Sep - Nov 2025
Vol 34 No 4

ISSN 2308-0647

Matrix

AFMA SAFE FEED FOR SAFE FOOD
Animal Feed Manufacturers Association
80 Year! 1945-2025 ANNIVERSARY

Quarterly magazine of the Animal Feed Manufacturers Association

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The South African animal feed industry: Celebrating 80 years while looking ahead

By Anina Hunter, chairperson, AFMA

This year, the Animal Feed Manufacturers Association (AFMA) celebrates 80 years of growth, resilience, and service to the animal feed industry in South Africa. Since our establishment, AFMA has become a central force that unites stakeholders, advances industry practices, and drives food security as we stay true to our vision: To be a dynamic thought leader in animal feed, influencing food security through partnerships with all stakeholders, and ensuring 'safe feed for safe food'.

With the global population projected to exceed nine billion by 2050, food production must increase by at least 60%. AFMA and its members have a critical role to play in meeting this demand and ensuring that animal proteins such as poultry, beef, and pork are produced in a sustainable, affordable, and safe way, while maintaining consumer trust and regulatory compliance.

Anina Hunter.

We continue to build a collaborative environment that brings together academia, regulators, and producers. This network promotes knowledge sharing and evidence-based solutions that help improve practices across the feed and livestock industries. In the past year, we have strengthened partnerships across the agricultural value chain, ensuring that AFMA remains the voice of our industry.

Success stories

One of our notable contributions has been evaluating the impact of the soya meal import duty, which was introduced to support local soya bean cultivation and attract investment in crushing facilities. From importing 80% of our needs, South Africa has now become self-sufficient in producing soya bean meal – a remarkable achievement that marks one of the greatest agricultural success stories of the past decade. As the industry reaches maturity, it is time to consider whether the duty has fulfilled its purpose.

AFMA plays a key role in coordinating disease prevention efforts. Outbreaks of African swine fever, foot-and-mouth disease, and avian influenza threaten livestock health, feed demand, and national food security. Biosecurity must remain a top priority with support from government in terms of border protection, phytosanitary regulation, and vaccine approval. Notably, South Africa recently launched its first mass vaccination of poultry against avian influenza following an announcement and approval by the minister of agriculture, John Steenhuisen.

Competitiveness and operational efficiency continue to be challenged by port delays, road and rail deterioration, and utility disruptions. These infrastructure issues require urgent attention to safeguard the long-term viability of our sector.

Youth development

AFMA recognises that today's youth are tomorrow's industry leaders. Through educational initiatives and student engagement programmes, we are investing in the next generation of agricultural professionals – ensuring that they are equipped with the knowledge, skills, and values required to lead with impact.

As we reflect on AFMA's 80-year legacy, we reaffirm our commitment to leading the way forward. The animal feed sector will continue to play a central role in delivering safe, sustainable, and nutritious food for a growing global population.

Thank you to our members, partners, and the AFMA team for your continued commitment and dedication to this essential industry. ❖

To contact Anina Hunter, send an email to anina.hunter@epol.co.za

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On the cover:
Join us as we celebrate 80 years of feed industry excellence in this special issue of *AFMA Matrix*.

EDITORIAL COMMITTEE

Published by: Plaas Media (Pty) Ltd
217 Clifton Ave, Lyttelton, Centurion, RSA
Private Bag X2010, Lyttelton, 0140, RSA
Tel: +27 12 664 4793 • *www.agriorbit.com*

Associate editor: Liesl Breytenbach
+27 12 663 9097 • liesl@afma.co.za

Chief editor: Lynette Louw
+27 84 580 5120 • lynette@plaasmedia.co.za

Deputy editor: Jayne du Plooy
jayne@plaasmedia.co.za

News editor: Susan Marais
susanmarais@plaasmedia.co.za

Design & layout:
Annemie Visser • annemie@plaasmedia.co.za
Inge Gieros • inge@plaasmedia.co.za

Advertising:
Karin Changuion-Duffy
+27 82 376 6396 • karin@plaasmedia.co.za
Susan Steyn
+27 82 657 1262 • susan@plaasmedia.co.za
Illa Hugo
+27 82 898 3868 • illa@plaasmedia.co.za

Sales manager: Marné Anderson
+27 72 639 1805 • marne@plaasmedia.co.za

Subscriptions: Beauty Mthombeni
+27 64 890 6941 • beauty@plaasmedia.co.za

Printed and bound by:
Business Print
+27 12 843 7600

Published on behalf of AFMA
Agri-Hub Office Park, Block B,
477 Witherite Str, The Willows, Pretoria
+27 12 663 9097 • *www.afma.co.za*

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NEWS & VIEWS

Could grain industry operate rail lines?

South Africa's grain industry has a clearer idea about the future of rail transport after Moshe Motlohi, acting chief executive of the newly established Transnet Rail Infrastructure Manager (TRIM), met with officials of Agbiz, Agbiz Grain, and the South African Cereals and Oilseeds Trade Association (Sacota) on 22 July.

In South Africa, the cost of rail is approximately two-thirds more affordable than road transport. This potential saving often means the difference between whether South Africa is competitive in the grain export market or not.

The 'new' TFR will in future compete with private network operators that will be licensed to use the rail infrastructure. Private entities that wish to offer network operator services must apply for a licence from TRIM. The first opportunity has already taken place with applications closing on 27 February 2025. A total of 98 applications were received. – *Dr André van der Vyver, executive director, Sacota*

Better canola without sacrificing quality

Future Canadian producers will be able to expect both better yield and more stress tolerance out of their canola crop if researchers at the University of Guelph have anything to say about it. The Guelph team is well into the process of developing a more robust, transgenic canola plant that produces bigger stems and increased biomass without impacting oilseed quality.

"We have increased numbers of stems up to 60%, increased numbers of siliques (seed pods) up to 40% and a total seed yield per plant increase of 35%," says Ian Tetlow, a professor with the university's department of molecular and cellular biology. "We're using gene editing to improve canola yield, but as a result of some of the work we've done it has also enabled us to protect that yield and increase stress tolerance in the plants that we've produced."

The high-biomass canola may be less prone to lodging, although researchers have not yet been able to test that theory in the field. It does, however, appear to perform well under drought and heat. – *The Western Producer*

GOSA workshop: Guarding grain

The development of audit criteria for health and safety – specifically regarding the grain storage industry and the growing problem of grain theft in the country – was a key topic at a recent workshop of the Cape branch of the Grain Handling Organisation of Southern Africa (GOSA), held on 16 July at Aan de Doorns Wine Cellar near Worcester.

Jaco Joubert, health and safety manager at Overberg Agri, briefed GOSA Cape members on the importance of dedicated audit criteria for health and safety. He also shared updates on the progress made by Agbiz Grain in developing an industry-specific audit protocol tailored to the grain storage sector. – *Hugo Lochner, Plaas Media*

ASC certification reaches new feed mills

The global momentum behind responsible aquafeed production continues to grow, with 18 feed mills across 12 countries achieving certification to the *ASC Feed Standard* in the first half of 2025.

Feed mills in Norway, Japan, Ecuador, the United Kingdom, Australia, Canada, Chile, Vietnam, Spain, Italy, Honduras and Costa Rica have all joined the ranks of ASC-certified producers – signalling a shift in the aquaculture sector towards more sustainable and socially responsible practices. With these latest additions, a total of 35 feed mills across 14 countries have now achieved ASC Feed certification.

The use of ASC conforming feed is necessary for ASC certified farms to meet the *ASC Farm Standard* and retain their certification. – *The Fish Site*

NWK hopeful despite dry spell

Although NWK Limited's group income rose by R156 million to just under R6 billion for the 2024/25 financial year, profit after tax dropped by 50% to R114,3 million. The decline comes as no surprise given that grain receipts were down by 43,4% compared to the previous year. This is a direct result of severe drought conditions experienced across NWK's operating area, resulting in the driest season in 52 years and the worst since 2012.

One of the big wins of the year came from NWK's sunflower oil press, Epko, which turned a record profit of R87 million. Despite the dry season, sunflower crops delivered good oil and protein content, and a new power line helped to ensure consistent processing. The company now looks forward to ramping up production, with a new refinery expected to be fully operational in the coming season. – *AgriOrbit*

Alberta producers can salvage poor crops

The 2025 crop year continues to be challenging in some regions of Alberta, Canada. The Agriculture Financial Services Corporation (AFSC) has adjusted the low yield allowance, enabling producers to salvage crops for livestock feed in an effort to reduce producers' feed-related costs.

The low yield allowance is a standard part of production insurance and is meant for situations where there may not be value in harvesting for grain, for example, low yield due to extreme heat and severe drought.

"The impact of ongoing dry conditions in some regions of the province is concerning for Alberta's agricultural community," says RJ Sigurdson, minister of Alberta Agriculture and Irrigation. "This adjustment lets producers act swiftly to salvage crops for livestock feed, rather than watch their fields deteriorate further and risk harvesting nothing." – *Feed Strategy*

Insecticides cut dung beetle numbers

Researchers with the Cornell Integrated Pest Management programme have been working in collaboration with farms across New York state in the United States to understand how feed-through pesticides – insecticides added to cattle feed to kill flies – impact dung beetle populations.

Both flies and dung beetles lay their eggs in manure pats. Larvae eat the manure and then hatch as fully-grown insects. Dung beetles control flies by competing for the same manure for food and shelter.

Initial findings suggest that farms that use feed-through insecticides have "significantly lower" dung beetle populations and beetle species diversity. In addition, the research showed that horn fly numbers rarely exceeded thresholds at which treatment is needed to prevent economic loss. Face fly populations were lowered by insecticides but almost universally exceeded problematic levels, even at farms using insecticides, suggesting the treatment was not addressing the problem. – *Phys.org*

Hidden cost of mycotoxins in poultry feed

Crops contaminated by mycotoxins may be costing poultry organisations more than £150 000 in losses annually. Ground-breaking research from Queen's University Belfast demonstrates that harmful chemicals in mycotoxins can negatively affect both the environmental and economic sustainability of the global poultry industry by contaminating animal feed.

The study, which saw collaboration from dsm-firmenich Animal Nutrition and Health and BOKU University, Vienna, and the Austrian Competence Centre for Feed and Food Quality, Safety and Innovation, showed that even very low levels of mycotoxins can increase the carbon footprint of poultry production by more than 8%.

Dr Gerd Schatzmayr, head of global R&D centres at dsm-firmenich Animal Nutrition and Health and fellow co-author, said the economic stakes were substantial.
– *Poultry World*

Understanding feed biosecurity in swine production

"The global nature of feed trade combined with the environmental stability of major swine viruses creates a perfect storm for transboundary disease transmission," says Dr Francisco Domingues, Anitox global technical director of swine markets. "What we've learned from recent research is that feed biosecurity can no longer be an afterthought in swine production systems."

In landmark transport simulation studies, researchers documented viral viability in feed ingredients over remarkable durations, namely 23 to 37 days for porcine epidemic diarrhoea virus (PEDv) in soya bean meal, vitamin D, lysine hydrochloride, and choline chloride; 23 days for porcine reproductive and respiratory syndrome virus (PRRSv) in soya products; and multiple weeks for African swine fever virus (ASFv) during simulated transoceanic shipment.

The recognition that feed can serve as a vector for viral transmission has fundamentally changed how the feed mill industry approaches biosecurity. – *Pig Progress*

New factory to end imported feed dependence

Mozambique will soon stop importing animal feed from Malawi, because it will have its own factory supplying feed for poultry producers throughout the north of the country, president Daniel Chapo promised.

Speaking in Gurue district, in the central province of Zambezia, shortly after visiting the premises of the new factory, Chapo said it will supply feed to producers not only in Zambezia, but in the northern provinces of Nampula, Niassa and Cabo Delgado. "This will allow us to make poultry production a reality, including breeding hens, chickens and eggs, in the north of our country," he said. Up until now most of the chickens and eggs in the northern provinces have been imported from Malawi.

The new factory is an initiative of the National Industrialisation Programme (PRONAI), run by the Ministry of the Economy. The workers in the new factory, Chapo added, will be young Mozambicans, for whom the government is building "a new economy with decent jobs". – *Club of Mozambique*

Cattle feed adulteration rampant

A troubling cycle of adulterated cattle feed has emerged in Jhenaidah, Bangladesh, defrauding producers and endangering public health and local economies. Local producers have reported that these animal feeds, made from a toxic mixture of rotten rice, wheat, rice husks, and expired flour, are not only making animals sick but are also poisoning the human food chain indirectly.

