Micro- and Macro environments

In order to identify and measure the driving forces within the value chain, the different business environments, being the meso-, micro- and macro-environments, were analysed.



© M. Will 2004

The **meso-environment** specifically refers to the supporting institutions of the actual value chain. At national level, the supporting industries mostly include business advice & support, quality assurance programmes, training, research, technology development, skills transfer and information provision. Trade facilitation and international certification, as well as international trade information, are all supporters within the export market value chain.

The **micro-environment** relates to issues which can be managed by each role player in the industry's direct business environment. It also refers to value chain co-ordination and the level of competition between role players.

The impact of regulatory and administrative issues, global and local economic trends, together with chance factors such as the exchange rate and the political environment are measured as influences within the **macro-environment**.

Methodologies applied | Questionnaire variables included

Example Question – Part 1: Does the supply/availability of electricity:

Constrain the competitiveness of
your business

1	2	3	4	5	6	7
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Enhance the competitiveness of
your business

In each case 7 indicates an
enhancing factor and 1 indicates
a constraining factor

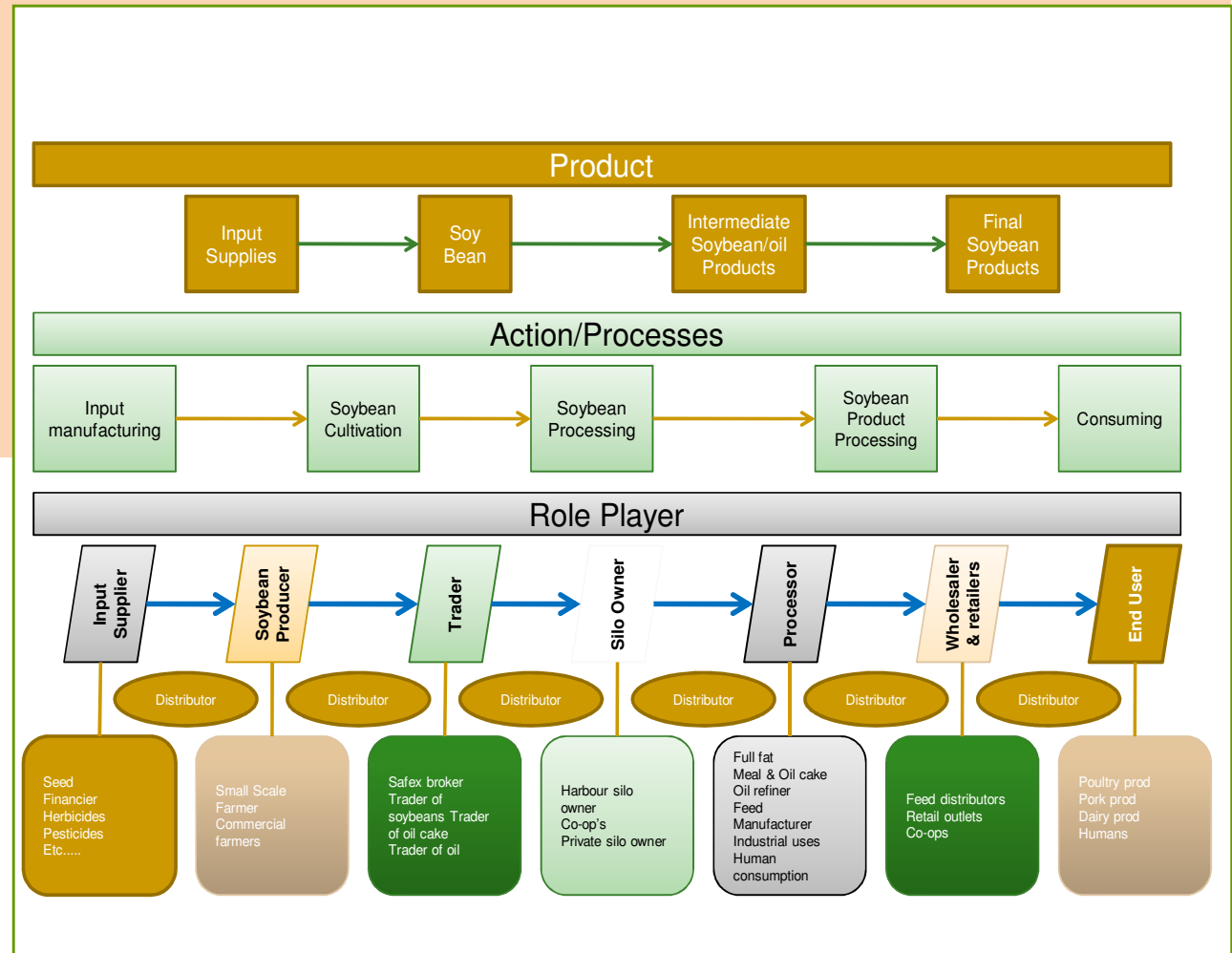
Macro factors	Meso factors	Micro factors
Exchange rate	Governmental support	Cost and supply of electricity
Cost of capital	Relationships in the chain	Cost of labour
Purchasing power	Research & development	Labour productivity
Input costs	Standard grading (Safex)	Distance from & to the markets
Administered prices	Industry information	Quality of natural resources
Political climate	Technology	Increase of SAFEX contract
Cost of crime	Industry organization	Pricing strategies
National Infrastructure	Bio-security	Level of competition
Labour laws	Training & skills development	Quality of inputs used
HIV and AIDS	Quality programs	Availability of land and water
By-laws		Barriers to enter
Competition Act		Business behaviour by role players
Land and water reform		Supply chain coordination activities
AgriBEE policy		Logistics
Trade environment		Role of SAFEX
Food safety		Labour availability
Admin procedures & regulation		Quality of inputs/raw materials
Environmental legislation		Cost of traceability
Imported inputs		Capacity and ability of input suppliers
Locally prod. Inputs		Operational infrastructure
Local market		Diversification strategies
Export market		Access to finance
Price of inputs (SA)		
Consumers tastes and preferences		

