

Projected protein requirements for animal consumption in South Africa

Project 2024



**PROTEÏENNAVORSINGSTIGTING
PROTEIN RESEARCH FOUNDATION**

Project for the Protein Research Foundation

April 2025

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1. Introduction

The primary objective of the Protein Research Foundation (PRF) is to replace imported protein sources with domestically produced alternatives. Following extensive exploration of various strategies over several years, the PRF strategically shifted its focus toward sectors offering the greatest potential for impact—specifically, the soybean and canola industries.

The expansion of the local oilcake supply has become a key performance indicator for evaluating the success of the PRF's initiatives, which include research, technological advancement, and technology transfer efforts. Achieving future targets, maintaining the current momentum, and ultimately attaining self-sufficiency will require accurate projections of future oilcake demand and a clear understanding of the necessary production levels and timelines.

Over time, the PRF has developed and employed several versions of the APR model to monitor progress.

This model integrates:

- Changes in per capita consumption of meat, milk, and eggs, as projected by the Bureau for Food and Agricultural Policy (BFAP),
- Population growth trends,
- Anticipated import and export volumes of animal products,
- Projected future prices and availability of major raw materials, particularly those produced as by-products of agricultural processing industries.

It also accounts for genetic improvements in livestock, which significantly influence productivity and, by extension, feed requirements. The model calculates both total feed needs and the composition of raw materials required.

Additionally, it incorporates the feed demands of non-food-producing animals, which also consume considerable amounts of protein-based feed.

A notable feature of the model is its ability to apply least-cost linear programming, factoring in transport costs across various regions. This capability enables the formulation of region-specific feed strategies, considering the availability of local raw materials. Consequently, it provides a highly accurate projection of domestic and imported protein requirements.

The steady growth in domestic oilcake production remains a vital benchmark for the PRF's success. Continued support through research, innovation, and technology dissemination will be essential to meet future targets. To this end, the PRF employs the Animal Product Requirement (APR) model, developed in collaboration with BFAP data, to forecast future oilcake demand and map the path toward self-sufficiency.

The model will also be utilized to conduct scenario analyses assessing the potential impact of avian influenza (bird flu) on the availability and demand for protein sources in animal feed. By simulating different outbreak scenarios, including varying levels of severity and duration, the model will help quantify the effects on feed consumption patterns across different species.

2. Results

2.1. Current scenario

Based on current per capita consumption of animal products, and utilizing the APR Model, it is estimated that South Africa's total animal feed requirements are as illustrated in Table 1. This analysis is based on data covering the full calendar year of 2024.

Table 1: National animal feed production 2024

Feed Types	National feed consumption (ton)
Aquaculture	9 510
Broiler	3 484 239
Cattle Beef	2 883 446
Cattle Dairy	2 700 057
Horses	137 099
Layer	1 006 295
Ostriches	109 308
Pets	396 604
Pigs	1 207 871
Sheep	319 845
Various	10
Grand Total	12 254 285

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

Table 2: Oilcake usage for 2024

Oilcake type	National consumption (ton)
Cotton Full Fat	27 755
Soya Full Fat	112 689
Canola Oilcake	120 000
Soya Oilcake	1356340
Sunflower Oilcake	320 000
Palm Kernel Meal	6 000
Total	1 942 784

In the local market, South Africa has made significant progress in substituting imported soya oilcake with locally produced oilcake. In 2024, local production accounted for 88% of total domestic requirements, compared to just 12% in 2005.

However, the continued success of import substitution is heavily reliant on the efficiency of infrastructure and logistics networks, particularly in ensuring the delivery of raw materials to coastal regions at competitive prices. In 2024, favourable crushing margins supported the growth of local oilcake consumption at coastal feed mills.

The demand for oilcake remains highly sensitive to price fluctuations and competition from alternative protein sources. For example, increased production of lucerne or the availability of wet milling by-products can significantly impact oilcake usage.

Table 3: Historical usages of total soya oilcake

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	67%
2019	820 000	1 218 000	67%
2020	849 700	1 213 700	70%
2021	1 073 682	1 444 193	74%
2022	1 153 519	1 337 122	86%
2023	1 164 510	1 321 671	88%
2024	1 198 122	1 356 340	88%

In terms of total oilcake, the local share in consumption increases from 35% in 2005 to 92% in 2024. It is projected that the local share will increase to 94% in 2027 and 96% in 2033.