Although local authorities occasionally conduct mobile court operations and impose fines, the perpetrators quickly resume their illicit activities once the law enforcement officials leave. Most producers have mentioned that they are continually facing losses, as their cows get sick more often, and milk production has drastically decreased after consuming this harmful feed.
– *Daily Sun*

Congratulations to our AFMA Intervarsity Writer's Cup 2025 winners

Literature review: Anri Pienaar

Anri Pienaar's literary review paper titled "The effects of limestone variability on nutrient metabolism and performance in laying hens" was published in the July 2025 issue of *AFMA Matrix*. Anri is a student at the University of Pretoria and decided to enter her article in the "Nutritional science: All species" section. Her promotor was Christine Jansen van Rensburg.

Her review focussed on the fact that plant-based poultry diets are naturally deficient in calcium (Ca), which necessitates dietary supplementation with a concentrated Ca source, typically limestone.

However, limestone's chemical and physical properties influence its bioavailability, affecting Ca and phosphorus (P) metabolism in poultry. These variations result from differences in geological origin, particle size, and mineral content, impacting nutrient availability.

Understanding how these factors influence nutrient availability is vital for optimising bone mineralisation, production performance, eggshell quality, and animal welfare.

The judging panel agreed that Anri's article was well-structured, contained few errors, and generally used sources well.

Anri Pienaar.

Own research: Cherise Basson

Cherise Basson's article titled "Supplementing pasture-based dairy cows with *Aspergillus oryzae* fermentation product" addressed the use of non-antibiotic alternatives to increase feed efficiency in livestock production. Direct-fed microbial feed additives are commonly used in dairy farming to increase nutrient intake and utilisation, boost production efficiency, and reduce the risk of metabolic disorders.

While these additives are particularly beneficial during periods of physiological stress, the mechanism by which these feed additives exert their effects, differ. This research article addresses the manner in which *Aspergillus oryzae* functions and affects dairy cows' milk production.

Cherise is a student at Stellenbosch University and she wrote the article under the guidance of Drs Robin Meeske and Lobke Steyn.

The judging panel was happy that Cherise wrote a scientifically sound article that was well-structured and well-formatted.❖

Cherise Basson.

AFMA TIMELINE (1935 TO 2025)

1935

- The first five-tonne electrical feed mixer is installed at Lions Bridge in Arcadia, Pretoria, heralding the beginning of modern feed manufacturing in South Africa.

1939

- Annual compound feed production reaches 12 000 tonnes, setting an early benchmark and highlighting the industry's steady expansion before formal organisation.

1945

- The Association of Manufacturers of Balanced Feeds is founded, formalising industry representation and advocacy.

1947

- The Association hosts its first annual general meeting, marking the start of formal governance structures, member representation, and sector-wide policy engagement.
- *Act 36 of 1947* is promulgated, establishing the legal framework for regulating animal feeds and agricultural remedies in South Africa.

1956

- The *Dey Report* is commissioned, the Animal Feed Manufacturers Association's (AFMA) first formal step in establishing industry data credibility and influencing pricing policy.
- AFMA helps to form the Society of Animal Nutritionists (now the South African Society for Animal Science [SASAS]), strengthening scientific collaboration.

1957

- Government formally accepts AFMA's proposed cost-based margin formula, officially recognising the feed industry's importance as a strategic input supplier.
- Pricing structures are refined to include railage and discounts, improving fairness and market transparency.

1958

- AFMA collaborates with the South African Bureau of Standards (SABS) to set formal pig feed specifications, ensuring higher nutritional standards and feed consistency.

1959

- AFMA collaborates with Onderstepoort and a panel of leading nutritionists to develop one of South Africa's first standardised dairy feed formulas, which is later referenced in public procurement tenders as a benchmark for quality and nutrition.

1960

- Direct government price controls on balanced feeds are lifted for the first time, empowering AFMA to promote voluntary, responsible pricing approaches.
- Deregulation of fish- and bonemeal sourcing introduces new flexibility but brings challenges in raw material quality and price volatility.

1961

- AFMA champions a shift in farm economics by encouraging evaluation of feed value per output (milk or meat) rather than per bag cost.
- AFMA identifies a shortage of qualified animal nutritionists and proposes industry-funded scholarships, shaping future research and skills capacity.

1962

- AFMA formally moves its secretariat from the Transvaal Chamber of Industries, where administrative support has been provided as part of a shared services arrangement, to the Maize Millers Mutual building.
- A new membership subscription and production levy system is implemented (R10,50 per member plus ½ cent per tonne of feed produced), providing AFMA with a secure, predictable financial base.

1963

- AFMA initiates plans for a joint raw material procurement scheme to help smaller manufacturers secure fairer prices and improve competitiveness.
- AFMA pushes for seats on the Mealie Board and Oil Seeds Control Board, strengthening its voice in national feed and protein policy decisions.

1964

- Amid a nationwide vegetable protein shortage from aflatoxin contamination, the association works with the Oilseeds Control Board, Agriculture Department, and Oil Expellers to secure fair allocation of clean oilcake to feed manufacturers.
- The association proposes practical labelling to avoid full additive registration and engages Onderstepoort to create a simplified, unified formula, reinforcing its technical leadership and collaboration with government.

1965

- AFMA joins the Federated Chamber of Industries, affirming its influence beyond agriculture into national industrial policy.
- AFMA supports maize substitution with kafir corn (grain sorghum) for drought-stricken areas, positioning itself as a practical solutions partner to government in times of crisis.
- AFMA responds to poultry breeder concerns about hatchability, initiating technical subcommittees and laying the foundation for modern species-specific ration design. This marks a turning point in AFMA's focus on poultry nutrition.

1968

- Feed sales hit a record high of 933 327 tonnes, confirming rapid growth and growing trust in scientifically formulated feed.

1975

- AFMA formalises governance with clearer voting rights, quorum rules, and standard resolutions. This strengthens transparency, ensures fair member representation, and lays the foundation for AFMA's future as a professional, incorporated association.
- Members raise concerns over raw material quality, prompting AFMA to promote standardised lab testing and early feed quality assurance, laying the foundation for future safety and audit systems.
- AFMA intensifies engagement with the Department of Agriculture, lobbying for practical updates to the *Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act 36 of 1947)*, securing a stronger voice in policy formulation to support safe, modern feed innovation.

1976

- AFMA drafts its first Code of Practice for feed manufacturing, marking the beginning of formal self-regulation and a commitment to quality.
- AFMA's membership expands as mineral premix manufacturers and specialised supplement producers join, strengthening technical expertise and broadening industry representation.

1977

- AFMA gains influence in national protein security strategies through the Protein Advisory Committee, linking feed manufacturing to broader food security policy.

1978

- AFMA's technical committee focusses on reducing confusion in the market by introducing clearer, standardised names for compound feed products.

1979

- AFMA advises decoupling soya bean and sunflower oilcake prices from volatile fishmeal benchmarks, promoting stable, market-driven protein pricing.
- AFMA's technical committee urges product diversification to meet evolving production needs, paving the way for tailored rations and phase feeding strategies.

1980

- The Registrar of *Act 36 of 1947* appoints dedicated inspection services to ensure consistent compliance with feed safety and registration standards.
- Comprehensive raw material cost benchmarking surveys are introduced, laying the groundwork for transparent, data-driven feed pricing.
- A key development is the formalisation of associate membership, allowing suppliers, equipment providers, and non-manufacturing stakeholders to become AFMA members.

1981

- AFMA's early draft Code of Practice (initiated in 1976) is refined into a more detailed framework, covering production hygiene, ingredient integrity, and formulation practices.
- As AFMA's membership base expands beyond traditional large millers to include smaller regional producers and specialised feed manufacturers, debates arise over fair voting rights and representation in decision-making processes. The need to balance influence between larger and smaller players lead to initial proposals for updated governance models and more equitable voting frameworks.

1983
- Complaints over fishmeal shortages lead AFMA to propose a fishmeal importation company to stabilise supply and ensure fair distribution.
- AFMA explores alternative proteins, such as soya bean and sunflower oilcake, to reduce reliance on fishmeal and improve supply security.

1984
- A national protein crisis sparks proposals for a multi-stakeholder National Protein Committee, positioning AFMA as a key crisis management partner.

1986
- AFMA members begin formalising processes for collecting more accurate production, sales, and raw material usage data across feed mills.

1988
- AFMA is formally renamed the Animal Feed Manufacturers Association and restructured as a Section 21 company with a new Memorandum of Association.

1989
- AFMA recognises the need to establish a permanent professional secretariat, shifting away from the mostly honorary and part-time structure.
- AFMA membership formally records at 51 full members and four associate members, reflecting a broader and more inclusive industry representation.

1990
- The first AFMA Student of the Year award is presented to Dirk van der Linde from Stellenbosch University.
- Fishmeal begins to decline in poultry and pig rations while soya bean oilcake becomes the industry's protein base, supported by local crushing capacity and amino acid balancing.

1992
- *AFMA Matrix* magazine is launched, and the first AFMA technical symposium is held, deepening communication and knowledge transfer.

1993
- Dr Munro Griessel is honoured as the first AFMA Person of the Year, recognising exceptional leadership and contribution to feed science.

1994
- AFMA adopts its first formal Code of Practice, laying the groundwork for the Code of Conduct (CoC) formally implemented in 2008.

1995
- AFMA intensifies lobbying for a soya bean oilcake import rebate, positioning itself as a strategic voice in protein cost debates.

1997
- AFMA transitions to a full-time secretariat. Monthly feed sales reporting and industry benchmarking are institutionalised.

1998
- The first AFMA Technical Person of the Year award is presented to Dr Martin Neitz.

2000
- Traders are formally accepted as AFMA members, broadening representation and industry inclusivity.

2005
- The first official draft of the AFMA CoC is released, coinciding with rising global concern over feed safety, traceability, and consumer protection.
- AFMA launches the *Salmonella* monitoring programme aimed at tracking contamination in raw material, finished feeds and environmental surfaces.

2006
- AFMA registers its modern logo and the slogan 'safe feed for safe food' as a trademark, reflecting a renewed brand identity and food safety commitment.
- AFMA finalises and adopts its CoC including Good Manufacturing Practice (GMP), the first steps towards self-regulation and quality assurance.

2007
- AFMA formally joins the International Feed and Industry Federation (IFIF) and begins active participation in Codex committees on feed and food safety, expanding its technical and policy influence into global standard-setting platforms.

2008
- Compliance with the CoC is made mandatory for membership, marking the transition from voluntary ethics to enforceable standards. Independent audits are initiated through Afri Compliance, using a rigorous nine-point audit framework. Meadow Feeds Group is the first to comply.
- AFMA's first website is launched on 14 July.

2009
- AFMA joins Agbiz, expanding its policy influence and aligning feed advocacy within broader agricultural value chains.
- Ceva Animal Health is the first associate member to comply with the CoC.

2010
- A tenth point of compliance is added to the CoC, incorporating transport standards for biosecurity and traceability.

2011

- The Feed Miller Short Course is launched in partnership with Bühler and the Swiss Institute of Feed Technology.
- A full-time secretariat is established to support the South African Cereals and Oilseeds Trade Association (Sacota).
- All members comply with the CoC audit requirements, reinforcing accountability and credibility within the sector.
- Meader Feeds becomes the first Southern African Development Community (SADC) member of AFMA to comply with the CoC.

2012

- The Feed Milling Operator qualification is nationally accredited with the South African Qualifications Authority (SAQA).
- AFMA is elected to the IFIF Board and chairs global committee.

2013

- AFMA co-hosts the Global Feed & Food Congress in partnership with IFIF and the Food and Agriculture Organization (FAO).
- AFMA introduces the transport protocol, promoting the safe transport of raw material to feed mills.
- AFMA develops, in partnership with *Act 36 of 1947*, the first template for reporting registration statistics to industry.

2016

- The Feed Registration Backlog project is launched, a breakthrough public-private partnership under *Act 36 of 1947*.

2017

- AFMA's technical committee revises mineral specifications for ruminant feeds in response to clinical symptoms in cattle identified by Onderstepoort, strengthening its role in animal nutrition policy and regulation.
- AFMA's Intervarsity Writer's Cup competition is introduced to South African universities.

2018

- AFMA supports the University of Pretoria in building a research and training feed mill that will offer practical training in feed milling.

2019

- AFMA's technical committee initiates the review of nutrient specifications for all complete and supplement farm feeds as input to the amendment of *Act 36 of 47* farm feed regulations, including a novel classification system and specifications for game feed, a first in South Africa.
- AFMA awards the first grand winner of the AFMA Intervarsity Writer's Cup competition.