Stakeholders in the value chain

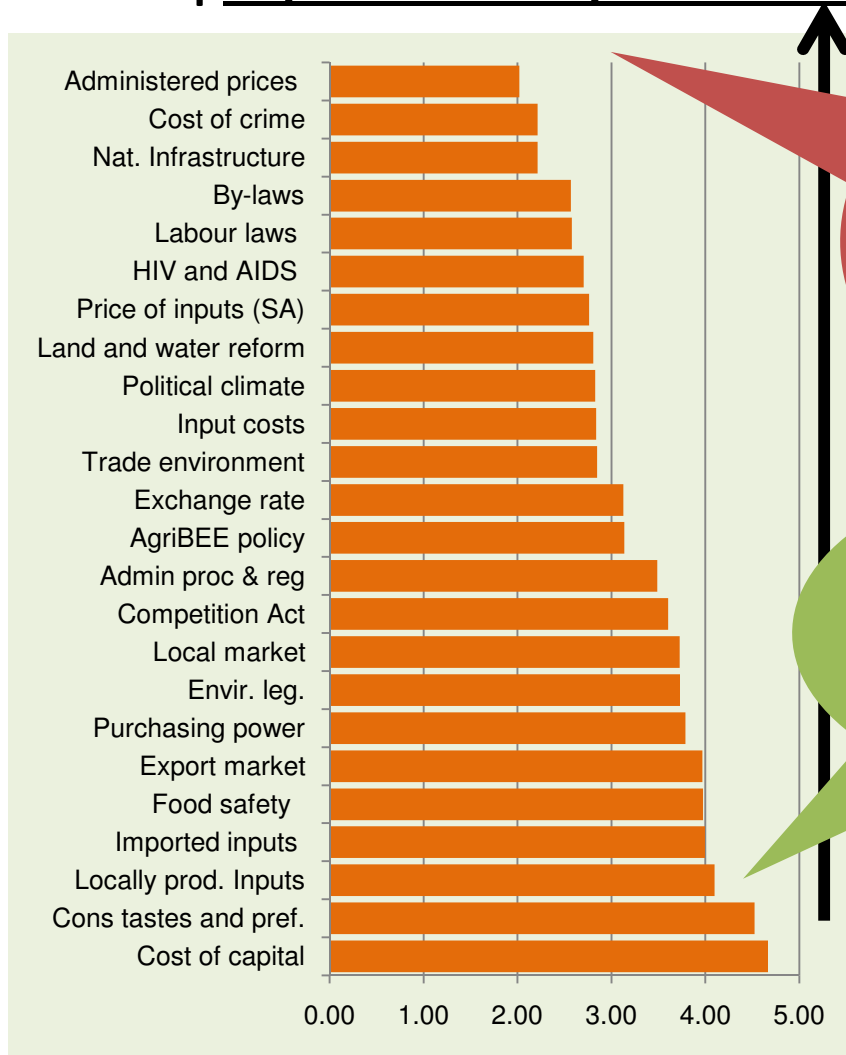
The analysis focussed on different role players namely:

- Input suppliers
- Producers
- Traders
- Silo owners
- Processors
- Wholesalers, retailers & distributors
- End users

In total 156 respondents



Results | Soybean industry as a whole (Macro environment)



Major constraining factors

1. Administered prices
2. Cost of crime
3. National Infrastructure
4. By laws
5. Labour laws

Major enhancing factors

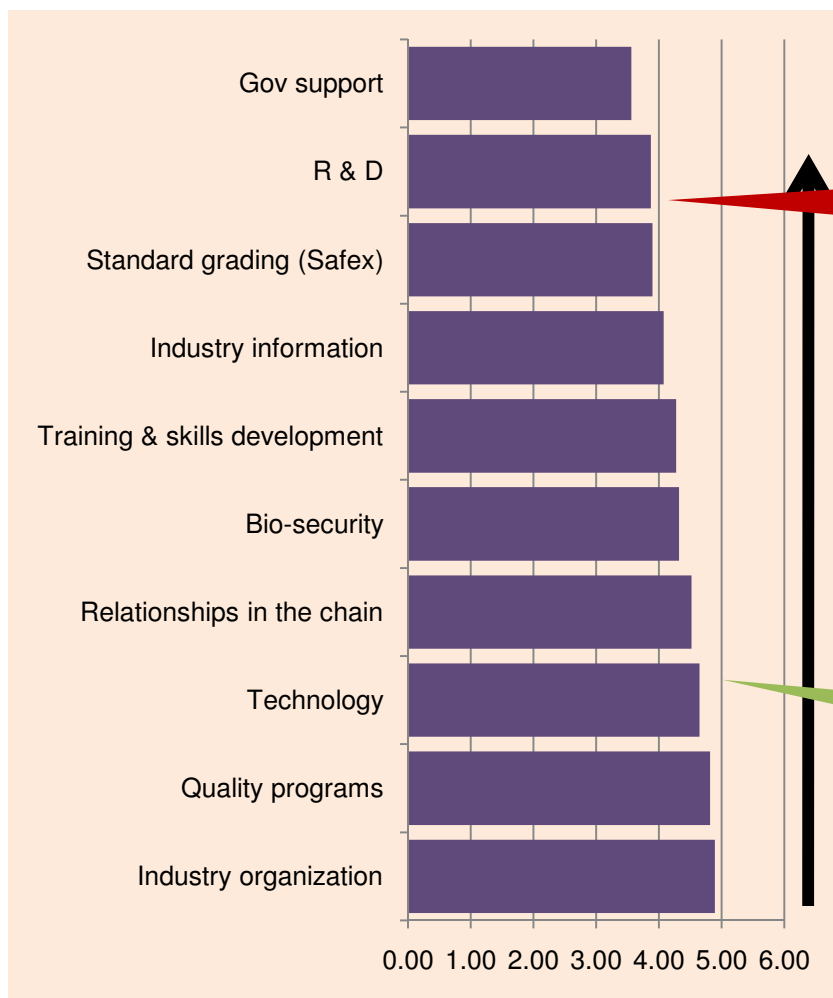
1. Cost of capital
2. Consumer tastes and pref.
3. Locally prod. Inputs
4. Imported inputs
5. Food safety

