

The potential impact of a breeding and technology levy collection system in South Africa

By the Bureau for Food and Agricultural Policy (BFAP)

Plant variety protection legislation in South Africa and many other countries allow for 'farmer privilege', i.e. a farmer's right to save and replant the grain he produced as seed. For self-pollinated crops (such as soya beans, wheat and barley) where the offspring (seed) is genetically identical to the parent, this means that farmers only have to buy seed once and can continue planting the same variety in subsequent seasons.

The South African National Seed Organization (Sansor) estimates farm-saved seed for soya beans as high as 80% and wheat 70%. Because of the low seed sales volumes and an effective seed price ceiling, the return on self-pollinated crop seed research and development is limited. The financial motivation for seed companies to invest in local long-term, expensive breeding programmes or to import new germplasm or traits is thus limited.

Continued investment in seed research, breeding and technology transfer is vital for a competitive and sustainable agricultural sector. Without a competitive and thriving agricultural industry, the targets for inclusive growth and job creation as determined by the National Development Plan 2030 will not be achieved.

In line with a number of leading agricultural countries that have implemented End-Point Royalty (EPR) collection systems, South Africa has recently introduced a Breeding and Technology Levy (BTL) whereby an agreed fee is (will be) paid on every ton of soya beans, wheat and barley that is delivered. The levies are then transferred to the seed breeding companies and research institutions, according to each company or

institution's seed sales market share. The focus of this article is on soya beans.

Increased soya bean plantings

The South African soya bean area has increased considerably over the last 50 years, from less than 10 000ha to 787 000ha in 2017/18. In 1996, the area planted by South African farmers was still less than 100 000ha.

With increased crushing capacity ensuring local demand for soya beans, the active promotion of the benefits of including soya beans into a rotational cropping system, and management ease brought by genetically modified herbicide-tolerant soya bean varieties (released in 2001), more and more farmers choose to plant soya beans in rotation with maize. In 2017, soya beans surpassed sunflower seed as South Africa's second biggest summer crop.

Yield potential

Compared to maize, the yield increase for soya beans has been significantly slower – 1,91% for 1970–2017. One important fact to consider when interpreting the lower yield for soya beans is that the area under soya bean production has increased rapidly.

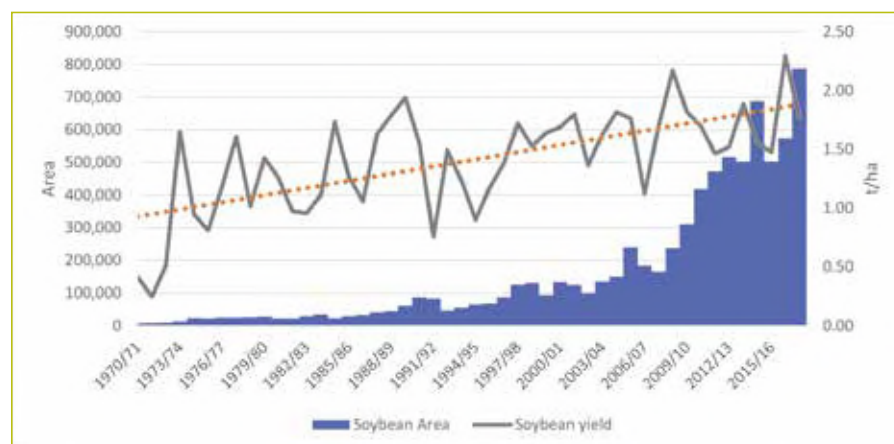
Western production regions that have traditionally been regarded as climatically more marginal for soya bean production are gradually coming into production.

Despite the significant variation in yields in recent years, South Africa has managed to produce a soya bean crop with an average yield of 2,29t/ha on 574 000ha in 2017. In the current season, average yields have fallen back again to an estimated 1,77t/ha due to more adverse climatic conditions (Figure 1).

Although average yields do not reflect the full potential of this expansion in the availability of seeds in combination with improved farming practices and investment in suitable mechanisation (planters and combines), it is expected that these investments will start to pay off in the next few years, if it can be maintained.

