

Projected protein requirements for animal consumption in South Africa

Project 2020



Project for the Protein Research Foundation

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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.

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 need 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 feed 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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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 2020

Feed Types	National feed consumption (ton)
Aquaculture	5 000
Broiler	3 320 366
Cattle Beef	2 894 960
Cattle Dairy	2 568 226
Horses	124 205
Layer	1 326 955
Ostriches	83 823
Pets	359 304
Pigs	1 036 398
Sheep	254 145
Various	10
Grand Total	11 973 392

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

Table 2: Oilcake usage for 2020

Oilcake type	National consumption (ton)
Cotton Full Fat	20 483
Soya Full Fat	240 000
Canola Oilcake	55 000
Soya Oilcake	1 213 700
Sunflower Oilcake	351 480
Palm Kernel Meal	5 000
Total	1 885 663

On the local market, South Africa progressed in terms of substituting imported soya oilcake with local oilcake. Currently South Africa produced 70% of the total requirement in 2020, in 2009 this was only at a 16% level. The projection for 2023 is at 97% and will increase to 100% in 2029. However, the substitution is highly dependent on efficient infrastructure and logistics support, providing internal raw materials to coastal areas at competitive levels. The usage of the oilcake is also very sensitive in terms of prices and competition of raw materials containing protein. For instance, an increase in Lucern production or wet milling by-products directly affects the usage of oilcakes.

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	836 285	1 267 098	66
2018	766 795	1 150 521	66
2019	820 000	1 218 000	67
2020	849 700	1 213 700	70

In terms of total oilcake, the local share in consumption increases from 34% in 2009 to 79% in 2020. It is projected that the local share will increase to 98% in 2023 and 99,7% in 2029.

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
2019	1 434 660	1 875 738	76
2020	1 485 183	1 885 663	79

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 2022 and 2028

	Feed (ton)	Oilcake (ton)	Soya Oilcake (ton)
2020	11 973 392	1 885 663	1 213 700
2023	12 973 505	1 935 209	1 218 087
2029	14 544 283	2 253 814	1 427 406

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. The future consumption figures are highly influenced by the Feed Conversion Ratios, with the constant increase in FCR it stabilises the future consumption. However, exports of beef, sheep and the prospect of chicken export increases the consumption of feed and have a large impact on the end consumption figures for 2029.

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	
2020	849 700	1 062 125	1 213 700	1 517 125	70
2023	1 187 436	1 484 295	1 218 087	1 522 608	97
2029	1 427 406	1 784 257	1 427 406	1 784 257	100

Total oilcake requirements in South Africa are estimated at 1 885 663 tons in 2020 versus a local production of 1 485 183 tons locally produced or 79% of requirements (Table 4). The soybean requirement of 1 517 125 tons is excluding the full fat soybeans and for human consumption. This production is needed in order to obtain 1 213 700 tons of oilcake.

Soya oilcake produced in South Africa in 2020 provided 79% of the countries soya oilcake requirements (Table 6). It is forecasted to increase to 100% in 2029. Logistics is still creating challenges to be competitive against imports and must be kept in consideration to reach these levels. In order to satisfy local demand 1 784 257 tons of soybeans is needed.

According to the model feed requirements will increase to 14 544 284 tons in 2029 and 12 973 505 tons in 2022. Soya oilcake requirement will be 1 218 087 tons by the year 2023 and 1 427 406 by 2029 (Table 6).