Major enhancing factors:

Even though there is a lack of convincingly enhancing factors in the soybean industry, there are, however, a few factors highlighted to enhance the industry. These factors should be improved and maintained for their impact is identified to contribute significantly.

Results of all factors measured for the soybean industry as a whole; Factors sorted according to their mean. (1 = Constraining, 7 = Enhancing)

Results | Soybean industry as a whole (Meso environment)



Major constraining factors

1. Governmental support
2. R & D
3. Standard grading (Safex)
4. Industry information

Most enhancing factors

1. Industry organization
2. Quality programs
3. Technology
4. Relationship in the chain

Results of all factors measured for the soybean industry as a whole; Factors sorted according to their mean. (1 = Constraining, 7 = Enhancing)

Results | Soybean industry as a whole (Micro environment)

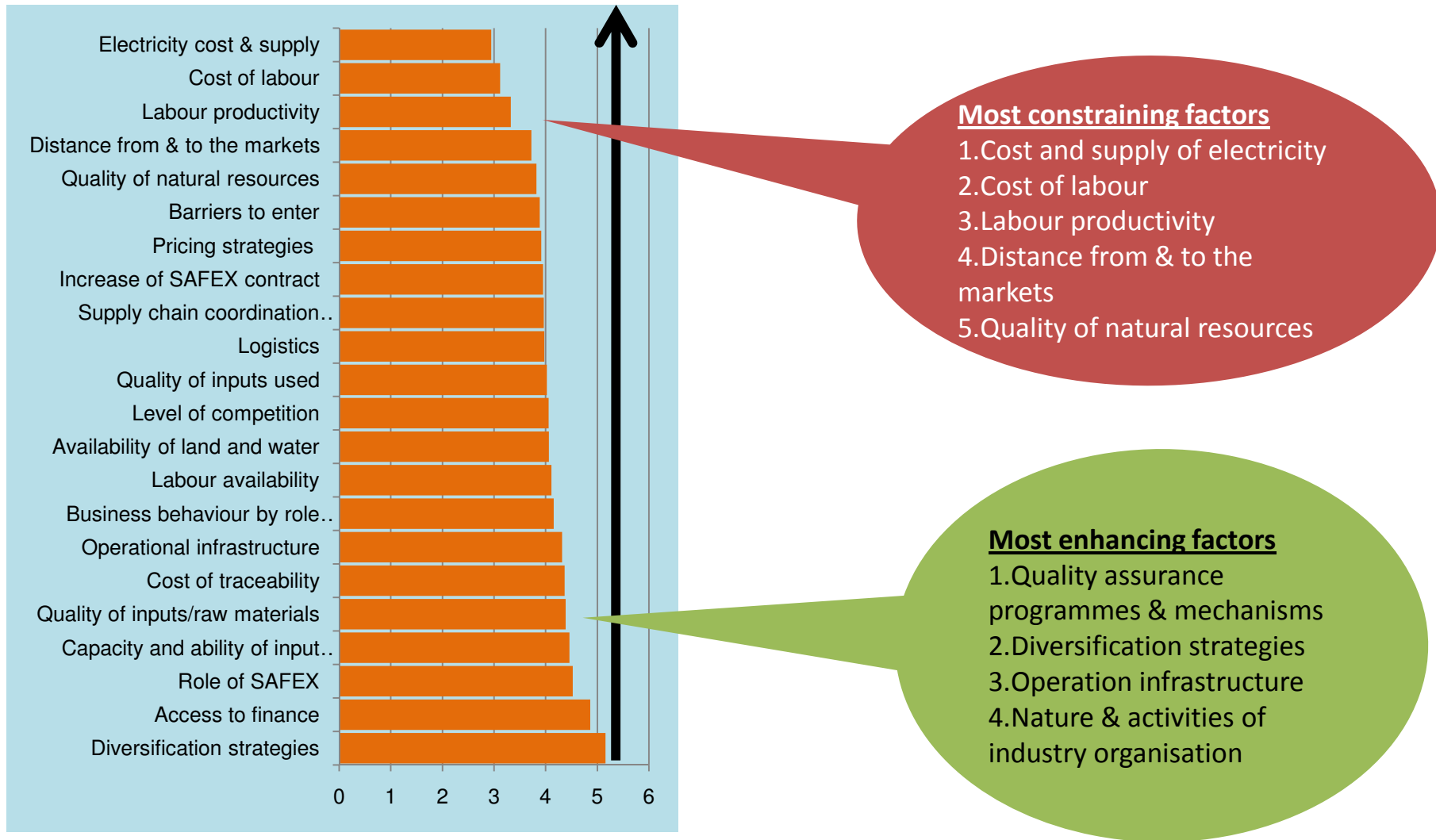


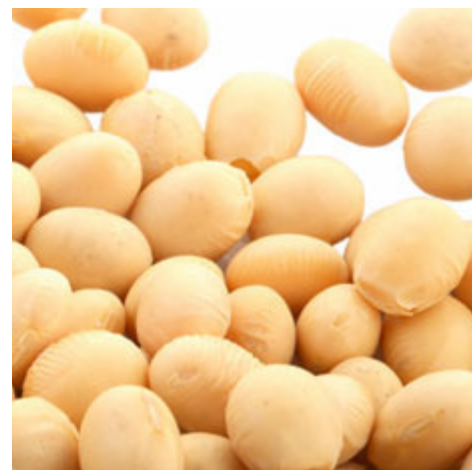
Figure 7: Results of all factors measured for the soybean industry as a whole; Factors sorted according to their mean. (1 = Constraining, 7 = Enhancing)

Recommendations

This document only provides broad recommendations.

These recommendations have to be explored in more detail within the ambit of this document, i.e. the potential of the soybean industry to grow in a financially feasible and sustainable manner provided a conducive environment exists.

The aforementioned can be achieved in a timely manner by leveraging the tacit knowledge and capacity that exist in both the public and private sector.



SOUTH AFRICAN SOYBEAN INDUSTRY

Recommendations

Item	Constraint	Recommended Action(s)
A	<p>Lack of land allocated to soybeans</p> <ul style="list-style-type: none"> <i>Adoption of soybeans is still sub-optimal, possibly due to investments required to make long term soybean production a permanent production strategy at the farm level, because farmers are not yet aware of the potential advantages of soybeans as a crop rotation strategy and a low level of tacit knowledge about farming with soybeans.