Projected protein requirements for animal consumption in South Africa

Project 2018

PROTEïENNAVORSINGSTIGTING .. PROTEIN RESEARCH FOUNDATION

Project for the Protein Research Foundation

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Unit for Livestock Economics

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Contents

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 2018

Feed Type	National feed consumption (ton)
Dairy	2 421 756
Beef & Sheep	3 433 951
Pigs	880 623
Layers	1 053 808
Broilers	3 258 449
Pet foods	343 952
Horses	138 303
Ostriches	112 117
Aquaculture	5 314
Total	**11 648 273**

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

Table 2: Oilcake usage for 2018

Oilcake type	National consumption (ton)
Soya oilcake	1 150 521
Sunflower oilcake	429 375
Canola oilcake	63 000
Palm Kernel	33 075
Soya Full Fat	212 662
Cotton Full Fat	36 000
Canola Full Fat	3 246
Total	**1 927 879**

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 2018, in 2008 this was only at a 20% level. The projection for 2021 is at 89% and will increase to 95% in 2027.

Table 3: Historical usages of soya 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*
2018	766 795	1 150 521	*69*

In terms of total oilcake the local share in consumption increase 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.

Table 4: Historical usages of Total oilcake (Local and imported oilcake)

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*
2018	1 441 527	1 649 498	*87*

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 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

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 70% in 2018 and is predicted to stabilise at 71 % in 2021. In Table 5 the soya oilcake consumption decrease from 2021 to 2027 this mainly due to the projection from BFAP that poultry imports will increase with 63% from 2021 up to 2027.

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 84% of soya oilcake usage currently in this sector expected to remain relatively stable up to the year 2027.

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	
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

Oilcake requirements in South Africa are estimated at 1 649 498 tons in 2018 versus a local production of 1 441 527 tons locally produced or 87% of requirements (Table 4). The soybean requirement of 1,2 million tons is excluding the 238 000 ton fullfat soybeans and 30 000 ton for human consumption.

Soya oilcake produced in South Africa in 2018 provided 85% of the countries soya oilcake requirements (Table 6).

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 the year 2021 and

1 243 233 by 2027 (Table 5). There is a decrease in requirements which can be attributed to an increase in feed conversion ratios.

Estimates indicate an 98% self-sufficiency by 2027 and a 89% by 2021 in terms of soybeans, this can be attributed to an increase in production of soybeans estimated by BFAP. (Table 5).

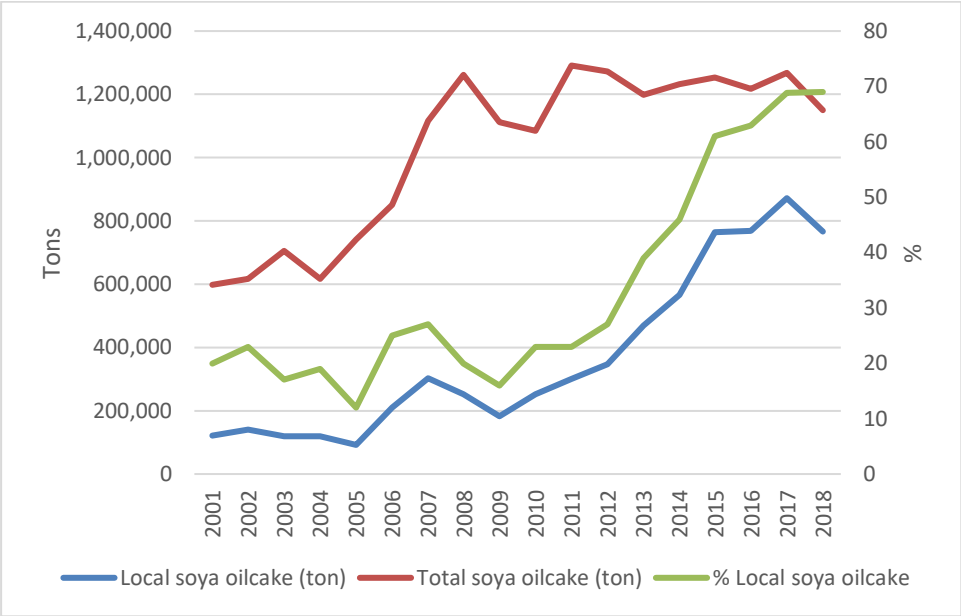

Figure 1: Growth in self-sufficiency in terms of soya oilcake

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.

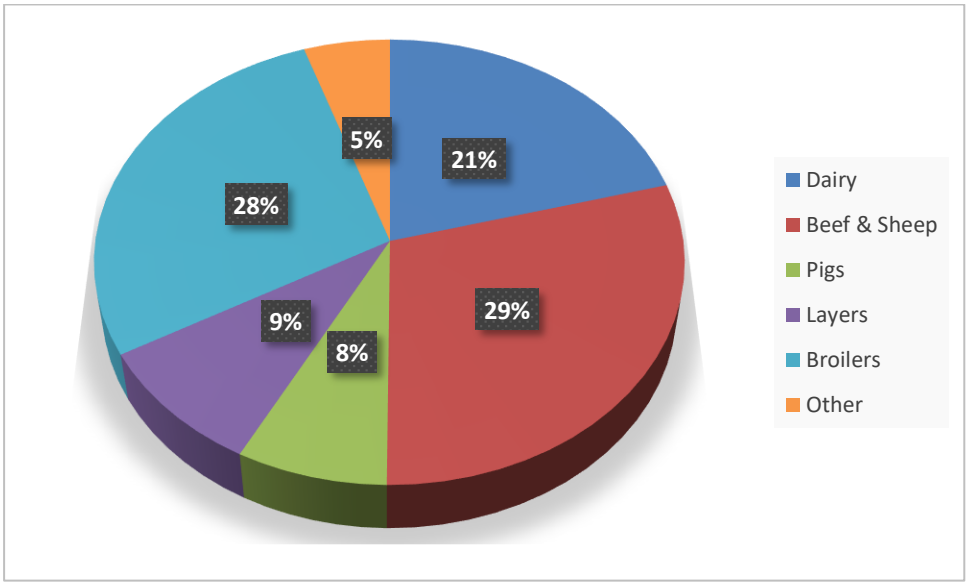

Figure 2: Specie feed consumption

Table 7: National animal feed production 2020 and 2026

Feed Type	National feed consumption 2021 (Ton)	National feed consumption 2027 (Ton)
Dairy	2 538 634	2 762 097
Beef & Sheep	3 770 587	4 131 534
Pigs	981 688	1 138 128
Layers	1 116 578	1 163 747
Broilers	3 498 788	3 393 667
Other	654 857	782 845
Total	**12 561 132**	**13 372 018**

Table 8: Oilcake usage projection 2021 and 2027

Oilcake	2021 Ton	2027 ton
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**	**2 047 426**

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 in 2018 there were a slight recovery on feed consumption. 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 87% self-sufficient. This is expected to increase towards 2027 indicating the progress South Africa is making in substituting imports.

Table 9: Self-sufficiency of total oilcake and oilcake

	2018	2021	2027
Total Oilcake	87%	90%	94%
Soya Oilcake	85%	89%	98%