Projected protein requirements for animal consumption in South Africa

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The Protein Research Foundation (PRF) has as its main objective the replacement of imported protein with domestically produced protein. After many years of investigating numerous alternatives, the focus has changed primarily to where the largest impact could be made, namely soya beans and canola.

Growth in the domestic availability of oilcake is a good measure the PRF uses to ascertain whether or not it is achieving its objectives by way of supporting the industry through research, new technology and technology transfer. The targets that will need to be met in the future for the PRF to continue with the progress that has been made thus far, require projections of future oilcake demands and requirements that should be met to attain self-sufficiency, as well as when this goal is likely to be met.

Various models have been developed and used during past few years to accurately measure this progress. A new model has been developed.

New model methodology

Collaboration between the University of the Free State's agricultural economics department, the PRF and its existing APR model and BFAP, led to the creation of a successful new model that can accurately calculate current protein requirements, and project future protein requirements, in various scenarios.

The model considers changes in per capita consumption of meat, milk and eggs as projected by BFAP as well as population growth. The quantity of meat, milk and eggs predicted for import and export is also considered. Projected future prices of major raw materials are incorporated, as well as the availability of raw materials, mainly those that are derived as by-products from various agricultural processing industries.

The genetic improvement of animals has a substantial impact on productivity, therefore performance change in animals is an important factor that the model incorporates. The model calculates the quantity of feed required as well as the raw material breakdown for these feeds.

There are several animals that are not producers of meat, milk or eggs, that nevertheless consume a substantial amount of animal feed, including protein. The feed consumption of these animals, including the protein materials, also needs to be considered.

The new model has the ability to formulate the actual feed required by all animals in South Africa, given the quantity constraints of the raw materials that will be domestically available. It does this by making use of least cost linear programming while considering the transport costs of raw materials across various regions of the country. The result is an accurate prediction and projection of protein requirements, domestic and imported.

The APR model in collaboration with BFAP data is used to calculate the projections of future oilcake demands and future requirements for self-sufficiency. This will enable the PRF to stay on track with the progressive path it has laid down.

Current scenario

Based on the current per capita consumption of animal products, the estimated (using the APR Model) requirement for animal feed in South Africa is set out in *Table 1*.

In terms of oilcake consumption, soya oilcake remains the most

Table 1: National animal feed production 2018.

Feed type	National feed consumption (tons)
Dairy	2 421 756
Beef and sheep	3 433 951
Pigs	880 623
Layers	1 053 808
Broilers	3 258 449
Pets	343 952
Horses	138 303
Ostriches	112 117
Aquaculture	5 314
Total	11 648 273

consumed oilcake in the market, followed by sunflower oilcake.

On the local market, South Africa has progressed in terms of substituting imported soya oilcake with locally produced oilcake. In 2018, South Africa produced 69% of the country's total requirement; in 2008 only 20% of oilcake demands were met by local production. The projection for 2021 is that 89% of oilcake needs will be met by domestic production, rising to 95% in 2027.

In terms of total oilcake consumption, the local share has increased from 37% in 2007 to 82% in 2018. It is projected that the local share will increase to 82% in 2021, and 94% in 2027.

Growth in requirements

It is critical to determine demand to calculate the consumption figures of various livestock species. The demand was calculated in combination with the growth figures of animal feed conversion ratios using the following macro variables: Population growth, per capita consumption growth, imported animal products and exported animal products.

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As already explained, soya oilcake remains the dominant protein source in South Africa; a dominance that has increased over time and will continue to do so. In 2010, soya oilcake made up 40% of oilcake requirements; this increased to 70% in 2018 and is predicted to stabilise at 71% in 2021. Soya oilcake consumption in *Table 2* shows a decrease between 2021 and 2027, mainly due to BFAP's projection that poultry imports will increase by 63% during that time.

Poultry feeds make up 39% of total feed consumed in South Africa, a market share of total feed which is predicated to remain constant until 2020. Most oilcake is used in the poultry sector,

Table 2: Projections of feed and oilcake requirements in 2021 and 2027.

	Feed (ton)	Oilcake (ton)	Soya oilcake (ton)
2018	11 628 789	1 649 498	1 150 521
2021	12 561 132	1 764 946	1 307 338
2027	13 372 018	1 826 894	1 287 638

Table 3: Local vs imported soya oilcake.

	Local soya oilcake (From local soya beans) ton	Local soya beans Production (required) ton	Total soya oilcake Requirements ton	Local soya Production (required) ton self-sufficiency	% local
2018	980 860	1 226 075	1 150 521	1 438 151	85
2021	1 172 228	1 465 285	1 307 338	1 634 173	89
2027	1 228 798	1 535 998	1 243 233	1 554 041	98

Figure 1: Growth in self-sufficiency in terms of soya oilcake.