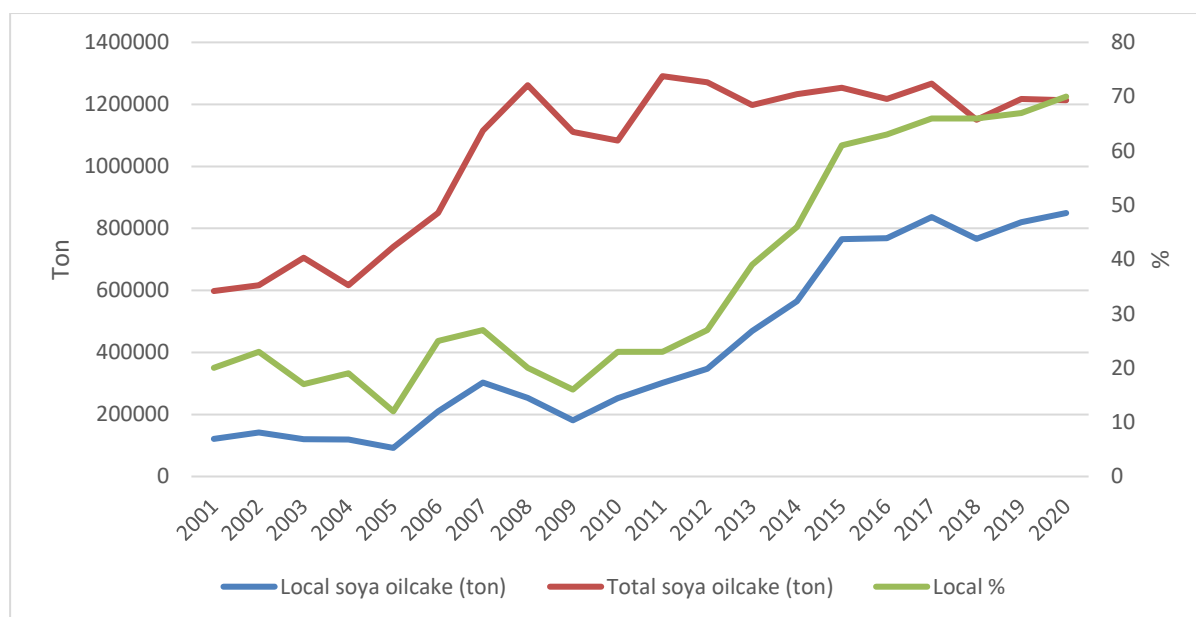


Figure 1: Growth in self-sufficiency in terms of soya oilcake

Broiler and Layer diets is playing an enormous role within the industry. Growth and sustainability in the poultry industry will play a major role in oilcake requirements within the future and it is good news to see that this is part of the recent masterplan submitted towards government. The second important role-player is the Beef and Sheep industry, in order to sustain growth and consumption of feed it is important that bio security be managed efficiently within South Africa. Except for normal population growth figures the largest contributor toward animal feed consumption increases are the exports of animal products such as mutton, beef and chicken.

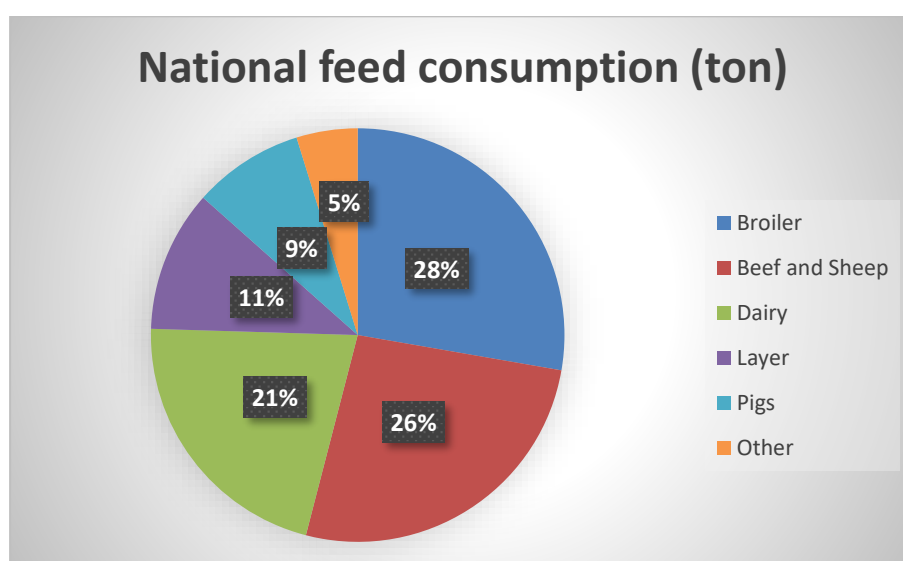


Figure 2: Specie feed consumption 2020

Table 7: National animal feed production 2023 and 2029

Feed Type	National feed consumption (ton)		
	2020	2023	2029
Beef & Sheep	3 149 104	3 507 445	3 975 199
Broiler	3 320 366	3 575 615	4 093 900
Dairy	2 568 226	2 661 446	2 855 846
Layers	1 326 955	1 427 903	1 490 083
Other	572 342	623 116	676 969
Pigs	1 036 398	1 177 981	1 452 286
Grand Total	11 973 392	12 973 505	14 544 284

Table 8: Oilcake usage projection 2023 and 2029

Raw Material	National consumption 2020	National consumption 2023	Nasional consumption 2029
Canola Oilcake	55 000	76 190	93 483
Cotton Full Fat	20 483	20 483	26 000
Palm Kernel Meal	5 000	5 701	6 000
Soya Full Fat	240 000	240 000	290 000
Soya Oil Cake	1 213 700	1 218 087	1 427 406
Sunflower Oilcake	351 480	374 748	410 925
Grand Total	1 885 663	1 935 209	2 253 814

4. Conclusion

The prospects of feed for animal protein are looking promising in the future. However, it is highly depended on a few factors. With increasing efficiencies regarding Feed Conversion Ratios it is important to find additional demand. This additional demand is predominantly situated in exports of animal products. Currently this is the focus within the different masterplans submitted towards government and will play an important role in sustainability.

Another factor that is very important is the prices and competition of raw material, in order to utilise these local consumption levels the raw material prices tend to be closer to export parity levels. Which means that a lot of work will be needed to increase the feasibility of producing the raw material at these levels. Given the production of raw materials the question prevails if there will be opportunities in the future for exports. Some of the commodities can be exported but there can even be opportunities to export processed product.

The protein raw material basket is very complex and any slight change in one raw material have effects on the utilisation of oilcake, specifically soya oilcake. If there is an increase in production or an import of a protein source it will have a direct impact on the consumption of soya oilcake.

Lastly logistics and biosecurity will play a very important role in the future, if inland products cannot be delivered price competitive at coastal consumers, imports will continue. If the exports of animal products do not increase, there will be pressure on the utilisation in South Africa and have a direct impact on production.

If all of the above fall into place South Africa can be totally self-sufficient and there is some space for an increase in soya bean production.

Table 9: Self-sufficiency of total oilcake and oilcake

	2020	2023	2029
Total Oilcake	79%	98%	99,7%
Soya Oilcake	70%	97%	100%