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
2021	1 643 916	2 069 697	79
2022	1 870 954	2 071 475	90
2023	1 828 558	1 988 970	92
2024	1 778 566	1 942 784	92

2.2. Growth in requirements for animal products

Accurately calculating consumption figures across different species requires a clear understanding of underlying demand. Demand was determined by utilizing the following macroeconomic variables in conjunction with animal feed conversion ratios and growth figures:

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

Table 5: Projections of feed and oilcake requirements for the years 2024, 2027 and 2033

	Feed (ton)	Oilcake (ton)	Soya Oilcake (ton)
2024	12 254 285	1 942 784	1 356 340
2027	12 845 386	2 008 442	1 397 871
2033	13 899 019	2 192 694	1 427 838

As previously noted, soybean oilcake remains the primary source of protein in South Africa's animal feed industry. Its dominance has not only persisted but has strengthened over time and is expected to continue increasing. Future consumption trends are largely driven by Feed Conversion Ratios (FCRs); improvements in FCRs contribute to stabilising overall consumption. However, the potential growth in exports of beef, sheep, and poultry could significantly boost feed demand, thereby impacting projected consumption figures for 2033. It is important to note, though, that these export opportunities are contingent on materialising and are heavily reliant on the effectiveness of South Africa's biosecurity measures.

2.3. Local Soya Oilcake Production

The constant 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	
2024	1 198 122	1 597 496	1 356 340	1 808 453	88
2027	1 293 611	1 724 815	1 397 871	1 863 828	93
2031	1 327 889	1 770 519	1 427 838	1 903 784	93

*Excluding full fat consumption

In 2024, total oilcake requirements in South Africa are estimated at 1,942,784 tons, with local production contributing 1,778,566 tons—equivalent to 92% of total demand (Table 4). The soybean seed (commodity) requirement for the same year is projected at 1,808,453 tons, excluding full-fat soybeans used for human consumption. This volume is necessary to produce approximately 1,356,340 tons of soybean oilcake.

Locally produced soybean oilcake is expected to meet 88% of South Africa’s total soybean oilcake demand in 2024 (Table 6), with forecasts indicating an increase to 96% by 2033. However, this projection is contingent upon industry competitiveness and profit/crush margins. Forecasts suggest that domestic soybean production will be sufficient to meet local demand, implying that additional markets beyond the feed sector—such as export markets—will be necessary to absorb the surplus. Nonetheless, logistical constraints continue to pose challenges to competing effectively with imports and must be addressed to achieve these targets.

A large proportion of oilcake production occurs inland and must be transported to coastal provinces such as the Western and Eastern Cape. In certain years, favourable crushing margins support increased local utilisation. To satisfy domestic demand by 2033, approximately 1,903,784 tons of soybeans will be required.

According to the model, total feed requirements are projected to rise from 12,254,284 tons in 2024 to 13,899,019 tons by 2033. Correspondingly, soybean oilcake demand is expected to increase from 1,397,871 tons in 2027 to 1,422,837 tons in 2033 (Table 6).