2020

- AFMA assists the Association Kenya Feed Manufacturers (AKEFEMA) in Kenya to embed new governance structures and strengthen strategy execution, extending its regional leadership role.
- AFMA adopts a new vision statement: 'The dynamic animal feed thought leader, influencing food security through partnerships with all stakeholders.'
- During Covid-19 lockdowns, AFMA plays a pivotal role in securing official recognition of the animal feed industry as an essential service, ensuring uninterrupted movement of feed and raw materials during lockdown restrictions.

2021

- AFMA assumes full in-house administration of the CoC process and introduces a pre-screening phase and membership numbers. Two additional requirements are added to the industry code.
- AFMA plays an instrumental role in establishing the Strategic Agricultural Inputs Forum (SAIF), representing a collaborative industry platform for input suppliers.
- The Sacota contract for secretarial services ends in October.

2022

- AFMA introduces a new membership category, namely Affiliate Membership; warehouse audits are now mandatory for all members using off-site warehousing.
- AFMA appoints Anina Hunter, its first female chairperson of the board of directors.

2023

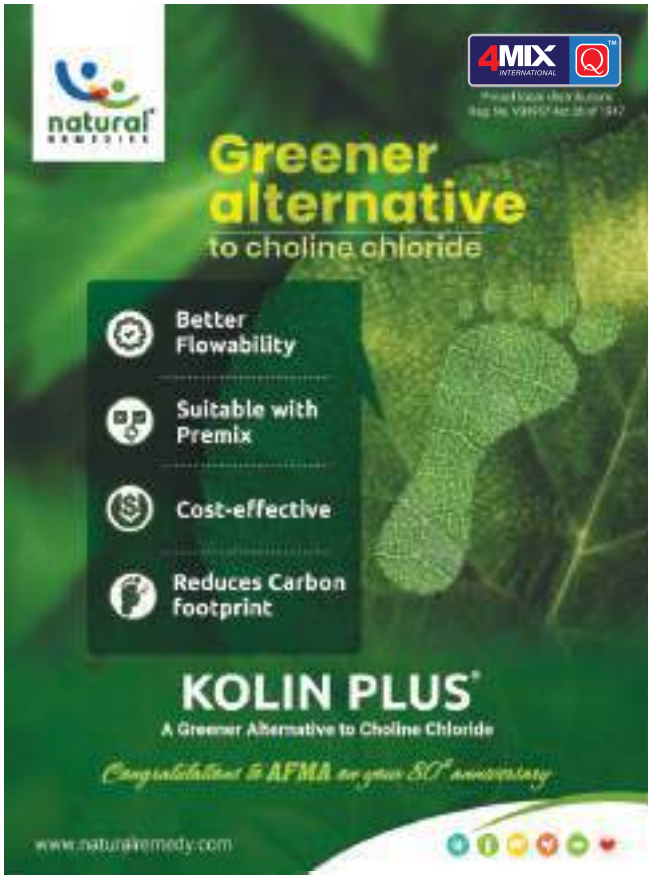
- AFMA appoints Liesl Breytenbach, its first female executive director.
- Affiliate membership categories are changed to include non-governmental organisations (NGOs).
- Avian influenza outbreaks heavily affect the poultry sector, significantly impacting feed production.

2024

- AFMA adopts a strategy built on four pillars: affordable feed supply, innovative animal nutrition, safe feed for safe food, and training and skills development.
- AFMA appoints its first intern in the office.
- AFMA initiates the Student Nutrition Poster award at the symposium.

2025

- Remote audits are introduced for specific member categories, including traders that do not use warehousing and manufacturing facilities in neighbouring SADC countries, and do not export to South Africa.
- AFMA launches its newly developed website.
- AFMA celebrates its 80th anniversary, reflecting on eight decades of leadership in animal nutrition, safety, and policy influence.



AFMA's emergence and voice (1930s to 1960s)

By Petru Fourie, operations manager

The roots of South Africa's animal feed industry can be traced back to the economic hardship of the Great Depression in the 1930s. Faced with severe financial pressures, local livestock producers needed new ways to keep livestock productive and healthy.

In 1935, Lion's Bridge in Pretoria installed the country's first five-tonne electrical feed mixer, a technological breakthrough that allowed early feed manufacturers to blend balanced rations systematically. This laid the foundation for what would become the formal compound feed sector in South Africa.

A collective voice takes shape

By 1945, after World War II, it became clear that no single manufacturer could steer the increasingly complex and restrictive agricultural policies alone. To address this, forward-thinking feed manufacturers formed the Association of Manufacturers of Balanced Feeds, which would eventually become AFMA.

Initially, it focussed on basic representation and knowledge sharing. However, it quickly became apparent that more strategic leadership and unified advocacy were needed to secure fair market access and shape agricultural policy.

Building credibility through data

The real turning point came in 1956 with the commissioning of the now-famous *Dey Report* of Greenwood, Poulton & Co. Not only did the report provide numbers; it also was the industry's first data-driven tool for influencing policy, defending margins, and being recognised as a vital input supplier to livestock production.

This groundbreaking independent study analysed the real costs of producing animal feeds. As noted in the *1956 Chairman's Report*: "The object of the investigation was to determine the true cost of producing feeds."

Armed with credible data, the association approached the National Marketing Council to demand fair recognition of feed manufacturing as a critical agricultural input. This led to the approval of a cost-based margin formula for regulated feeds (9% on working capital and 10% on fixed capital) in 1957. Not only did this win secure better pricing; it gave manufacturers the confidence to expand capacity, invest in specialised nutrition, and strengthen the foundation of the livestock industry.

Towards professionalisation

Its new credibility rapidly transformed the association. In 1962, the secretariat moved from the Transvaal Chamber of Industries to Maize Millers Mutual Insurance Company, a step that reflected closer alignment between feed manufacturers and the country's dominant maize-processing sector. This marked a decisive shift towards independence and more professional administration.

Core governance changes followed: standardised minute-keeping, rotating chairpersons, and the introduction of a production-linked membership levy. These measures laid the financial and organisational groundwork for future national influence. In 1963, AFMA sought seats on the Maize Industry Control Board and Oilseeds Control Board, strategic moves that integrated feed manufacturers into broader national protein and grain supply policy decisions.

Throughout this era of statutory control boards and strict price regulation, AFMA became the key liaison between state structures and feed manufacturers, helping direct a tightly controlled policy environment. This strengthened its influence and further cemented its role as the industry's voice in influencing agricultural policy.

Groundwork for self-regulation

By 1964, as more scientific nutrition principles took hold, new additives such as synthetic vitamins and enzymes began entering rations. However, the F*ertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act 36 of 1947)* had not kept pace, creating many grey areas. AFMA engaged in intense debates on additive registration, labelling, and quality control, drafting technical guidelines that emphasised practicality and science.

One prescient comment summed up AFMA's stance: "It is neither practical nor scientifically justified to re-register every known vitamin under individual trade names. A framework based on active ingredients should be adopted." These discussions laid the early philosophical foundation for AFMA's later self-regulation and feed safety monitoring systems.

Culture of ethics and excellence

Though AFMA's formal Code of Conduct would only be adopted decades later (2008), its principles started forming as early as the 1960s. Work on additive standards, member communication, and ingredient integrity reflected a strong emerging culture of quality and ethical practice. By the mid-1960s, AFMA's growing role was formally recognised when it became an associate member of the South African Federated Chamber of Industries. This milestone extended its influence beyond agriculture, into broader national economic discussions.

Conclusion

The 1950s and 1960s were not just formative years; they were foundational decades for AFMA. What began as a loosely connected group of feed manufacturers became a respected national institution, one capable of negotiating margins, guiding regulations, and shaping technical standards. More importantly, AFMA demonstrated that industry progress depends on credibility, technical rigor, and ethical leadership. ❖

From modest beginnings to remarkable success

By Hansie Bekker, former general manager, AFMA

After AFMA decided in 1998 that it should have its own secretariat, I was appointed on 1 January 1990 to establish it. From 1983 to 1989, Dr Roger du Toit, who managed several entities, also oversaw AFMA's administration.

AFMA's first office and committee room, where all meetings were held, was in Rivonia, and my new secretary and I started working from there. We were also responsible for serving refreshments after meetings. In response to a remark to the chairperson, Dr Munro Griessel, that brandy was rather expensive at over R100 a bottle, his only comment was: "It's still a bargain".

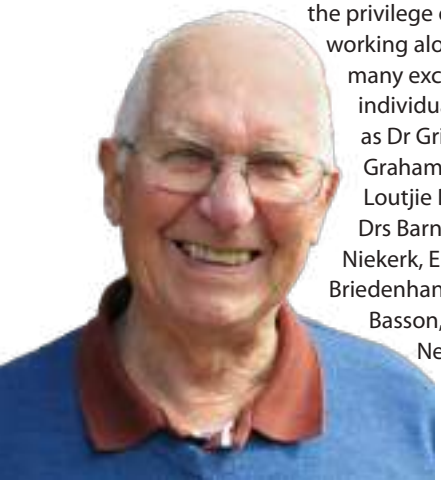
AFMA's office was moved to Centurion in 2002. My wife, Elize, sometimes baked a pot bread for smaller functions, and one day, when the board meeting was adjourned for lunch, we noticed that the bread no longer had crusts. Apparently, someone could not resist the temptation!

Many issues were discussed over the years but were not always implemented. These matters, along with new ones raised by the board, the technical and other committees, always kept us busy – and I remain grateful to have been part of it all.

Notable achievements up to 2006

- The association officially approved AFMA as its abbreviation in both English and Afrikaans. The AFMA logo, which is still in use today in an updated form, was also designed.
- AFMA launched *AFMA Matrix*, a formal trade magazine aimed at communicating industry developments to stakeholders. The first edition appeared in 1992.
- Recognising the need for a local feed industry congress, AFMA established a congress committee. Just six months later, the first AFMA Congress was held at Sun City in 1992. The event continues to be hosted there every three years.
- In 1998, Roger Gilbert, CEO of the International Feed Industry Federation (IFIF), delivered a lecture at the AFMA Forum, marking the start of a strong and lasting relationship. Gilbert encouraged AFMA to connect with other African feed manufacturers. This led to my visit in January 2004 to the Association of Kenya Feed Manufacturers (AKEFEMA), AFMA's first direct engagement with the wider African feed industry.
- *AFMA Matrix* and the congresses became key platforms for technical knowledge exchange, supported by an annual technical symposium featuring local – and later, with member support, international – speakers.
- To introduce AFMA and the animal feed industry to future professionals, four to five student symposia were held annually at universities, with industry speakers presenting.
- AFMA initiated a cost survey of feed sales, drafting and circulating the necessary documents to members. Representatives visited members to resolve issues, after which a detailed report was compiled.
- By April 2005, AFMA had 67 members: 41 feed manufacturers and associate members, ten traders, six premix manufacturers, and ten raw material suppliers. Ongoing efforts were made to recruit smaller producers.
- Strong communication was maintained with key organisations influencing the feed industry, including the Department of Agriculture, NAMPO, and the Protein Research Foundation or PRF.

During my 16 years at AFMA, I had the privilege of working alongside many exceptional individuals, such as Dr Griessel, Graham Ebedes, Loutjie Dunn, Drs Barney van Niekerk, Erhard Briedenhann, Billy Basson, Martin Neitz, Hinner Köster, and many others.



I valued their expertise and insight – though we had the occasional disagreement! My own team was always small, never more than two members. Teresa Struwig, my last secretary, played a key role in our move to Centurion in 2002, by which time we had progressed far beyond keeping just a minute book.

An extraordinary success story

AFMA will always remain close to my heart. I entered the industry during a new phase, and my interest in its progress has never waned. I continue to be inspired by the achievements of executive directors De Wet Boshoff and Liesl Breytenbach, together with their teams and the dedicated AFMA committees. Since the decision to establish an independent secretariat, AFMA has grown from strength to strength. I am humbled and grateful to have been part of this remarkable journey.

On this 80th anniversary of the association's founding, I extend my warmest congratulations to Anina Hunter and Michael Schmitz, chairperson and vice-chairperson, the board, Liesl and her staff, and every AFMA member. I wish you continued success on the road ahead.❖

Looking back on my 18-year AFMA journey

By De Wet Boshoff, former executive director, AFMA

Reflecting on my 18-year journey managing AFMA, the first and most important thing that comes to mind is what an enormous privilege and honour it was being allowed to steer the association into the modern era of the agricultural environment. I always fulfilled the role of AFMA ambassador with pride, and passionately represented the association and its members at local and international forums.

