Projected protein requirements for animal consumption in South Africa

Project 2017

PROTEIENNAVORSINGSTIGTING .. PROTEIN RESEARCH FOUNDATION

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Unit for Livestock Economics

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1. Introduction

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 changed mainly to where the largest impact could be made namely soybeans and canola.

The growth in the domestic availability of oilcake is a good measure by which the PRF could ascertain if it was achieving its objectives, by way of supporting the industry with research, new technology and technology transfer. The targets that will need to be met in the future for the PRF to continue to emulate the great progress that has been made thus requires projections of future oilcake demands and what will be required to obtain self-sufficiency, as well as when this goal is likely to be met.

To accurately measure this progress various models were developed and used over the years. A new model has been developed.

2. The new model methodology

Collaboration between the University of Free State Agricultural Economics department, PRF existing APR model and BFAP, created a new successful model that can accurately calculate current protein requirements and project future requirements under 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 that are predicted to be imported and exported are 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 changes in animal performance is an important factor that the model incorporates. The model calculates the quantity of feed required as well as raw material breakdown for these feeds.

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

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

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of future oilcake demands and what will be required to obtain self-sufficiency, as well as when this goal is likely to be met. The APR model in collaboration with BFAP data is used to calculate these projections.

3. Results

3.1. Current scenario

Based on the current per capita consumption of animal products it is estimated (using the APR Model) that the requirement for animal feed in South Africa is as follows:

Table 1: National animal feed production 2017

Feed Type	National feed consumption (ton)
Dairy	2 150 194
Beef & Sheep	3 173 601
Pigs	917 668
Layers	1 163 747
Broilers	3 150 249
Pet foods	335 563
Horses	134 930
Ostriches	106 778
Aquaculture	5 184
Total	**11 137 923**

In terms of oilcake consumption the largest consume oilcake is still soya oilcake followed by sunflower oilcake.

Table 2: Oilcake usage for 2017

Oilcake type	National consumption (ton)
Soya oilcake	1 127 098
Sunflower oilcake	350 000
Cotton oilcake	27 866
Canola oilcake	68 000
Palm Kernel	33 075
Soya Full Fat	140 000
Cotton Full Fat	49 593
Canola Full Fat	2 740
Total	**1 798 372**

On the local market, South Africa progressed in terms of substituting imported soya oilcake with local oilcake. Currently South Arica produced 69% of the total requirement in 2017, in 2007 this was only at a 27% level. The projection for 2020 is at 82% and will increase to 87% in 2026.

Table 3: Historical usages of oilcake (Local and imported soybeans processed in South Africa)

Year	Local soya oilcake (ton)	Total soya oilcake (ton)	Local %
2001	121 140	598 070	*20*
2002	141 520	616 593	*23*
2003	120 000	705 352	*17*
2004	119 280	616 596	*19*
2005	92 080	740 558	*12*
2006	210 000	849 678	*25*
2007	303 280	1 115 280	*27*
2008	253 200	1 261 791	*20*
2009	181 600	1 111 172	*16*
2010	251 840	1 083 640	*23*
2011	301 600	1 291 069	*23*
2012	347 760	1 271 341	*27*
2013	469 360	1 197 978	*39*
2014	565 280	1 232 687	*46*
2015	765 287	1 254 120	*61*
2016	768 800	1 218 001	*63*
2017	871 913	1 267 098	*69*

In terms of total oilcake the local share in consumption increase from 37% in 2007 to 72% in 2017. It is projected that the local share will increase to 82% in 2020 and 87% in 2026.

Table 4: Historical usages of Total oilcake (Local and imported soybeans processed in South Africa)

Year	Local Oilcake (ton)	Total Oilcake (ton)	Local %
2001	454 192	1 021 862	*44*
2002	482 448	1 149 224	*42*
2003	472 312	1 210 396	*39*
2004	489 413	1 121 460	*44*
2005	416 736	1 212 593	*34*
2006	572 231	1 414 338	*40*
2007	608 370	1 635 525	*37*
2008	494 557	1 758 185	*28*
2009	565 181	1 664 927	*34*
2010	701 030	1 743 137	*49*
2011	624 912	1 857 391	*34*
2012	766 927	1 856 360	*41*
2013	760 321	1 877 671	*40*
2014	913 356	1 889 979	*48*
2015	1 197 604	1 914 330	*63*
2016	1 238 120	1 965 291	*63*
2017	1 300 865	1 798 372	*72*