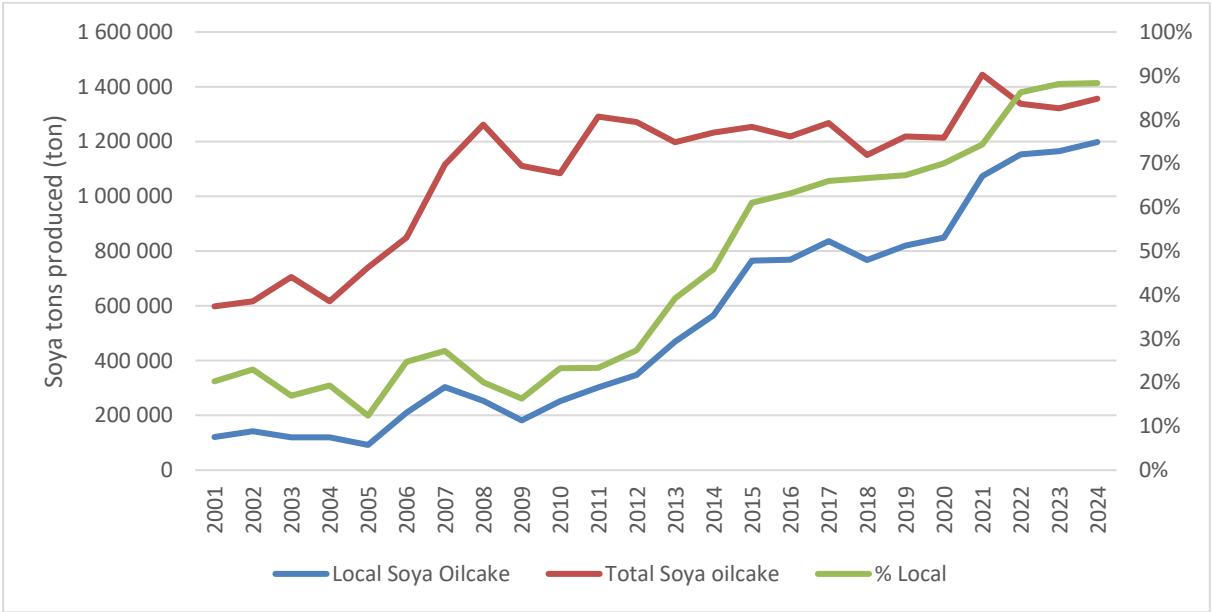


Figure 1: Growth in self-sufficiency in terms of soya oilcake

Broiler and layer diets play a critical role in the animal feed industry, with the growth and long-term sustainability of the poultry sector being a key driver of future oilcake demand. Encouragingly, the poultry industry’s importance has been acknowledged in the latest sector masterplan submitted to government.

In recent years, avian influenza (bird flu) has had a significant impact on the poultry sector and its effects are still evident in the market. Going forward, effective biosecurity and sound

management practices across the broader livestock industry will be essential in safeguarding growth and ensuring the consistent consumption of feed.

Beyond natural population growth, the most substantial driver of increased animal feed consumption is the expansion of exports of animal products—including mutton, beef, and poultry. Maintaining and enhancing export competitiveness will therefore require a focused effort on health standards, infrastructure, and market access.

Figure 2: Specie feed consumption 2024

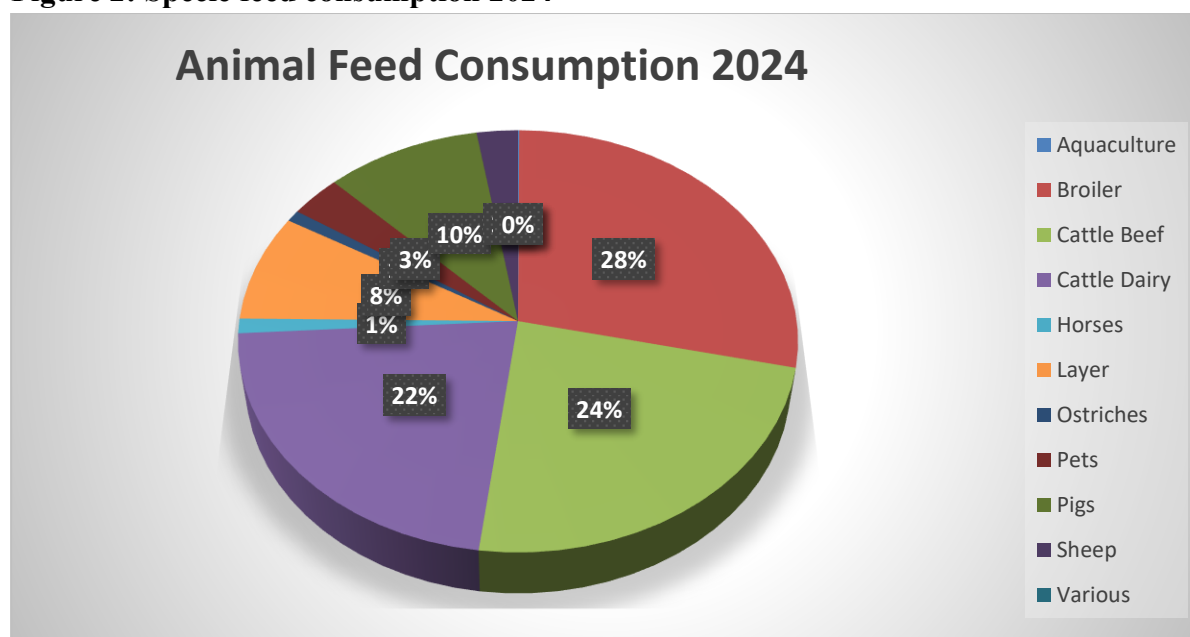


Table 7: National animal feed production 2027 and 2033

Feed Types	National feed consumption (ton)		
	2024	2027	2033
Aquaculture	9 510	10 241	11 304
Broiler	3 484 239	3 609 234	4 115 332
Cattle Beef	2 883 446	2 918 659	3 157 286
Cattle Dairy	2 700 057	2 785 141	2 763 125
Horses	137 099	147 641	162 968
Layer	1 006 295	1 262 110	1 432 570
Ostriches	109 308	126 537	105 309
Pets	396 604	427 100	471 438
Pigs	1 207 871	1 246 923	1 374 486
Sheep	319 845	311 790	305 191
Grand Total	12 254 285	12 845 386	13 899 019

