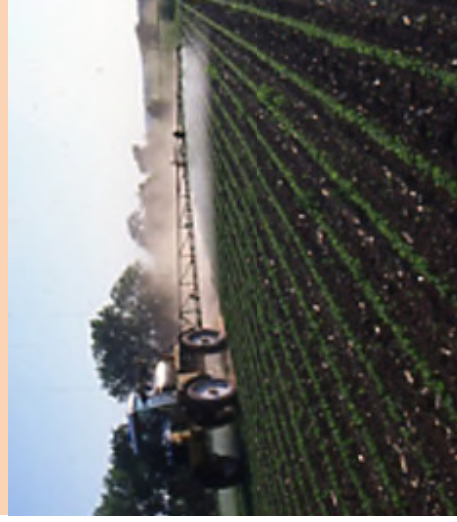


The South African Soybean Value Chain

by the
Markets and Economic Research Centre of the NAMC

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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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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 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