However, this journey would not have been possible without the support of a highly skilled and dedicated team of motivated individuals who I could always rely on and trust. This special team would walk through fire to champion the association's cause – and I salute you for that.

An industry leader

The modernisation of AFMA's new look and feel was a unique, creative, and exhilarating experience at all levels, inspiring a culture of purpose and drive within the team regarding new ideas and a novel way of doing things. AFMA has always prided itself on improvement and forward thinking, qualities that the association has become known for in the industry.

Something I'm very proud of is the fact that AFMA, after reclaiming its rightful place in both the grains and oilseeds value chain, as well the governmental regulatory space, became one of the top three influential policy and regulatory influencers from industry side. AFMA fulfils such an important role that neither the grain value chain nor government regulators will approve or reject policies and regulations without consulting AFMA first for its input.

International regulatory influence

AFMA's greatest achievement in this space was assisting the International Feed Industry Federation (IFIF) in convincing Codex Alimentarius to create a task force on feeds, advising international food regulators on possible impacts of feeds on food.

Secondly, AFMA took the lead globally as the first feed association within the IFIF to audit an industry code by an independent third party, which clearly sparked work and discussions among all feed associations to reassess their industry codes – with some also moving to third party audits.

Critical local contributions

The single largest issue being driven by AFMA, besides feed registrations, was and still is the supply, demand, processing, and trade of soya beans and soya bean products. AFMA is currently one of the main stakeholders working towards a system that ensures effortless access to the product with as few as possible obstacles, be it trade policy or regulatory related.

From the beginning, AFMA was and will always be the South African Poultry Association's (Sapa) leading supporting industry value chain partner, a role that it plays to the best interest of its members and local poultry integrators. AFMA was a leading driver in three of the processes of the *Agriculture and Agro-processing Master Plan* (AAMP), while playing a key supporting role, alongside Sapa, in the *South African Poultry Master Plan*.

Going forward

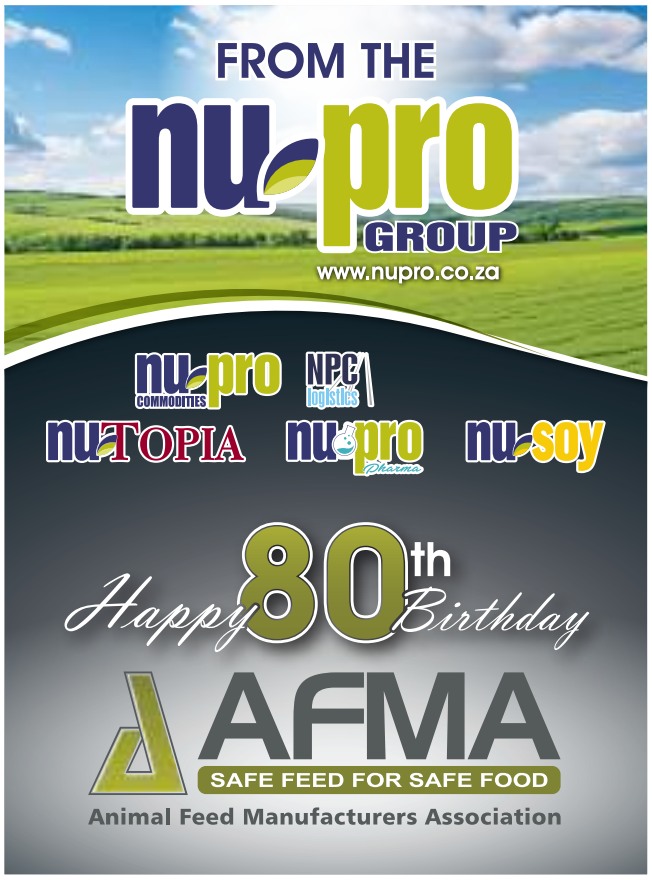
My message to the AFMA team is simple: Keep up the excellent work you are doing, stay true to yourselves, and continue making us proud.

To our industry decision-makers: Always remember that AFMA is a organisation of members, and the members are AFMA. Therefore, prioritise broadening representation at decision-making level. AFMA is an industry representative body with its own unique character and internal dynamics, so respect and preserve that. AFMA serves the interests of all members (big and small) wholeheartedly, therefore guard against 'us' and 'them', and promote 'all members are equal'. And lastly, AFMA cannot be run as if it is a JSE-listed corporate company, because it is not.

I thank you. It has been a privilege and an honour! ❖

Local regulatory influence

- Although discussions about modernising *Act 36 of 1947* date back to the mid 1980s and early 1990s, a key breakthrough was securing government's in-principle agreement to shift from registering each feed individually to licencing all manufacturing facilities instead.
- The introduction of the AFMA Code of Conduct (CoC) audit system to verify member compliance and ensure that government knows that the *CoC* will be run and maintained at an international level.
- AFMA proved its credibility as a trusted partner by investing more than R1 million to assist *Act 36* to work through an overwhelming backlog of new feed registrations, benefiting its members and government.
- AFMA was instrumental in setting up reporting database templates for *Act 36*, which are still being used today.
- During Covid-19, AFMA was instrumental in negotiating and establishing the Strategic Agricultural Inputs Forum (SAIF). This was the first true private public partnership legally signed between industry and government in this segment, chaired by AFMA and the Registrar of *Act 36*.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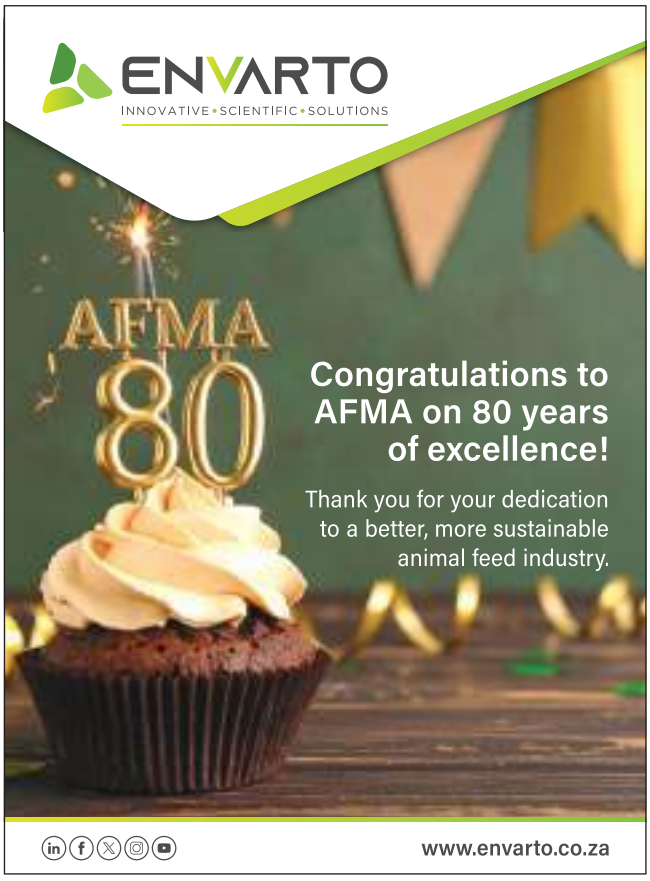
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Taking AFMA to new heights with a dedicated team

By Liesl Breytenbach, executive director, AFMA

Since joining the feed industry in 2004 as a formulator at Meadow Feeds, I gained invaluable knowledge and experience throughout every step of my career, cultivating a passion for this industry and the people who drive it.

So, when a position as technical advisor at AFMA became available in 2011, it was an easy decision to leave the corporate environment for a seat at this non-profit organisation that has been serving the industry for decades. Today, 21 years later, I am blessed to still be a part of this industry.

In celebrating 80 years as the representative body of the animal feed industry, AFMA has proven to be a remarkable association that has stood the test of time. Reflecting on our journey in this special edition of *AFMA Matrix* brings tremendous appreciation for the people who have dedicated their careers for the betterment of the industry. I am very proud to be part of the AFMA family.

With only two years' experience as executive director, the biggest journey still lies ahead, and I am looking forward to working with Anina Hunter, chairperson, and the AFMA board of directors, to ensure that our association serves the industry well.

Thought leader, industry expert

Our association is vitally important to the industry, as AFMA creates an enabling environment for our members to conduct business, be competitive, and drive innovation. Secondly, AFMA commits itself to the vision of being a thought leader in animal feed that is influential in securing protein food for the people of South Africa and, thirdly, AFMA will be even more instrumental in growing animal agriculture to new heights, including expanding export potential for animal proteins and thereby contributing to a sustainable agricultural economy.

Looking back and reading the input from Hansie Bekker and De Wet Boshoff, my predecessors, it is clear that AFMA has evolved rapidly over time and achieved a multitude of milestones in service to its members and the greater agricultural landscape. I want to thank them, as well as all the previous chairpersons, for paving the way to greatness. I am looking forward to also leaving deep footprints in the future of the animal feed industry.

Knowledge is power and data is gathered all around us, but it is critical that the right information is quickly shared to enable good business decisions that can drive success. AFMA is embarking on a new chapter to ease communication with its members and stakeholders. With the revamp of our website and an integrated member management system planned for 2026, AFMA will be able to share sensible and accurate information timeously.

Innovation across the board

AFMA will also be driving electronic submissions for feed registrations and renewals so that technology can alleviate the manual burden and backlogs that restrict our industry from implementing innovative nutritional strategies. New efforts in transparent pricing mechanisms and innovative ways for ensuring affordable feed supply will guide the efforts of the association in the years to come.

Furthermore, the future also promises a new legislative framework for animal feed that will move away from a pre-market approval system, support innovation and allow the delivery of adequate nutrition to poultry and livestock producers. Feed is no longer just meeting nutrient requirements, it provides a holistic approach to reduce animals' dependence on antimicrobials and contributes to greater animal, human, and environmental health and sustainability.

Regardless of digitisation, AFMA will remain true to its core, and will continue to nurture and build relationships with our partners in the agricultural value chain, government, and academia to support a collaborative approach regarding food security and economic growth in this country.

It is after all the people who drive impact, and with a passion for continuous improvement and training and skills development, I am excited to continue the great work of AFMA in developing the next generation of skilled professionals – from mill operators to nutritionists.

A truly special family

Lastly, I want to thank the team at the AFMA office for their unwavering support during the past two years and their immense commitment in giving their all. Without them the future would remain mere words on paper and our members would never experience the true benefit of being a part of the AFMA family. Through challenge lies our opportunities.❖

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From 1947 to the future:
Time to modernise South Africa's feed law

By Bonita Cilliers, technical and regulatory advisor, AFMA

As South Africa's animal feed industry celebrates its 80th anniversary, the moment is as much a reflection on the past as it is a call to modernise. Central to this conversation is the *Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act 36 of 1947)* – a law that has shaped the country's regulatory framework for decades. While *Act 36* laid the foundational safety net for animal feed regulation, it has grown increasingly outdated. Today, in an era defined by global trade, data-driven food systems, and innovation, the time has come to transition to a modern, fit-for-purpose legislative framework.

A legacy of control and safety

Before *Act 36*, South Africa's first legislative effort to regulate fertilisers and farm feeds came in the form of the *Fertilizers, Farm Foods, Seeds and Pest Remedies Act, 1917 (Act 21 of 1917)*. This *Act* introduced mandatory product registration and labelling requirements, aimed at preventing adulteration and misrepresentation, thereby offering important but limited protections to producers. However, it lacked broader regulatory tools such as oversight of manufacturing practices, facility standards, and any control over agricultural or stock remedies. As agriculture became more industrialised and complex, the limitations of *Act 21* became increasingly evident.

To address these gaps, government introduced a more comprehensive legal framework, namely *Act 36 of 1947*. Gazetted on 5 June and brought into effect on 1 July 1948, this *Act* replaced *Act 21* and significantly expanded regulatory oversight. It formalised product registration systems, extended control to include agricultural and stock remedies, and designated the Department of Agriculture as the *Act's* custodian. Although amended over time to reflect scientific and trade developments, the foundational structure of *Act 36* is now outdated and increasingly misaligned with modern feed safety and regulatory needs.

An outdated model

Today, the *Act* remains product-based and manual, falling short of international best practices and modern food and feed safety demands. While feed products must be registered, critical aspects such as manufacturing process oversight, digital traceability, and preventative safety systems are absent. Substantial portions of feed (~60%) volumes are unregulated when produced on-farm. Definitions, labelling requirements, and ingredient listings are outdated, and self-regulation through industry-led feed and food safety initiatives is not formally recognised. The result is a regulatory bottleneck that inhibits innovation, responsiveness, and global competitiveness.