3. Conclusion on projections

The future outlook for feed demand in the animal protein sector appears promising, but it remains contingent on several key factors. Improvements in Feed Conversion Ratios (FCRs) continue to enhance efficiency, which, in turn, underscores the need to expand demand—particularly through increased exports of animal products and, potentially, processed products such as oilcake. These goals are central to various industry masterplans currently under consideration by government and will be critical for the long-term sustainability of the sector. However, the realisation of these positive projections has yet to materialise.

One of the most significant challenges remains the competitiveness and pricing of raw materials. For local feed consumption to remain viable, raw material prices must align more closely with export parity levels. This presents a challenge in terms of ensuring the economic feasibility of domestic production. The pricing of protein sources, in particular, is a sensitive issue. A key indicator in this regard is the maize-to-soybean price ratio, which has a direct influence on feed formulation decisions.

In light of growing raw material production, questions arise about the potential for future export opportunities. While certain commodities are already suitable for export, further prospects may lie in the export of value-added products such as oilcake. However, the protein raw material basket is complex, and even minor shifts in the supply or importation of one protein source can significantly affect the demand for others—especially soybean oilcake.

Crushing margins also play a pivotal role in determining the level of self-sufficiency, as they influence the competitiveness of locally produced (inland) oilcake versus imported coastal alternatives. When inland production cannot be delivered to coastal markets at competitive prices, imports tend to dominate. Consequently, if exports of animal products do not increase, domestic utilisation could come under pressure, directly impacting local production volumes.

Logistics and biosecurity will be critical determinants of the industry's future performance. Efficient logistics are essential to maintaining cost competitiveness, particularly for transporting inland products to coastal consumers. At the same time, biosecurity is increasingly important—not only for maintaining and expanding export markets, but also for safeguarding domestic production. This has been clearly demonstrated by the ongoing impact of avian influenza outbreaks, such as the one experienced in 2023, which had a profound effect on the industry.

Table 8: Self-sufficiency of total oilcake and oilcake

	2024	2027	2033
Total Oilcake	92%	94%	96%
Soya Oilcake	88%	93%	93%

4. Additional Scenario analysis on animal feed given disease outbreaks

The South African animal feed industry is a critical component of the broader agricultural value chain, supplying nutrition to the poultry, beef, dairy, pork, and sheep sectors. However, its stability is highly vulnerable to outbreaks of transboundary animal diseases, notably Avian Influenza (AI) in poultry and Foot-and-Mouth Disease (FMD) in cloven-hoofed animals. These diseases not only threaten animal health but also disrupt feed demand, logistics, and international trade.

In a disease-vulnerable environment like South Africa, biosecurity must be viewed as a strategic pillar of the animal feed market. The recent bird flu and FMD outbreaks underscore the importance of proactive investment in biosecurity infrastructure, training, and technology to protect both livestock productivity and feed industry resilience.

4.1 Avian Influenza

Below is an analysis based on the impact of Avian Influenza as well as sensitivity scenarios explaining the impact on various different raw materials.

Avian Influenza (AI), commonly referred to as bird flu, has had a significant impact on the South African poultry sector, particularly in 2023 and 2024. The highly pathogenic strain (HPAI H7 and H5) led to extensive culling of both broiler breeders and commercial layer flocks, resulting in major disruptions in bird numbers and associated feed consumption.

- The broiler sector was affected primarily at the breeder level, with an estimated 20–25% reduction in parent stock during peak outbreaks.
- This drop translated into a shortfall in day-old chick production, delaying broiler cycles and constraining supply to the market.
- The commercial broiler population saw a temporary reduction of 10–15%, especially during the last quarter of 2023 and early 2024.
- The layer industry was more severely hit, with culling of over 9.5 million layer birds, amounting to roughly 30% of the national layer flock.
- This created a critical shortage of table eggs, prompting increased imports and price spikes.
- Recovery has been slow due to the time required to raise replacement pullets (approx. 16–18 weeks to point of lay).

The following analysis explains the impact Avian Influenza had on the feed market between 2022 and 2024 illustrating the impact on total feed reduction. Table 9 illustrates the consumption per specie. Because of the impact on Boilers and Layers the total feed consumption in the country decrease with 2%.