3.2. Growth in requirements for animal products

In order to calculate the consumption figures of the different species it is very important to determine the demand. The demand was calculated by means of using the following macro variables in combination with animal feed conversion ratios growth figures:

- Population growth
- Per Capita consumption growth
- Imported animal products
- Exported animal products

Table 5: Projections of feed and oilcake requirements to the year 2020 and 2026

	Feed (ton)	Oilcake (ton)	Soya Oilcake (ton)
2017	11 137 923	1 798 372	1 127 098
2020	12 506 010	2 135 339	1 425 515
2026	13 152 948	2 212 549	1 454 144

As explained earlier soya oilcake remains the dominant protein source in South Africa, this dominance has increased over time and will continue to do so. Soya oilcake in 2010 made up 40% of oilcake requirements, this increased to 63% in 2017 and is predicted to increase even further to 67% in 2020 and 68% in 2026.

Poultry feeds make up only 39% of total feed consumed in South Africa, this market share of total feed is predicated to remain constant until 2020. Most oilcake is however used in this sector with a share of 83% of soya oilcake usage currently in this sector expected to remain relatively stable up to the year 2026.

3.3. Local Soya Oilcake Production

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

Table 6: Local vs imported soya oilcake

	Local Soya Oilcake	**Local Soybean**	**Total Soya Oilcake**	**Local Soya**	**% Local**
	(From local soybeans) ton	**Production (required) ton**	**Requirements ton**	**Production (required) ton self-sufficiency**	
2017	731 913	914 891	1 127 098	1 408 872	64,9
2020	1 138 666	1 423 332	1 425 515	1 781 893	79,8
2026	1 248 353	1 560 441	1 454 144	1 817 680	85,5

Oilcake requirements in South Africa are estimated at 1 798 372 tons in 2017 versus a local production of 1 300 865 tons locally produced or 72% of requirements (Table 4).

Soya oilcake produced in South Africa in 2017 provided 64.9% of the countries soya oilcake requirements (Table 5). The growth in oilcake consumption decreased mainly due to a lag effect because of the drought but more importantly the outbreak of bird flu, which has decreased a large amount of layer birds and consequently layer feed.

According to the model feed requirements will increase to 13 152 948 tons in 2026 and 12 767 149 tons in 2020 from 11 137 923 tons. Oilcake requirements will increase from 1 798 372 tons to 2 135 339 in 2020 and 2 212 549 tons in 2026. Soya oilcake requirement will be 1 425 515 tons by the year 2020 and 1 454 144 by 2026 (Table 5).

Estimates of soybean production increase by BFAP are 85.5% self-sufficiency by 2026 due because of soybean production increasing to 1,6 million tons. Soybean production by 2026 for 100% self-sufficiency in soybean oilcake requirements is estimated by the APR model to be 1,8 million tons (Table 5).