> "On behalf of **Bühler Southern Africa**, we extend our heartfelt congratulations to the Animal Feed Manufacturers Association on this incredible milestone.
>
> It has been a true pleasure to be part of your journey. Our collaboration over the years has played a key role in keeping us connected to the needs and developments of the feed industry. Your commitment to advancing animal nutrition and supporting your members has helped shape a strong and resilient industry in South Africa.
>
> As you celebrate 80 years of excellence, innovation, and leadership, we thank you for the important role you play – and we look forward to continuing this valued partnership for many more decades to come."

Feeds and Pet Food Bill

The *Feeds and Pet Food Bill* marks a significant legislative shift, originating from policy discussions initiated by the Department of Agriculture since the early 2000s. Now again undergoing stakeholder consultation, the *Bill* seeks to replace the outdated, product-based model of *Act 36* with a modern, systems-based regulatory framework. A 2019 national public consultation revealed strong support for these reforms and highlighted key weaknesses in the current system – particularly inadequate oversight of on-farm feed manufacturing, lack of control over processing-related risks, and major gaps in traceability and food safety.

Key features of the *Bill* include risk-based facility licencing, supported by audits on preventative controls; registration of on-farm feed manufacturers above defined thresholds; ingredient registration with exemptions for GRAS-listed materials; expanded authority for advisory committees, inspectors, and third-party assignees; and mandatory preventative control programmes aligned with HACCP principles.

The *Bill's* core objective is to protect human, animal, and environmental health by ensuring the production of safe, high-quality feed and pet food. It introduces responsive traceability systems, aligns with international food safety standards, and promotes a prevention-focussed regulatory model to ease compliance burdens while supporting food security, public confidence, and trade competitiveness.

AFMA supports a tiered regulatory approach that considers the size and risk profile of facilities. A flexible,

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Figure 1: Global tiered comparison of feed legislation.

practical framework is essential to avoid overburdening smaller operators and ensure successful implementation across the sector.

South Africa's global standing

AFMA benchmarking places South Africa's feed legislation in Tier 3 – outdated, paper-based, and product-focussed. By contrast, Tier 1 countries such as the United States, Canada, Australia, and those in the European Union operate comprehensive, digital, risk-based systems with full ingredient oversight and formal recognition of industry-led self-regulation.

Figure 1 illustrates this tiered framework and how countries progress from basic compliance systems to integrated, prevention-oriented models. A detailed comparison of these systems is provided in *Table 1*.

If passed and effectively implemented, the proposed *Feeds and Pet Food Bill* could elevate South Africa to Tier 2 by closing critical gaps in facility oversight, traceability, and preventive control systems, enabling safer, more competitive trade in global markets. While the Tier 1 to 3 framework used here is not officially standardised, it is commonly referenced by global bodies such as the International Feed Industry Federation (IFIF) and the Food and Agriculture Organization (FAO) of the United Nations to describe regulatory maturity.

Advancement to Tier 2 will depend not just on passing legislation, but on effective implementation and enforcement.

Interim amendments

While the *Feeds and Pet Food Bill* remains under development, and the Department has not yet provided a clear timeline for its publication or enactment, AFMA, in close collaboration with PFI, has actively engaged with the Department of Agriculture since 2017 to support the modernisation of *Act 36* through interim amendments. Their involvement includes the submission of detailed technical inputs, regulatory proposals, and industry-wide recommendations to improve clarity, consistency, and practicality of the regulations.

Key contributions from AFMA include proposals to align definitions with international standards, streamline registration and renewal processes, improve labelling and advertising requirements, and update nutrient and feed categories. AFMA also recommended the incorporation by reference of technical standards, supported by free-standing guidelines to allow for faster updates – drawing on legislative models such as that of Canada.

In line with international norms and practices referenced by IFIF and other global frameworks, AFMA further proposed that only aflatoxins be regulated as undesirable substances, with all other mycotoxins managed through industry-led, risk-based standards. This approach promotes regulatory alignment, maintains safety, and supports innovation and trade.

Additional recommendations addressed the need for maximum limits for undesirable substances, carry-over thresholds for veterinary medicines in non-target species, updated nutrient specification tables, and the introduction of a notification process for minor administrative amendments. These efforts aim to bridge the current regulatory gap and help South Africa transition more smoothly once the new *Bill* is enacted.

However, despite these extensive efforts and contributions over the years, progress in finalising and publishing the amended regulations has been slow. The last official amendment to the *Farm Feeds Regulations* was in 2010 and, according to industry knowledge, the most recent draft is currently with the Minister for approval, with publication anticipated sometime this year. This slow pace of regulatory reform continues to impact the industry, which operates in a dynamic environment shaped by global trade, emerging risks, and rapid innovation. Delayed legislative updates hinder the sector's ability to remain competitive, adopt new technologies, and meet evolving market and compliance demands.

Looking ahead

The proposed *Bill* presents a strategic opportunity to transition from reactive, paper-based system to proactive, prevention-orientated governance. If successfully implemented, it could deliver multiple benefits:

- Accelerated innovation and reduced regulatory burden.
- Stronger alignment with international standards to enhance trade.
- Support for One Health and antimicrobial resistance objectives.
- Formal recognition of self-regulation alongside government oversight.
- Greater consumer trust and food chain assurance.

As the animal feed industry enters its next decade, the effectiveness of these reforms will be critical. While *Act 36* provided a solid foundation in its time, a modern, adaptable regulatory system is now essential for future success.

> "**Huvepharma South Africa** extends our heartfelt congratulations to AFMA on reaching this remarkable 80-year milestone. Your unwavering commitment to advancing the animal feed industry has played a vital role in shaping the future of agriculture in South Africa. We are proud to partner with an organisation that continues to lead with integrity, innovation, and impact. Here's to your legacy – and the next 80 years of progress!"

Table 1: Global comparison of feed regulation frameworks.

Aspect	South Africa (*Act 36* and proposed *Bill*)	European Union (EU)	Canada (Feeds Reg 2024)	US (FDA/FSMA/VFD)	Australia (FSANZ/DAFF)
Primary legislation	Minimal under *Act 36*; *Bill* proposes HACCP-aligned traceability systems and preventative controls.	Mandatory HACCP and traceability under Reg 183/2005. **Source:** EUR-Lex	Feeds Regulations, 2024 – includes licencing, preventive controls and labelling. **Source:** Justice Laws	FDA Veterinary Feed Directive (within FSMA) regulating medicated feed and facility registration. **Sources:** Federal Register, US Food and Drug Administration (USDA)	FSANZ-led frameworks requiring feed safety systems and traceability. **Source:** Food Safety, Food Standards Agency (FSANZ)
Risk-based framework	Limited tiering; uniform controls under *Act 36*.	Mandatory HACCP-based hazard plans per Reg 183/2005. **Source:** EUR-Lex	Tiered oversight with mandatory preventive control plans under new regulations. **Source:** Canadian Food Inspection Agency	VFD applies risk-based control for medicated feeds under FSMA. **Sources:** USDA, Registrar Corp	Risk-based, prevention-focussed controls under national policy and state enforcement. **Source:** FSANZ
Food safety and traceability	Minimal under *Act 36*; new *Bill* proposes HACCP aligned traceability systems.	Mandatory HACCP, traceability under Reg 183/2005 (all feed business operators registered, tracing and withdrawal procedures). **Source:** EUR-Lex	Preventive control and licencing, traceability rules under new regs, full traceability via record-keeping. **Source:** Canadian Food Inspection Agency	FSMA traceability rule and e-portals; audit trail for imports/export under Foreign Supplier Verification Program (FSVP). **Source:** USDA	HACCP-style safety requirements and state-facilitated traceability under national policy. **Source:** FSANZ
Registration of feed ingredients	*Bill* proposes GRAS listing and mandatory registration for novel additives.	EFSA-reviewed, additive authorisation; carry over control under Reg 183/2005. **Source:** EUR-Lex	Schedule-based ingredient approval; RG -1 guidance governing registration and efficacy data. **Source:** Canadian Food Inspection Agency	GRAS notification system for ingredient evaluation; FDA reviews petitions for feed additives. **Source:** USDA	FSANZ approval processes for additives; some exemptions for common feed compounds. **Source:** FSANZ
Licencing of facilities	New *Bill* proposes facility licencing linked to preventive control systems.	EU Regulation 183/2005 mandates business registration and approval of higher-risk establishments. **Source:** EUR-Lex	Licences issued by CFIA based on risk category; required for import, manufacture, sale. **Source:** Canadian Food Inspection Agency	Facilities must register with FDA or state authorities; VFD registrants subject to oversight. **Source:** USDA	State DAFF licencing or registration required for feed or pet food production. **Source:** FSANZ
Regulation of home mixers (on-farm feed)	*Bill* proposes registration for on-farm mixers (>10t/month), exemptions otherwise.	EU allows primary production exemption, but hygiene records still required. **Source:** EUR-Lex	On-farm operations need preventive control plans; small volumes exempt under threshold. **Source:** Canadian Food Inspection Agency	Producers generally exempt unless medicated feed used (under VFD). **Source:** USDA	State-level exemptions may apply, but safety standards enforced. **Source:** FSANZ
Labelling and advertising	*Act 36* limits; *Bill* aims to modernise labels, claims, and advertising rules.	Labelling claims regulated by feed hygiene reg and general food labelling laws; misleading claims prohibited. **Source:** EUR-Lex	Mandatory bilingual (English/French) labelling, nutrient guarantees, and restricted claims. **Source:** Canada Gazette	Ingredient statements by weight needed; directions and warnings required per AAFCO manual. **Source:** *aafco.org*	National/state labelling frameworks regulate product identity, nutrients, safety claims.
Regulation of imported products	*Bill* proposes importer approval, supplier compliance validation, signed registries.	EU requires TRACES-based import approval and feed operator registration. **Source:** EUR-Lex	CFIA rules: Importers must register or hold licence; imports must meet domestic PCP standards. **Source:** Canadian Food Inspection Agency	Foreign Supplier Verification Program (FSVP) mandates importer accountability; traceable imports. **Source:** USDA	Import compliance via state/federal regulations aligned with FSANZ standards. **Source:** FSANZ
Licencing of rendering and sterilising plants	*Bill* includes sterilising/ rendering licencing via facility licencing provisions.	EU ABP reg (1069/2009) requires separate approval for Category 3 ABP plants. **Sources:** EUR-Lex; *ukpetfood.org*	Canada's CFIA licencing includes feed plants tied to animal by-product processing. **Source:** Canadian Food Inspection Agency	FDA/state oversight includes medicated feed and by-product facilities. **Source:** USDA	State-level licencing controls for ABP processing ensures feed safety. **Source:** FSANZ
Recognition of industry initiatives	*Bill* to formally recognise industry codes, self-regulation, third-party auditing.	EU recognizes standards (GMP+, FAMI QS) for certified operators. **Source:** *effpa.eu*	FeedAssure certification recognised for risk control and facility assurance. **Source:** *anacan.org*	FDA accepts Safe Feed/ Safe Food (SF/SF) third-party certification by AAFCO. **Source:** *aafco.org*	FeedSafe audit programmes recognised in national export and safety schemes. **Source:** FeedSafe

Timeline of South Africa's feed legislation

1917

***Act 21 of 1917* enacted**

First legislation regulating sale and quality of fertilisers and farm feeds; lacked product registration or manufacturing controls.

1947

***Act 36* promulgated**

Comprehensive law covering fertilisers, farm feeds, stock and agricultural remedies. Gazetted June 1948; came into effect 1 July 1948.

1950

Amendment *Act 48 of 1950*

Inserted Section *7bis*; enhanced ministerial powers for prohibition notices via *Gazette*.

1970

Amendment *Act 60 of 1970*

Major revisions: Updated definitions, registration processes, offences, and control measures for farm feeds.

1972

Amendment *Act 17 of 1972*

Extended the *Act's* jurisdiction to South-West Africa (Namibia), added section 24, adjusted definitions and oversight.

1977

Amendment *Act 24 of 1977*

Comprehensive restructuring, including new roles (registrar, adviser), substitution of core sections.

1980

Amendment *Act 4 of 1972*

Introduced pest control operators; added new sections and enhanced supervision, renewal, and withdrawal provisions.