Table 9: National feed consumption

Feed Types	National feed Consumption		
	2022	2024	% change
Broiler	3 743 167	3 484 239	-7%
Cattle Beef	2 864 511	2 883 446	1%
Cattle Dairy	2 546 373	2 700 057	6%
Layer	1 279 836	1 006 295	-27%
Pigs	1 178 683	1 207 871	2%
Pets	377 494	396 604	5%
Sheep	278 810	319 845	13%
Horses	130 493	137 099	5%
Ostriches	92 415	109 308	15%
Aquaculture	5 253	9 510	45%
Grand Total	12 497 046	12 254 285	-2%

To assess the impact of Avian Influenza (AI) on raw material consumption, various scenarios were modelled, focusing solely on a reduction in the national hen population while keeping other livestock populations constant, 2024 were utilised as a base year. This approach was used to isolate and evaluate the specific effect of AI on layer feed demand. The ration formation is based on the current min and max requirements within the model. However, it is noted that each feed manufacturer or animal producers uses their own recipes. This is to give an industry viewpoint and not necessarily individual impacts. The most significant decreases in raw material usage were observed in yellow maize and soybean oilcake. Under a scenario reflecting a 30% reduction in the layer population, as experienced in 2023/2024, yellow maize consumption declined 210,243 tons, while soybean oilcake consumption dropped by 54,088 tons. This reduction in oilcake use corresponds to an estimated 72,117 tons of soybean production. Overall, total feed consumption decreased by 301,899 tons under this scenario.

Table 10: Scenarios of reduction in total number of hens and impact on raw materials categories

	2024	10%		20%		30%		40%	
Rawmaterial Categories	ton	ton	decrease	ton	decrease	ton	decrease	ton	decrease
Amino_Acids	20788	20650	-138	20524	-264	20393	-395	20258	-530
Byprod_Industry	772984	773050	65	772901	-84	773022	37	773144	160
Byprod_Milling	2023224	2023224	0	2023224	0	2023224	0	2023224	0
Byprod_Wet_Mill	240498	239980	-518	239462	-1036	238945	-1553	238427	-2071
Fishmeal	6812	6812	0	6812	0	6812	0	6812	0
Full_fat	148186	148186	0	148186	0	148186	0	148186	0
Grain	5698094	5627782	-70312	5558583	-139511	5487852	-210243	5417252	-280842
Minerals	581004	569323	-11680	556849	-24153	545367	-35635	533870	-47132
NPN	54143	54151	8	54134	-8	54132	-10	54143	0
Oilcake	1802340	1784285	-18055	1766137	-36203	1748252	-54088	1730238	-72102
Other	824026	824026	0	824026	0	824026	0	824026	0
Rendering	82187	82187	0	82187	0	82187	0	82187	0
	12254285	12153656	-100630	12053026	-201259	11952397	-301889	11851767	-402518

In the broiler sector as illustrated in Table 11, the most significant reductions in raw material consumption were observed in yellow maize, soybean oilcake, and limestone. Based on a 10% decrease in broiler production aligned with the estimated impact during the 2023/2024 Avian Influenza outbreak yellow maize consumption declined by 280,842 tons, soybean oilcake by 72,102 tons, and limestone by 39,520 tons. The reduction in soybean oilcake equates to an estimated 96,136 tons of soybean production. In total, this scenario resulted in a 402,518 ton decrease in animal feed consumption for broilers.

When considering the combined impact on both broilers and layers specifically a 10% decrease in broiler production and a 30% decrease in layers the total reduction in yellow maize consumption reached 490,885 tons, and soybean oilcake consumption dropped by 369,491 tons. This combined scenario led to a total decrease of 704,407 tons in overall animal feed consumption.

Table 11: Scenarios of reduction in total number of broilers slaughtered and impact on raw materials