Although seed companies have taken the opportunity of expanding sales and market share on the back of the rapid growth of the industry, current market information indicates that companies are not willing to introduce the latest seed technology in South Africa without a guarantee that they will be able to earn a return on their investments.

Figure 1: South Africa soya bean area and average yield. (Source: Sagis)



This could have a significant impact on the competitiveness of soya bean farmers, who are facing very stiff competition from the major international soya bean producers not only from a yield perspective, but also from the ability to produce a consistent quality of bean. Considering the same 20-year period as for maize (1998-2017), the average annual yield increase for soya beans in the US was 1,46%, while yields increased by 1,33% in Brazil and 0,64% in Argentina.

Over this same period, soya bean yields increased marginally in South Africa, at 0,43%. Over the 20-year period, South Africa's average soya bean yield was 40% lower than the average obtained in the three leading soya bean countries. Although the recent droughts have played a role in South Africa's average yield trends, it is clear from *Figure 2* that yields over the long term have increased at a higher pace in major soya bean exporting countries, such as the US and Brazil, than in South Africa (*Table 1*).

Table 1: Annual average soya bean yield increase between 1998 and 2017.

Country	Percentage
US	1,46%
Brazil	1,33%
Argentina	0,64%
South Africa	0,43%

The potential economic value of yield improvements is based on alternative assumptions regarding the

outlook of yields, which are introduced in BFAP's sector level model. BFAP publishes a baseline each year where a 10-year outlook is presented for 44 agricultural commodities.

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The most important assumption for this exercise is that 'normal' weather is used for the outlook, which obviously makes the outlook on yields far more stable than what the reality would be. However, it also provides the opportunity to measure the impact of various growth paths over time.

In the case of soya beans, the BFAP baseline – presenting the yields of the past decade as well as the projected yields for the next ten years – projects an average annual growth rate of 2% over the next decade compared to the growth rate of 0,33% over the past decade.

In other words, the baseline already presents a positive outlook on yield increases due to the significant investment that has taken place in

recent years. Based on this growth rate, an average yield of 2,1t/ha is projected by 2027 on approximately one million hectares under production.

If it is assumed that a step change occurs in the annual average growth rate, due to increased investment in seed technology, and it increases by 1% above baseline projections to reach 3,5% over the outlook period, it implies that the average yield will be 2,5t/ha in 2027. At the projected equilibrium price, this alternative growth path in yields would represent an increase in industry revenue of just over R1 billion per annum by 2027.

Integrated value chains

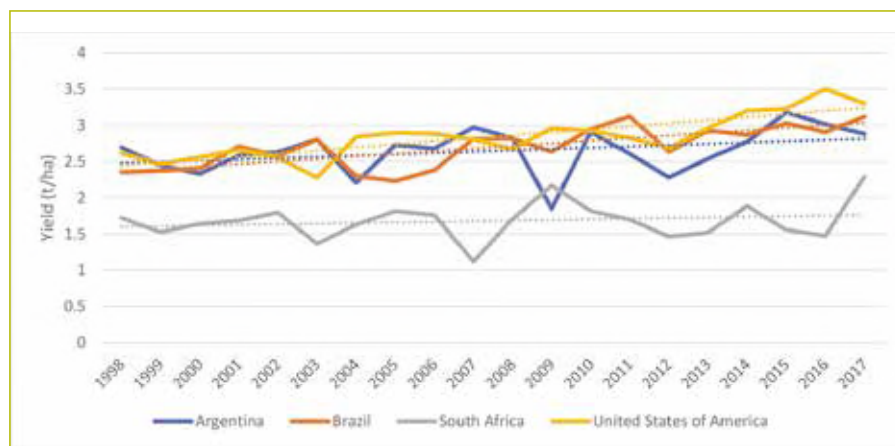
The integration of the primary soya bean industry into the feed industry, and consequently the production of broilers and chicken meat, serves as a useful illustration of the importance of the competitiveness of a primary industry for the economic sustainability of downstream industries.