1983 – 1990

Regulatory and procedural enhancements

Regulatory updates introduced pest control operators and strengthened provisions for registration, labelling, record-keeping, appeals, and renewal. Procedures, fees, and sampling protocols were

1996

General law amendment *Act 49 of 1996*

Repealed Section 24 (territorial scope) and updated general liability context.

2000

DAFF initiates review of *Act 36*

Identified outdated aspects; proposed separation of fertiliser/feed legislation

2008

Drafting of new *Bill* begins

Combined legislation initially proposed (*Feeds and Fertiliser Bill*).

2009

***Feeds and Fertiliser Bill* gazetted**

Combined *Bill* opened for public comment.

2010

National public consultation workshop held

Stakeholder engagement to gather input on draft *Bill*.

2012

***Bill* submitted to parliament**

Combined *Bill* reviewed by parliament.

Mar 2013

Parliament returns combined *Bill*

Recommendation: split into separate feeds and fertiliser legislation.

Feb 2015

Feeds consultation paper

Principles for new *Feeds Bill* shared with industry stakeholders.

Jan 2017

Fertiliser consultation paper released

Shared with stakeholders.

2018

Fertiliser consultation

Similar consultative process followed for fertiliser sector.

2018 – 2019

Revised *Feeds and Pet Food Bill* and stakeholder consultations

The updated draft of the *Feeds and Pet Food Bill*, along with a national stakeholder workshop in October 2019, confirmed broad industry support for progressing with the new legislative framework.

Feb 2019

***Feeds and Pet Food Bill* published (GG 42230 Gen. 70)**

Official release for stakeholder and public comment. Outlined licencing, registration, preventative control programmes, and risk-based oversight.

Aug 2024

AFMA White Paper on *Feeds and Pet Food Bill* submitted

AFMA submitted a White Paper to the Department of Agriculture at the request of the Registrar. The submission outlines key industry recommendations and reform principles to support the development of the *Feeds and Pet Food Bill*.

2017– 2025

Submission of amended *Act 36* regulations

Over the course of the regulatory review period, AFMA submitted several proposals under *Act 36 of 1947*. These included revisions related to nutrient guidelines, veterinary medicine carry-over limits, advertising, undesirable substances, a mycotoxin mitigation strategy, and a system for notifying minor label or formulation changes. A final consolidated submission was made in January 2025.

May 2025

Registrar initiates new consultations on *Feeds and Pet Food Bill*

A renewed consultation process on the *Feeds and Pet Food Bill* is currently underway, with broader engagement across various stakeholder groups expected to continue in the coming months.

2025

Publication of amended *Act 36* regulations

The amended *Act 36* regulations are currently under ministerial review and anticipated to be gazetted in 2025. Once published, a 30-day public comment period is expected. These amendments represent the final step in modernising the current regulatory framework before transitioning to the new *Feeds and Pet Food Bill*.

2026 and onwards

***Feeds and Pet Food Bill*: Legislative revision phase**

Amendments to the *Feeds and Pet Food Bill* are expected to be initiated as part of the broader legislative reform process. These updates will build on the 2019 draft and incorporate feedback from anticipated 2025 stakeholder consultations. The redrafting phase aims to refine the *Bill*'s scope and better align it with both regulatory priorities and industry needs.

A revised draft is tentatively anticipated in 2026, although the timing will ultimately depend on the progress and outcomes of the consultation process.

***Feeds and Pet Food Bill*: Parliamentary submission and review**

Once the revised draft of the *Feeds and Pet Food Bill* is finalised, it is expected to be submitted to Parliament for consideration as part of the legislative process. The timing of its final enactment will depend on the progress and outcomes of the parliamentary process.

Conclusion

'From 1947 to the future' is more than a milestone – it marks a decisive turning point. While *Act 36* served its purpose in an earlier agricultural era, it can no longer support the needs of a modern, globally integrated animal feed and pet food industry. The *Feeds and Pet Food Bill* offers a critical opportunity to move beyond outdated, bureaucratic regulation and establish a smarter, risk-based system – one that positions South Africa as a forward-thinking, globally competitive leader in feed and food safety.

Legislative reform is no longer a matter of convenience – it is an urgent necessity for safeguarding public health, driving innovation, unlocking trade, and securing the future of our agricultural and food systems for generations to come. South Africa has the tools, the knowledge, and the industry momentum to lead but now it needs the legislation to match.❖

Send an email to Bonita Cilliers at technical@afma.co.za for more information.

Animal feed production: A historical perspective

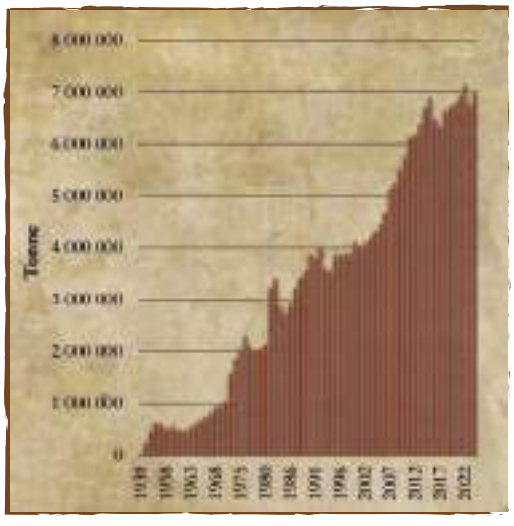
By Petru Fourie, AFMA

Over the past 80 years, the evolution of animal feed production in South Africa, as reflected through AFMA's feed production, narrates a story of steady growth, technological innovation, and adapting market dynamics. Drawn from AFMA's historical *Chairman's Reports* and industry data, this article traces the development of feed manufacturing from its modest beginnings in the 1930s to its current status as a multi-million-tonne industry, producing over seven million tonnes annually and shaping South Africa's livestock and poultry production and food security.

The beginning: 1930s to 1950s

The South African animal feed industry took root during the economic hardships of the 1930s. Producers, grappling with droughts and limited resources, began experimenting with scientifically formulated feeds to maintain livestock productivity. According to industry data compiled by Dr IG Halliday, production of balanced feeds in 1939 was only 12 000t, with a turnover of approximately £120 000.

Figure 1: AFMA historic feed production.



The installation of electrical feed mixers during this period laid the groundwork for compound feeds.

Post-war demand for animal protein and improved farming practices drove rapid growth. Halliday's estimates show that production surged to 250 000t by 1945 and reached 450 000t by 1954. By the mid-1950s, the need for coordinated industry representation became clear. The newly established Association of Balanced Feed Manufacturers, which would later evolve into AFMA, issued its first comprehensive report in 1956, describing the growth as "phenomenal". That year, production was recorded at 621 000 tonnes, with turnover exceeding £10 million.

However, this expansion was not without setbacks. Feed production declined steadily, falling to 606 000t in 1957/58, 523 000t in 1958/59, and 497 000t in 1961/62. This contraction was attributed to favourable grazing seasons, increased on-farm mixing, and reduced demand for dairy and poultry feeds.

Recovery: 1960s to early 1970s

Feed production hovered at low levels for much of the early 1960s. AFMA *Chairman's Reports* indicated that almost every raw material used in balanced feeds was in free supply, making home mixing increasingly attractive to producers. At the same time, declining egg export prices reduced the profitability of poultry producers, while surplus dairy products that could not be sold at economic prices limited the demand for commercial dairy feed. These factors, combined with producers relying on on-farm feed mixing, contributed to a prolonged slowdown in commercial feed production during this period.

Production only began to recover in the latter part of the decade. By the late 1960s, the industry began to recover as mechanisation of dairies and the intensification of poultry and pig production created new demand. Feed production nearly doubled from the 1960 low to 1970, marking the start of an unprecedented growth phase.

Surge and mid-1980s decline

The early 1980s brought renewed growth driven by severe drought conditions, which increased demand for beef and sheep feed. By 1981/82, production jumped to 3,24 million tonnes, one of the most significant increases in the industry's history. However, this surge was short-lived. The economic recession of the mid-1980s, coupled with prolonged droughts and financial pressure on livestock producers, caused feed production to drop sharply.

By 1984/85, feed production fell to 2,88 million tonnes, and by 1985/86, to 2,73 million tonnes, the lowest levels since the early 1980s. This period also saw strong price competition as feed manufacturers

The golden era: 1970s

The 1970s are remembered as the golden era of South Africa's feed industry. Production skyrocketed from 973 881t in 1971/72 to exceeding two million tonnes by 1974/75. This represented an approximate 110% increase in less than five years. Poultry feed, particularly broiler rations, drove this surge, growing at triple the rate of layer feeds. Beef feeds also expanded strongly during this period.

By 1975/76, feed production reached a record of 2,29 million tonnes, but growth began to slow. The *Chairman's Report* that year warned that maintaining annual growth rates of 7 to 10% would be increasingly challenging. From 1976/77, production dipped, falling back to almost two million tonnes. Inflation, rising raw material costs, and adverse economic conditions characterised the late 1970s, slowing the industry's momentum.

This period also marked the beginning of a significant shift in protein sources, as concerns over fishmeal availability and price volatility prompted early exploration of alternative proteins, particularly locally processed oilseeds. These initial developments laid the foundation for the later dominance of soya bean oilcake in South African feed formulations.

could no longer use a single association-recommended price list. New competition laws required each company to set its own prices, leading to greater rivalry and lower profit margins.

Recovery resumed from 1986, with production increasing. The growth was driven primarily by beef and poultry feed production, although the industry remained under economic pressure.

Restructuring and stability: 1990s

The 1990s were a period of stabilisation and market restructuring. In 1989/90, feed production increased to 3,56 million tonnes, and by 1990/91 it reached 3,89 million tonnes, with poultry feeds making up 54% of the total. Despite this growth, AFMA's reports noted that the commercial feed industry was still supplying only around 60% of the potential market, with significant volumes being home mixed. By the early 1990s, soya bean oilcake (mostly imported at the time) had become the primary protein source in feed formulations, replacing fishmeal due to its more stable supply and cost-effectiveness compared to the volatile fishmeal market.

Throughout the decade, production fluctuated between 3,6 and 3,9 million tonnes. By 1999/2000, AFMA members broke the four million tonne barrier, producing 4,12 million tonnes despite ongoing challenges in the poultry and dairy sectors.

Expansion: 2000s

The early 2000s saw steady growth supported by improved data collection and technological advancements in feed formulation. In 2007/08, AFMA recorded a historic milestone as production surpassed five million tonnes, reaching 5,16 million tonnes, a 10% year-on-year increase despite record-high raw material prices. Poultry, which had already become the largest feed category in the 1990s, strengthened its dominance during this decade, reflecting its central role in South Africa's protein supply.

Technological growth: 2010s

The 2010s were marked by continued growth and industry modernisation. During this decade, AFMA established monthly feed production reporting, a step that greatly enhanced transparency, improved data-driven decision-making, and positioned the industry to respond more effectively to market shifts. Advances in genetics, feed efficiency, and data management further enhanced production. During this period, the growth in layer and breeder feeds also reflected consumer trends favouring eggs and value-added poultry products, reinforcing poultry's role as the backbone of the industry.

By 2011/12, feed production reached 6,14 million tonnes, a record at the time. Despite challenges such as droughts, avian influenza outbreaks, and volatile global soya bean prices, the industry maintained a strong upward trajectory. The decade also saw the expansion of game feed production, driven by the growth of wildlife ranching.

Volatility and resilience: 2020s

The early 2020s were marked by market volatility but also showed the industry's resilience. Production grew steadily and in 2022/23 broke through the seven million tonne mark for the first time, reaching a new record. This was followed by weaker demand, sectoral disruptions, and the severe impact of avian influenza, which led to widespread poultry culling and reduced feed usage. While earlier outbreaks in 2017 and 2021 had highlighted the industry's vulnerability, the 2023/24 event had the most significant impact. By 2024/25, production recovered again to just over seven million tonnes, reflecting improved market conditions as the poultry sector stabilised. ❖

"On behalf of **Southern Oil (SOILL)**, we extend our heartfelt congratulations to AFMA on reaching this incredible milestone of 80 years.

Your leadership, commitment to excellence, and unwavering focus on strengthening South Africa's feed manufacturing industry have played a vital role in advancing sustainable agriculture and food security in our country. Over the decades, AFMA has not only been a champion of industry standards, but also a trusted partner in promoting innovation, collaboration, and growth across the entire value chain.

As a proud member of the agricultural sector, SOILL is honoured to celebrate this legacy with you. We look forward to continued collaboration in building a more resilient and sustainable future for all."