	2024	10%		20%		30%		40%	
Rawmaterial Categories	ton	ton	decrease	ton	decrease	ton	decrease	ton	decrease
Amino_Acids	20788	20258	-530	17898	-2890	16447	-4342	15009	-5780
Byprod_Industry	772984	773144	160	750266	-22718	738478	-34507	726727	-46258
Byprod_Milling	2023224	2023224	0	2023224	0	2023224	0	2023224	0
Byprod_Wet_Mill	240498	238427	-2071	240498	0	240498	0	240498	0
Fishmeal	6812	6812	0	6812	0	6812	0	6812	0
Full_fat	148186	148186	0	148186	0	148186	0	148186	0
Grain	5698094	5417252	-280842	5266989	-431105	5053514	-644581	4839608	-858486
Minerals	581004	533870	-47132	550830	-30173	534549	-46454	518074	-62929
NPN	54143	54143	0	54179	37	54156	13	54172	30
Oilcake	1802340	1730238	-72102	1592342	-209998	1486937	-315403	1382067	-420273
Other	824026	824026	0	824026	0	824026	0	824026	0
Rendering	82187	82187	0	82187	0	82187	0	82187	0
	12254285	11851767	-402518	11557437	-696848	11209013	-1045272	10860590	-1393695

4.2 Foot and Mouth Disease

Over the past decade, South Africa has experienced multiple outbreaks of Foot-and-Mouth Disease (FMD), particularly in the provinces of Limpopo, KwaZulu-Natal, and parts of the Free State. These outbreaks have been primarily attributed to informal livestock movements and inadequate biosecurity practices. Should a severe FMD outbreak occur in feedlots across the country, it could result in a substantial decline in feed demand based on the assumption that culling is needed to control the disease and not quarantine .

To estimate this potential impact, 2024 was used as a baseline year, with various scenarios modelled based on reductions in feedlot cattle numbers. The most significant decreases in raw material consumption were observed in yellow maize and soybean oilcake. Under a scenario of a 10% reduction in feedlot cattle, yellow maize consumption decreased by 223,661 tons, while soybean oilcake declined by 12,888 tons, resulting in a total animal feed reduction of 253,497 tons.

In a more severe scenario reflecting a 40% reduction in feedlot cattle due to a widespread FMD outbreak yellow maize consumption dropped by 804,807 tons and soybean oilcake by 48,402 tons, leading to a total decrease in feed consumption of 1,013,989 tons, which equates to approximately 8% of the national animal feed usage.

Keep in mind this effect is simulated only for feedlot numbers and not the total impact of FMD.

Table 12: Raw material consumption under different feedlot number reductions due to FMD

	2024	10%		20%		30%		40%	
Rawmaterial Categories	ton	ton	decrease	ton	decrease	ton	decrease	ton	decrease
Amino_Acids	20788	20872	83	21035	247	21261	472	21272	483
Byprod_Industry	772984	772327	-657	772868	-116	772462	-522	772237	-747
Byprod_Milling	2023224	2023224	0	2023224	0	2023224	0	2023224	0
Byprod_Wet_Mill	240498	240498	0	240498	0	240840	342	240840	342
Fishmeal	6812	6812	0	6810	-2	6810	-2	6810	-2
Full_fat	148186	148186	0	148186	0	148186	0	148186	0
Grain	5698094	5474433	-223661	5250512	-447582	5060756	-637338	4893288	-804807
Minerals	581004	566389	-14614	552521	-28481	523765	-57238	490026	-90978
NPN	54143	52383	-1760	49773	-4369	47905	-6237	45198	-8945
Oilcake	1802340	1789452	-12888	1775650	-26690	1742372	-59968	1709742	-92598
Other	824026	824026	0	824026	0	824026	0	807287	-16739
Rendering	82187	82187	0	82187	0	82187	0	82187	0
	12254285	12000788	-253497	11747291	-506995	11493793	-760492	11240296	-1013989

5. Conclusion on impact of AI and FMD

This assessment highlights the significant vulnerability of South Africa's animal feed sector to disease outbreaks, particularly Avian Influenza (AI) and Foot-and-Mouth Disease (FMD). Using 2024 as a baseline, scenario modelling revealed that both poultry and livestock disease events have substantial consequences for feed consumption and raw material demand.

In the case of AI, reductions in layer and broiler populations—reflecting conditions during the 2023/2024 outbreak—resulted in considerable declines in the consumption of yellow maize and soybean oilcake, with combined feed losses exceeding 700,000 tons. These decreases have a direct knock-on effect on grain and oilseed demand, and highlight the sector's dependence on stable poultry output.

Similarly, FMD outbreaks present a serious risk to feed demand in the beef sector. A simulated 10% to 40% reduction in feedlot cattle due to FMD scenarios showed feed losses ranging from 253,497 to over 1 million tons, representing up to 8% of total national feed usage. These estimates are conservative, as they account only for feedlot cattle and not the broader livestock sector.

Overall, the data underscores the critical importance of disease prevention and biosecurity measures. Proactive management is essential not only to protect animal health and food security, but also to safeguard the stability of the animal feed industry and its associated value chains.