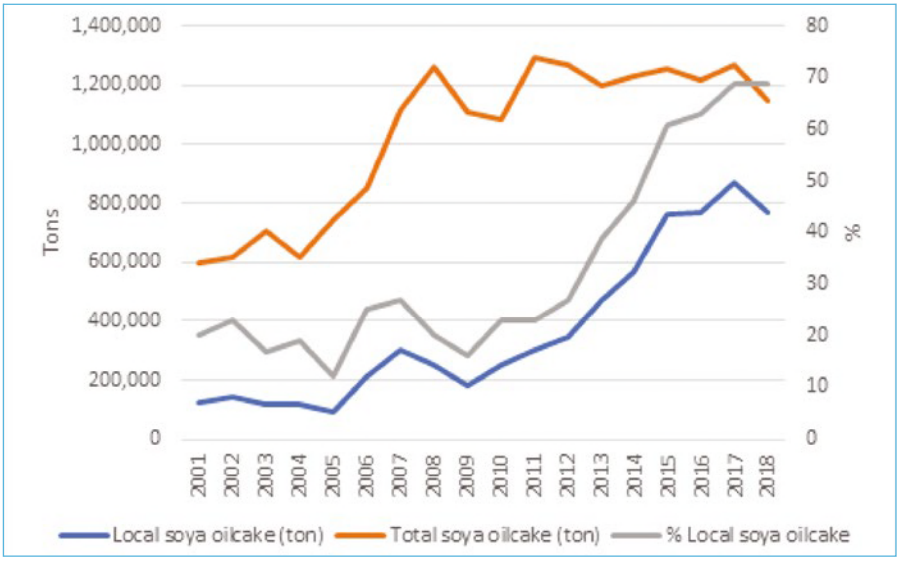
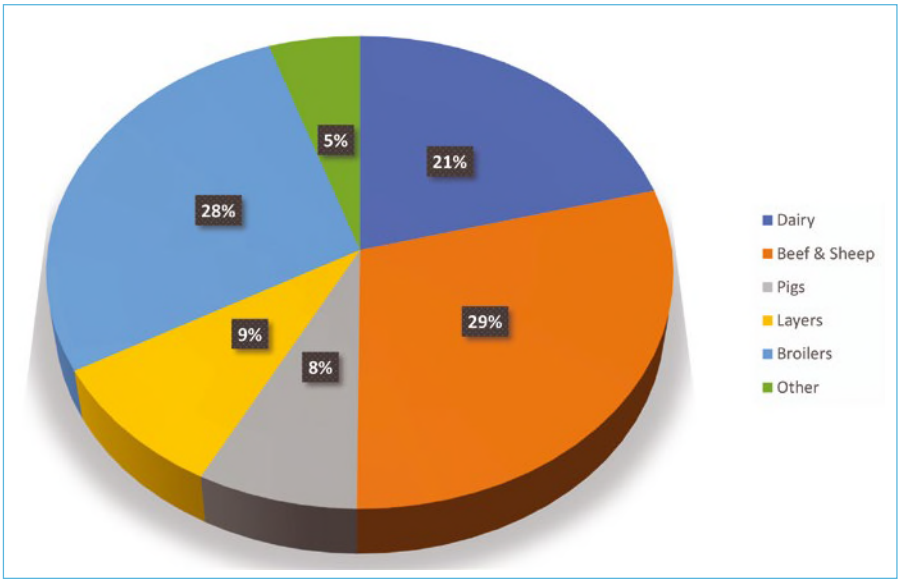


Figure 2: Species feed consumption.



with a share of 84%, which is expected to remain relatively stable until 2027.

Local oilcake production

The increase in local oilcake production from locally produced soya beans will make South Africa increasingly self-sufficient in meeting its protein requirements.

Oilcake requirements in South Africa were estimated at 1 649 498 tons in 2018 and local production was at 1 441 527 tons or 87% of requirements. The soya bean requirement of 1,2 million tons excludes the 238 000-ton full fat soya bean requirement, as well as the 30 000-ton requirement for human consumption. Soya oilcake produced in South Africa in 2018 provided 85% of the country's soya oilcake requirements (*Table 3*).

According to the model, feed requirements will increase to 13 372 018 tons in 2027 and 12 561 132 tons in 2021. Soya oilcake requirement will be 1 307 338 tons by 2021 and 1 243 233 by 2027 (*Table 2*). There is a decrease in requirements that can be attributed to an increase in feed conversion ratios.

Estimates indicate 98% self-sufficiency by 2027 and 89% self-sufficiency by 2021 in terms of soya beans. This can be attributed to an increase in production of soya beans, estimated by BFAP.

Although the combined beef and sheep population is the largest consumer of animal feed, the poultry sector plays a major role in oilcake, and particularly in soya oilcake, utilisation. Growth and sustainability in the poultry industry will play a major role in oilcake requirements.

Table 4: Oilcake usage projection in 2021 and 2027.

Oilcake	2021 (tons)	2027 (tons)
Soya oilcake	1 307 388	1 287 638
Sunflower oilcake	356 299	362 300
Canola oilcake	63 000	125 064
Palm kernel	37 710	42 993
Soya full fat	147 302	159 000
Cotton full fat	36 000	65 086
Canola full fat	3 246	5 345
Total	**1 950 945**	**1 047 426**

Conclusion

South African animal feed consumption decreased dramatically in 2017, mainly due to the lag effect of the drought, but also because of the bird flu outbreak in the country. However, in 2018 there was a slight recovery in feed consumption. Given the major increase in production of local soya beans, there was a significant increase in self-sufficiency. In terms of total oilcake consumption, at a level of 87%, South Africa is self-sufficient. This figure is expected to increase towards 2027, indicating the progress South Africa is making in substituting imports.