The stated figures were compiled as accurately as possible, but reporting periods may vary between sources. These differences should be kept in mind when interpreting year-to-year trends. For more information, email Petru Fourie at petru@afma.co.za

AFMA
SAFE FEED FOR SAFE FOOD
Animal Feed Manufacturers Association

EMPOWERING THE FEED INDUSTRY

AFMA's Commitment to Sustainable Growth and Food Security

The Animal Feed Manufacturers Association (AFMA) is the official representative body for the South African feed industry, playing a vital role within the broader agricultural sector. Positioned in the food value chain, AFMA partners with government, regulatory bodies, parastatals, forums, academia, international agencies, and other related stakeholders in the value chain, to drive growth and innovation in the agricultural sector.

VISION

The dynamic animal feed thought leader influencing food security through partnerships with all stakeholders.

STRATEGIC PILLARS

AFMA's activities are guided by four strategic pillars:

Affordable feed supply

Ensuring the **consistent** supply of **sufficient** and **affordable** animal feed for the production of meat, milk, eggs and fish.

Innovative animal nutrition for sustainable animal production

Using innovative nutritional strategies to produce **nutritious** animal feed in a **responsible** and sustainable way.

Safe feed for safe food

Promoting **good manufacturing practices** in the provision of **safe** feed to enhance **consumer confidence.**

Training & Skills Development

Supporting **job creation**, **training opportunities** and **skills development** in the animal feed industry.

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From a single-market channel to a free-market system

By Dr Lucius Phaleng, trade advisor, AFMA

The evolution of agricultural policy in South Africa has been marked by a steady move from tightly regulated markets to a more liberalised, market-driven system. Reforms aimed to improve economic efficiency, align domestic prices with international markets, and create a competitive agricultural sector.

A major shift came in 1995 when government replaced the single-channel, fixed price system for maize with a floor price scheme managed by the Maize Board. Funded through stabilisation levies, it sought to stabilise prices while allowing greater market responsiveness. This arrangement, however, lasted only until 1997, when South Africa transitioned to a free-market system for maize, eliminating statutory price interventions.

Although these reforms led to declines in real farm output prices, they aligned domestic prices with global trends and improved economic efficiency. Agricultural producers, agro-processors, and consumers benefited from a system better attuned to world markets. Deregulation also extended to other commodities. Price controls on dairy, flour, meal, and bread were phased out, along with consumer subsidies on maize meal and bread. By 1997, the abolition of marketing boards marked the end of single-channel marketing systems, ushering in a competitive, less regulated marketplace.

Reforms and deregulation

The process was entrenched through new legislation. The *Marketing of Agricultural Products Act, 1996 (Act 47 of 1996)* replaced older marketing laws, introducing a phased elimination of statutory controls. The *Act* also created the National Agricultural Marketing Council (NAMC) to advise the minister on interventions and ensure fair competition in the new environment.

By early 1998, control boards for commodities such as maize, sorghum, oilseeds, wool, meat, wheat, cotton, mohair, lucerne, citrus, fruit, and dairy had ceased operations, leaving only minor technical functions. This marked the complete disappearance of single-channel markets and control boards.

Challenges and market monitoring

Deregulation aimed to encourage efficiency and competition but also raised concerns about market concentration. The control board system had shaped market structures, and its removal risked empowering a few dominant players. Government therefore emphasised monitoring, recognising that competition legislation – administered by the Department of Trade and Industry – or targeted interventions might be necessary to safeguard fair markets.

Impact of deregulation

The pace and impact of deregulation varied across commodities and were influenced by broader reforms, including relaxed exchange controls, trade liberalisation, global price shifts, and production changes.

Reports from AFMA in the late 1990s highlighted both volatility and opportunity. Members adjusted procurement strategies, used the South African Futures Exchange (SAFEX), and began hedging core inputs such as maize. This marked a major change in how feed companies managed supply risks.

The disappearance of single-channel marketing gave feed manufacturers direct access to producers and traders. While procurement became more complex, it also allowed price negotiation, quality control, and flexible contracting – particularly important for sourcing yellow maize and oilseeds.

Stability and considerations

The abolition of agricultural control boards and move towards liberalisation have drawn mixed views on stability. On the one hand, deregulation encouraged price discovery and spurred the development of risk management tools. SAFEX became a critical platform for feed manufacturers to hedge input costs and manage volatility. On the other hand, deregulation introduced greater price fluctuations, particularly in staples such as maize and wheat, exposing producers and consumers to heightened risks.

Key milestones: Agricultural market liberalisation

1990	1995	1996	1997	1998	Late 1990s	2002
SAFEX established, enabling futures trading for agricultural commodities.	Government replaces single-channel maize pricing with a floor price scheme under the Maize Board.	New *Marketing Act* enacted; NAMC established to guide deregulation and fair market practices.	Floor price system scrapped; marketing boards abolished, ending statutory price and channel controls.	Control boards for maize, oilseeds, dairy, meat, and others fully dissolved. Free-market trading begins.	AFMA members start using SAFEX to hedge maize and oilseed prices; procurement shifts to direct trading.	Soya bean futures launched on SAFEX, strengthening market tools for feed.

Conclusion

South Africa's agricultural policy evolution reflects a deliberate shift towards market liberalisation, shaped by legislation and the pursuit of efficiency. The transition brought significant benefits – better price signals, competitiveness, and the development of modern risk management tools. Yet challenges remain. Market concentration and volatility require close monitoring to ensure that the benefits of deregulation are not undermined.

In essence, South Africa's experience illustrates both the promise and risks of liberalised agricultural markets. While efficiency and competitiveness have improved, continued vigilance is vital to ensure fair outcomes for producers, processors, and consumers alike. ❖

JSE agricultural futures and efforts to launch a soya bean oilcake contract

By Dr Lucius Phaleng, trade advisor, AFMA

The South African Futures Exchange (SAFEX) is the futures exchange subsidiary of the Johannesburg Stock Exchange (JSE). SAFEX was formed in 1990 as an independent exchange and experienced steady growth over the following decade.

In 1995, a separate agricultural markets division was formed for the trading of agricultural derivatives. The exchange continued to make steady progress despite intensifying competition from international derivatives exchanges and over-the-counter markets, where contracts are traded privately rather than through a centralised exchange.

The JSE Commodity Derivatives Market provides a platform for price discovery and efficient price risk management for the grains markets in South Africa. Through a licencing agreement with the CME Group – the world's leading derivatives marketplace – the market also offers a range of foreign-referenced derivatives on both soft and hard commodities. The use of derivative instruments through futures and options contracts provides market participants with the ability to manage their price risk in the underlying physical markets.

Futures contracts traded

By trading on a formal exchange that connects buyers and sellers, not only is price discovery achieved transparently, but all transactions are guaranteed through the derivatives clearing structure. The physically settled commodities rely on warehouse receipts (WRs) to facilitate the delivery process. The WRs are used by financial institutions that offer financing to clients who own receipts.

Derivative contracts also enable institutions to fund input costs to producers who hedge their price risk and, in so doing, encourage sustainable production. The JSE currently offers futures and options on white maize, yellow maize, wheat, sorghum, and soya beans. Contracts are priced and traded in rands/t and can be physically settled should the futures position be held until the last trading day.

Other trading platforms, such as CME Group, offer a diverse range of agricultural futures markets (such as maize, soya beans, soya oilcake, wheat, oats, rice, coffee, cocoa, sugar, orange juice, and milk), allowing traders and producers to hedge and speculate on the prices of various commodities. These futures contracts are traded on the CME Globex electronic trading platform and are used by market participants worldwide for risk management, price discovery, and investment purposes.

CME Group's Chicago Board of Trade (CBOT) launched its first soya futures contracts on 17 October 1951. This was part of the broader development of agricultural futures markets at CBOT, which included soya beans and soya bean oil. However, the JSE has yet to introduce soya oilcake futures contracts, despite market demand expressed by the animal feed industry.

Facilitating risk management

The potential soya oilcake futures contracts will allow feed manufacturers, importers, and the local oilseed crushing role-players the opportunity to use the product in price risk management strategies. This facilitates risk management by allowing animal feed manufacturers to hedge against price volatility in soya oilcake, which is a key ingredient in animal feed. Additionally, the futures market enhances market liquidity, making it easier for stakeholders to buy and sell positions without significant price impacts. The increased transparency and access to hedging tools ultimately lead to more stable feed prices.

Overall, the Safex listing empowers the animal feed industry with improved market efficiency, risk mitigation options, and price stability, fostering growth and resilience within the sector.❖

For more information, send an email to trade@afma.co.za

Soya oilcake futures market talks

To date, AFMA has actively facilitated discussions between the JSE and oilseed crushers to reach consensus on the terms of soya oilcake futures contracts. This includes negotiations around storage commitments, contract specifications, and other key provisions to ensure a transparent and efficient trading framework.

These negotiations include storage commitments, contract specifications, and other key provisions, aiming to establish a transparent and efficient trading framework. These efforts are crucial for promoting market stability, providing clarity for participants, and supporting the development of a robust soya oilcake futures market in South Africa.

From fishmeal to soya bean: A shift in South Africa's feed industry

By Petru Fourie, operations manager, AFMA

For much of the mid-20th century, fishmeal was the premium protein source in South Africa's animal feed industry. With its exceptional digestibility, high lysine and methionine content, and consistent performance benefits, it became the cornerstone of starter diets for broilers, weaner pigs, and dairy calves. In certain high-performance poultry rations, inclusion rates even exceeded 10%, a clear sign of its value and the confidence the industry placed in it.

Over time, however, fishmeal's dominance waned. Rising costs, inconsistent supply, and growing sustainability concerns opened the door for plant-based proteins such as soya bean and sunflower oilcake. This transition reshaped feed formulations and fundamentally shifted how the industry approached protein sourcing and long-term sustainability.

From by-product to protein (1940s to 1960s)

The commercial production of fishmeal in South Africa began in the 1940s, spurred by the growth of coastal fisheries along the West Coast. Offal from anchovy and pilchard processing, once discarded, was transformed into high-protein meal at plants in Saldanha, Hout Bay, and Walvis Bay.

By the 1950s, fishmeal was considered the premium protein source. It boosted feed conversion ratios, supported rapid growth in young animals, and delivered consistency across rations. During this period, AFMA committees actively discussed fishmeal imports from South West Africa and Peru, while also raising early concerns about the need for standardised quality control protocols.

While fishmeal was celebrated for its nutritional excellence, even at this early stage concerns emerged: price volatility, seasonal availability, and quality inconsistencies foreshadowed future vulnerabilities.

The height of fishmeal use (1970s to 1980s)

The 1970s ushered in the golden age of fishmeal in South Africa. During this period, the country exported fishmeal to Europe and Asia, while still meeting strong domestic demand. Poultry starter diets frequently included 10 to 12% fishmeal, and it featured prominently in rations for dairy calves and piglets. With domestic animal production booming, fishmeal was both affordable and abundant. It offered critical nutrients such as lysine, methionine, and calcium, vital in supporting early growth stages and reproductive performance.

Minutes from AFMA technical and executive committee meetings in the late 1970s repeatedly started to highlight member frustration over sudden fishmeal price surges and allocation inconsistencies, as export prioritisation during high-price cycles further tightened local supply. *Chairman's Reports* from this era frequently stressed the need for stricter quality standards and improved supply security.

> "Efforts to secure consistent protein content and ash levels in imported fishmeal remain an ongoing concern. We urge members to maintain internal quality testing procedures while broader import protocols are pursued."
> *- AFMA Chairman's Report, 1985/86*

During severe shortages between 1983 and 1984, AFMA even proposed establishing a fishmeal importation company to stabilise supply, highlighting the strategic importance of fishmeal at the time.

Shifting tides: The 1990s

By the 1990s, fishmeal's dominance waned under mounting pressures: stricter environmental controls on processing plants, tighter marine quotas introduced later in the decade, and rising global competition from markets such as China and Europe.