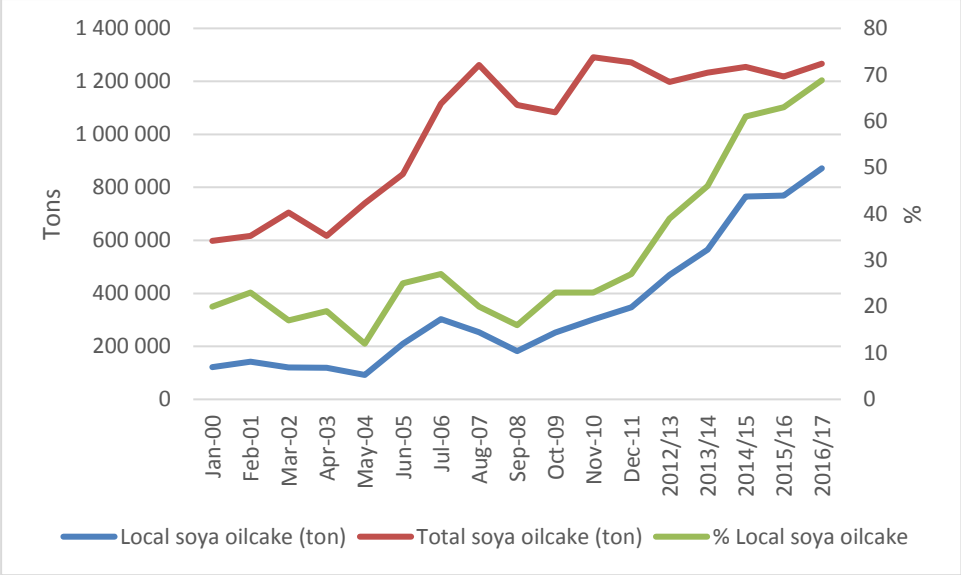


Figure 1: Growth in self-sufficiency in terms of soya oilcake

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

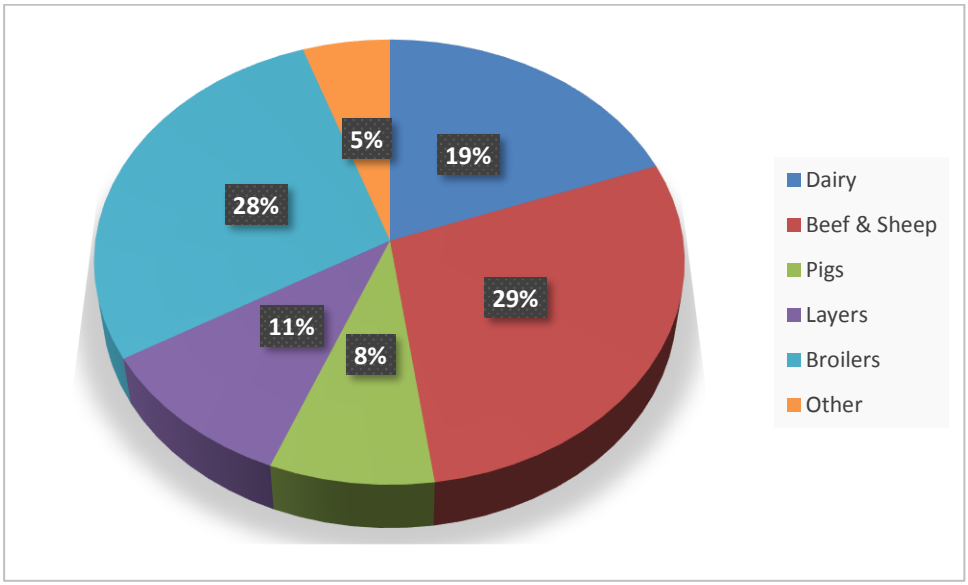


Figure 2: Specie feed consumption

Table 7: National animal feed production 2020 and 2026

Feed Type	National feed consumption 2020 (Ton)	National feed consumption 2026 (Ton)
Dairy	2 217 087	2 348 752
Beef & Sheep	3 826 374	3 940 361
Pigs	970 205	1 105 124
Layers	1 372 875	1 478 202
Broilers	3 483 598	3 460 570
Other	635 870	702 663
Total	**12 767 149**	**13 152 948**

Table 8: Oilcake usage projection 2020 and 2026

Oilcake	2020 Ton	2026 ton
Soya oilcake	1 425 515	1 454 144
Sunflower oilcake	349 882	350 725
Cotton oilcake	15	3 251
Canola oilcake	88 074	125 064
Palm Kernel	37 710	12 627
Soya Full Fat	146 211	174 968
Cotton Full Fat	84 384	86 731
Canola Full Fat	3 549	5 040
Total	**2 135 339**	**2 561 503**

4. Conclusion

South African feed consumption decreased drastically in 2017 this was mainly due to the lag effect of the drought but more importantly the outbreak of bird flu within the borders of South Africa. However, given the major increase in production of local soybeans the self-sufficiency increased drastically. In terms of total oilcake consumption, South Africa is at a level of 69% self-sufficient. This is expected to increase to 87% in 2026 indicating the progress South Africa is making in substituting imports.

Table 9: Self-sufficiency of total oilcake and oilcake

	2017	2020	2026
Total Oilcake	72%	82%	87%
Soya Oilcake	69%	82%	87%