</i> 	<ul style="list-style-type: none"> • Encourage use of crop rotation (maize/soybeans) by commercial farmers to stimulate increased planting of soybeans – the potential is there! • Aggressively encourage the planting of soybeans by new farmers, who acquired new land as a result of Land Reform <ul style="list-style-type: none"> • Unlock supply side constraints (extension services, access to inputs, infrastructure, etc.) for new farmers, who have additional hectares of land that could be used for soybeans and other crops. This should be done through partnerships between public and private sector stakeholders, and NGO's. • Educate new farmers on the benefits of crop rotation • Encourage the planting of soybeans by current smallholders <ul style="list-style-type: none"> • Unlock supply side constraints (extension services, access to inputs, etc.) for smallholder farmers that include agronomic best practices • Encourage partnerships between commercial and smallholder farmers <ul style="list-style-type: none"> • Government encourages agri-business models (ABPs) to successfully execute land reforms, while also benefiting both sets of farmers • Develop contract/bartering system between new farmers and commercial farmers to encourage development of land in exchange for inputs and extension services. • Research and Development and partnerships <ul style="list-style-type: none"> • Significant investment required in R&D into cultivars with higher yields and/or facilitation of partnerships with international seed companies that have already made significant progress. Introduction into South Africa will require shift action by the public sector. • Supply push vs demand pull <ul style="list-style-type: none"> • The aforementioned will largely create a push effect, and hence it is critically important that the demand pull effect should be addressed. This issue is addressed in subsequent recommendations.