Since 2012, 1,75 million tons of dedicated soya bean crushing capacity was developed in South Africa, which represents a total capital investment of approximately R2 billion. Currently, the local demand for soya bean cake exceeds local levels of production. Even though the development of these new plants has resulted in an increasing replacement of imports by local production, there is still a significant amount of soya bean cake that is being imported.

Under these market conditions, the local soya bean prices are expected to trade between import parity and the derived price from cake and oil. Consequently, these newly developed crushing plants are competing directly with imported soya bean cake from major surplus producers of soya beans, such as Argentina, where soya bean prices are trading at export parity. This implies that the crushing plants in these countries are sourcing soya beans from a relatively lower cost base compared to their South African counterparts, which makes them highly competitive.

However, price is not the only driver in the evolution of the South African soya bean cake market. The current (2017/18) marketing year is a case in point – soya bean prices are trading closer to export

Figure 2: International soya bean average yield trend comparison. (Source: Sagis and FAO STAT)



parity levels, with a crop estimated close to 1,4 million tons and positive crushing margins that should boost the uptake of soya beans in the crushing market.

However, the demand for locally produced soya beans remains subdued, mainly due to one of the major chicken producers in South Africa that still prefers the imported soya bean cake above the locally produced cake. According to reports, the preference is based on the consistent quality of the imported cake. The result is that around 500 000 tons of soya bean cake

will be imported in the current season, despite the fact that South Africa can supply a significant share of this volume.

Quality and consistency

There are many arguments in the market around the local quality of soya bean cake versus the imported quality, which underlines the fact that the quality and consistency of seed delivered to the crushing plant also play a significant role in the economics of the integrated value chains.

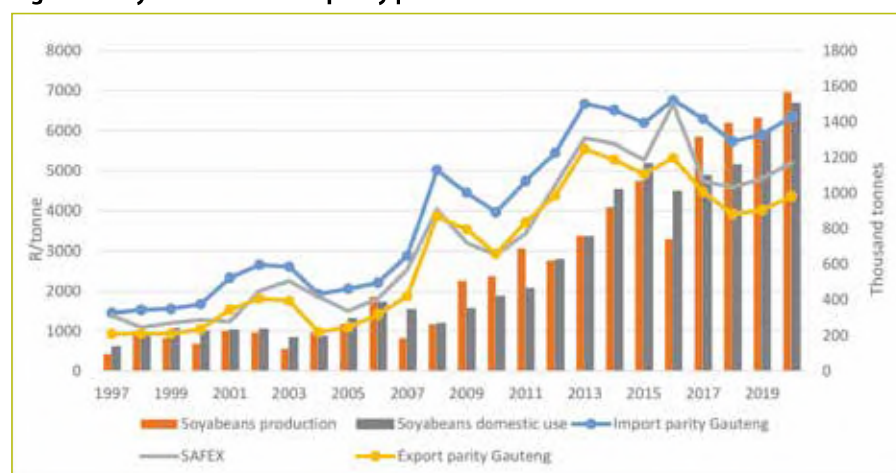
It is anticipated that the current

question around quality will be resolved, and it is only a matter of time until the major producer of chicken meat will also start consuming locally produced cake in greater quantities. *Figure 3* illustrates this scenario and presents an outlook over the next few years where soya bean prices in South Africa will again be trading between the import parity and derived price for meal and oil – this is where the pricing scenarios start playing a role.

In the alternative scenario for soya bean trend yields, the projected increase in production is large enough to result in soya bean prices trading significantly lower, in other words between the export parity and derived price for oil and cake. This will have a positive impact on the relative competitiveness of the crushing plants and will drive the demand for locally produced soya beans, and consequently soya bean cake, to a significantly higher level.

In other words, the investment in the primary seed market is also a key driver for a thriving agro-processing industry. Based on the targets set by the NDP, the agro-processing industry is responsible for one-third of all the additional jobs that must be created by the agricultural sector. 🌱

Figure 3: Soya bean local and parity price band.



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