SOUTH AFRICAN SOYBEAN INDUSTRY

Recommendations

Item	Constraint	Recommended Action(s)
B	<p>Lack of utilization of processing capacity and inconsistent protein content of processed soybean meal/cake encourages imports of the required quality soybean cake/meal</p> <ul style="list-style-type: none"> • <i>While processing capacity exists to meet current soybean meal/cake demand, much of this capacity is not being utilized for soybean processing.</i> • <i>Processing plants (in particular dual capacity plants) are being utilized for sunflower seed processing, mainly for its oil, which is then refined for sale. Integration between refineries and crushing facilities plays a dominant role. Other factors include cost of switching, value chain integrity and generation of own facility energy.</i> • <i>Locally processed soybean meal/cake can range in protein consistency, which makes it hard for feed manufacturers to rely on since variations in protein content constitute additional costs to users.</i> 	<ul style="list-style-type: none"> • Upgrading necessary <ul style="list-style-type: none"> • Current processing capacity should be upgraded to produce the required protein content soybean meal, and the necessary funding leveraged to achieve this (not addressing this will cause the status quo to be maintained). • Feed manufacturer and soybean oil processors should upgrade to standard quality processes (husk removal, denaturing process, etc.). • Set-up grading standards with feed manufacturing stakeholders. • After addressing the aforementioned forge value chain linkages and promote the “up to required standard product” to local users. This will require that quality can be verified by reputable institutions/organisations. • Investment in new processing facilities <ul style="list-style-type: none"> • Ensure appropriate processes to produce the needed quality soybean meal/cake on a consistent basis. This will require partnerships taking different configurations where the public sector can play a pro-active role. <p>Comment: Upgrading and new facilities can create the necessary demand pull effects. This, together with the expansion in production, can contribute significantly towards job creation at the primary and secondary level relative to the status quo. In other words, reverse (partially or completely) the exportation of jobs by exporting the raw product. It is however critically important that the necessary infrastructure is available, such as electricity to support further investment in processing facilities.</p>

Item	Constraint	Recommended Action(s)
C	<p>Low acceptance of soybeans for human consumption</p> <ul style="list-style-type: none"> • <i>Historically, soybeans in South Africa have not been fully accepted within diets due to its taste and habitual consumption patterns .</i> 	<p>Soybean nutrition campaign</p> <ul style="list-style-type: none"> • Encourage the acceptance of soybeans within diets <ul style="list-style-type: none"> • Link with health and nutrition practitioners to promote soybeans health benefits and its use as an alternative source of protein. • Investment in/promote the use of affordable “small scale” technology in poor communities linked to local production of soybeans to produce soybean derived products. • Link government and research universities (private/public partnership) to provide more research for new cultivars that can improve taste.
D	<p>Micro, Meso and Macro environment limitations to leverage the potential of the soybean industry to engage in the production of biofuels.</p> <ul style="list-style-type: none"> • <i>Although government has issued the Biofuel Industrial Strategy to encourage biofuel growth and use of oilseeds such as soybeans for biodiesel, there has been very little investment in soybeans for biodiesel.</i> 	<p>Explore the potential of soybeans as feedstock for biofuel production</p> <ul style="list-style-type: none"> • Creation of alternative markets for soybean derived products <ul style="list-style-type: none"> • Initiate pilot programmes to explore the potential of soybeans as feedstock for the production of biofuels. • Explore potential incentives to leverage the potential of the soybean industry to assist in establishing a viable biofuel industry in South Africa.