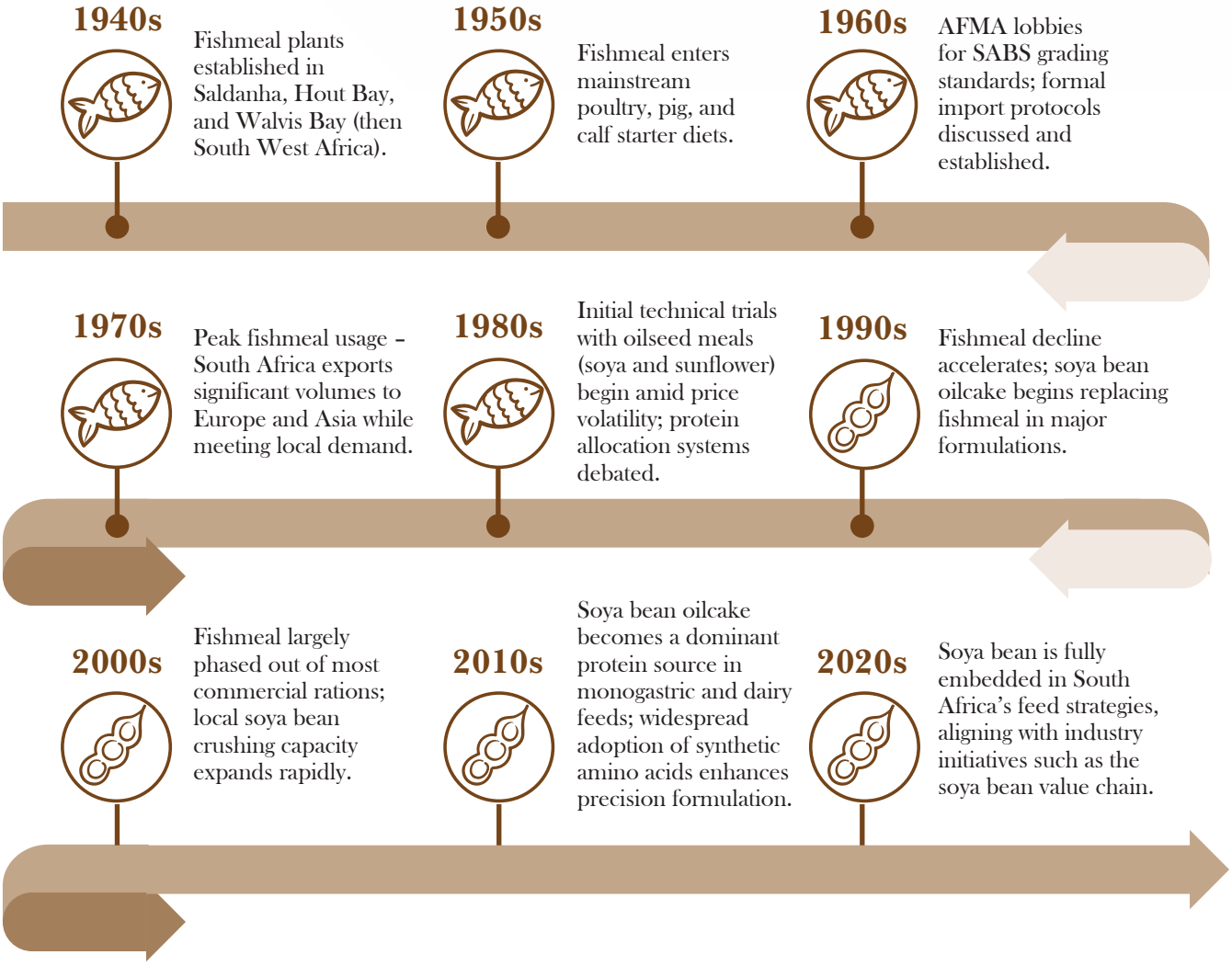
AFMA members began reformulating broiler diets to reduce or exclude fishmeal, aided by synthetic amino acids that allowed plant proteins to match its performance. This shift paved the way for soya bean oilcake, supported by imports from Argentina and Brazil and the gradual expansion of local crushing capacity.

AFMA's technical committees compared cost-performance models for oilcake-based diets, while tariff debates and calls for import rebates highlighted the need to secure affordable protein supplies.

Turnaround: 2000s to 2010s

The early 2000s marked a turning point for the feed industry, as aflatoxin contamination in groundnut oilcake heightened the need for safer, more consistent protein alternatives. Fishmeal, while still a high-quality ingredient, had become costly and its availability increasingly erratic due to global

Timeline snapshot: The rise and fall of fishmeal – and the rise of soya.



demand and marine resource constraints, discouraging its use in standard formulations.

By the 2010s, fishmeal's role in mainstream commercial feed had fallen to trace levels, confined mainly to specialised applications, high-end pet foods, and select breeder rations that required top-tier nutrition. In contrast, soya bean oilcake rose rapidly, driven by local investments in crushing plants and supported by genetically modified (GMO) soya bean varieties that improved both supply stability and protein consistency.

Soya bean oilcake: More than a substitute

The rise of soya bean oilcake was not merely a response to fishmeal's decline; it marked a structural shift in South Africa's protein sourcing. Initially reliant on imports, the feed industry soon recognised the value of expanded domestic crushing capacity, which stabilised supply and reduced dependency on volatile imports. Combined with advances in synthetic amino acids and enzymes, soya bean oilcake became the cornerstone of modern feed formulations.

Legacy and lessons

The decline of fishmeal was more than an ingredient change; it forced the industry to innovate, diversify, and embrace sustainability. Synthetic amino acids allowed plant proteins to deliver performance on par with animal-derived ingredients. Today, soya bean oilcake is firmly entrenched as a foundational ingredient, not a fallback. Its rise reflects AFMA's pivotal role in helping the feed industry navigate transitions while maintaining both nutritional performance and economic resilience.

Conclusion

What began as a discarded by-product of the fishing industry evolved into a pillar of animal nutrition, only to be overtaken by soya bean oilcake in a new era defined by precision and sustainability. From lobbying for quality standards to shaping trade discussions and supporting local value chain development, AFMA played a crucial part in this transformation.

As AFMA marks 80 years, the journey from ocean to oilcake stands as a testament to the industry's innovation, collaboration, and resilience. ❖

Send an email to Petru Fourie at petru@afma.co.za for more information.

The evolution of local trade and animal feed raw material usage

By Dr Lucius Phaleng, trade advisor, AFMA

The evolution of local trade and the use of animal feed raw material reflect major shifts shaped by supply dynamics, quality issues, import policies, and technological developments. Historically, the industry relied on locally produced ingredients such as dairy meal, maize, and oilcake (mainly sunflower, cottonseed, and groundnut).

In 1961, feed consumption declined sharply, with production at a five-year low. Reduced dairy meal and maize-free mixtures, surpluses of dairy products, and falling export egg prices weakened poultry feed sales. At this stage, almost all raw materials for balanced feeds were freely available, and home mixing grew popular as a cost-effective option.

Facing challenges head on

By the 1970s, raw material quality became a concern. The protein content of yellow maize fell to 7%, while oilcake quality declined, lacking nutrients such as phosphorus and calcium. This spurred higher imports of better oilcakes, notably soya bean and groundnut. In 1975, about 20 000 tonnes were imported privately. Usage of oilcake and fishmeal was substantial: in 1977, roughly 270 000 tonnes of oilcake and 165 000 tonnes of fishmeal were used, largely by balanced feed manufacturers.

In the late 1970s and early 1980s, substitution of traditional ingredients accelerated. During 1983 and 1984, imports of cheaper milling wheat from Australia replaced yellow maize, reflecting the need to diversify cereals amid unstable domestic supplies. Reliance on imported fishmeal and oilcake also increased due to droughts and rising demand.

By the 1990s, efforts to expand local raw material production gained traction. A soya expressing facility was commissioned in 1991 to stabilise supply. Fishmeal production in 1990/91 was about 103 000 tonnes, while imports reached 160 468 tonnes, bringing total usage to 263 468 tonnes.

High-quality ingredients

The late 1990s and early 2000s marked further diversification and efficiency. From 2005/06, maize inclusion averaged around 50%, while oilcakes became increasingly important due to improved local supply and competitive prices. In 2006, Sasol and the Central Energy Fund secured rebates on imported soya beans for extraction of soya bean oil used in the production of biodiesel for a period of three years (from 1 July 2008 to 30 June 2011). To accomodate AFMA, ITAC decided to create a rebate provision for soya oilcake for the same period as recommended for soya beans.

During this period, over 95% of feed formulations included various raw materials. Oilcake inclusion rose from 11,41% in 2005/06 to nearly 14% in 2007/08, supported by greater domestic production of sunflower, groundnut, cottonseed, and soya oilcake. The adoption of genetically modified (GM) maize and soya beans boosted yields, ensured consistent oilcake supply, and lowered dependence on imported protein sources.

Historical AFMA data confirms these trends. In 2011/12, imports of soya bean oilcake (beans and oilcake combined) fell 6,6% to 923 852 tonnes, thanks to increased local crushing. This expansion was expected to strengthen domestic availability and reduce imports. Policy adjustments supported the trend: On 1 April 2016, import duty on soya bean oilcake from Mercosur countries dropped from 6,6 to 4,95%.

Recent dynamics

Industry data from 2020/21 to 2024/25 shows ongoing stability in raw material use. Inclusion rates in feed production stayed very high, between 98,71 and 99,7%, reflecting efficiency in converting raw materials into finished feeds. Maize and oilcakes remain the backbone of the industry, while fishmeal use is now minimal, likely due to cost and sustainability concerns.

Conclusion

Since the 1960s, South Africa's feed industry has shifted from reliance on local ingredients to greater use of imported, higher-quality raw materials, driven by quality concerns, shortages, and evolving policy. Continuous adjustments – such as diversifying cereal imports, lobbying for tariff reductions, and expanding local processing – aim to balance cost, quality, and stability. The result is a resilient industry capable of adapting to changing nutritional demands and market conditions.❖

"**Bester Feed & Grain** would like to congratulate AFMA on reaching this impressive milestone. We appreciate the role AFMA has played in supporting and representing the animal feed industry over the years. We wish AFMA all the best for the years ahead."

PRODUCTION AND FROM PAST

Figure 1: Soya bean production in South Africa, 1970 to 2025.

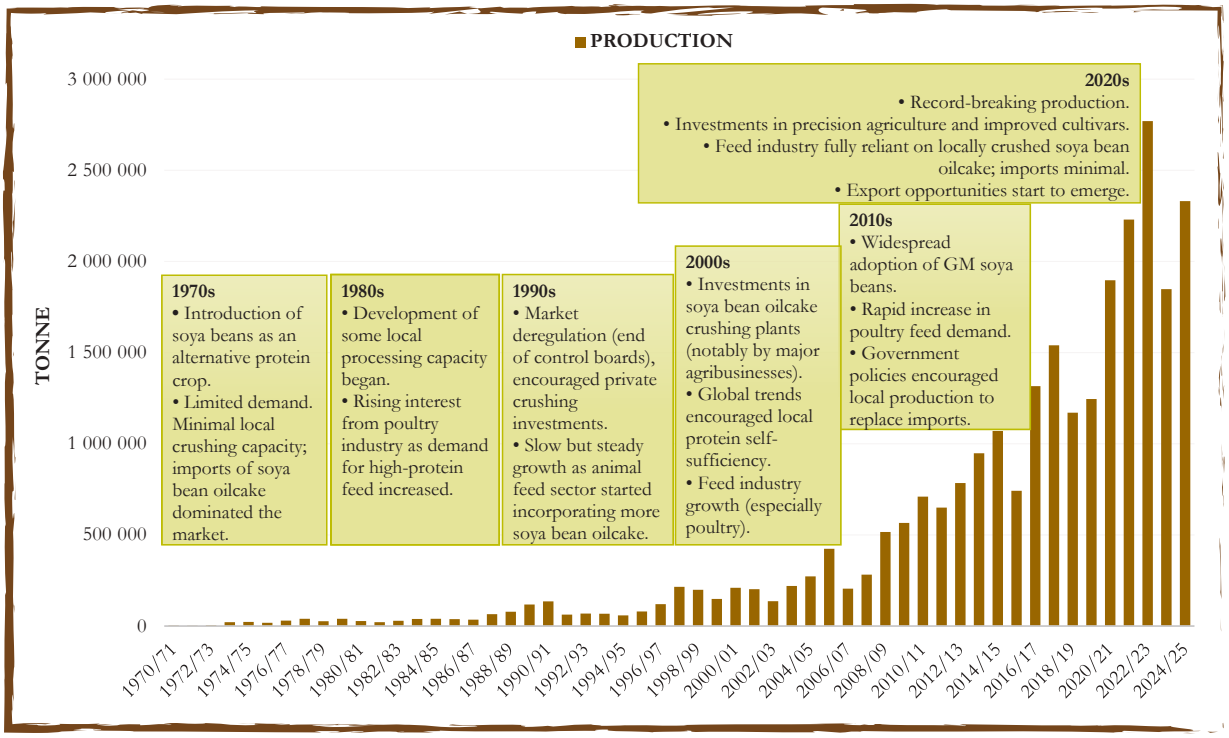
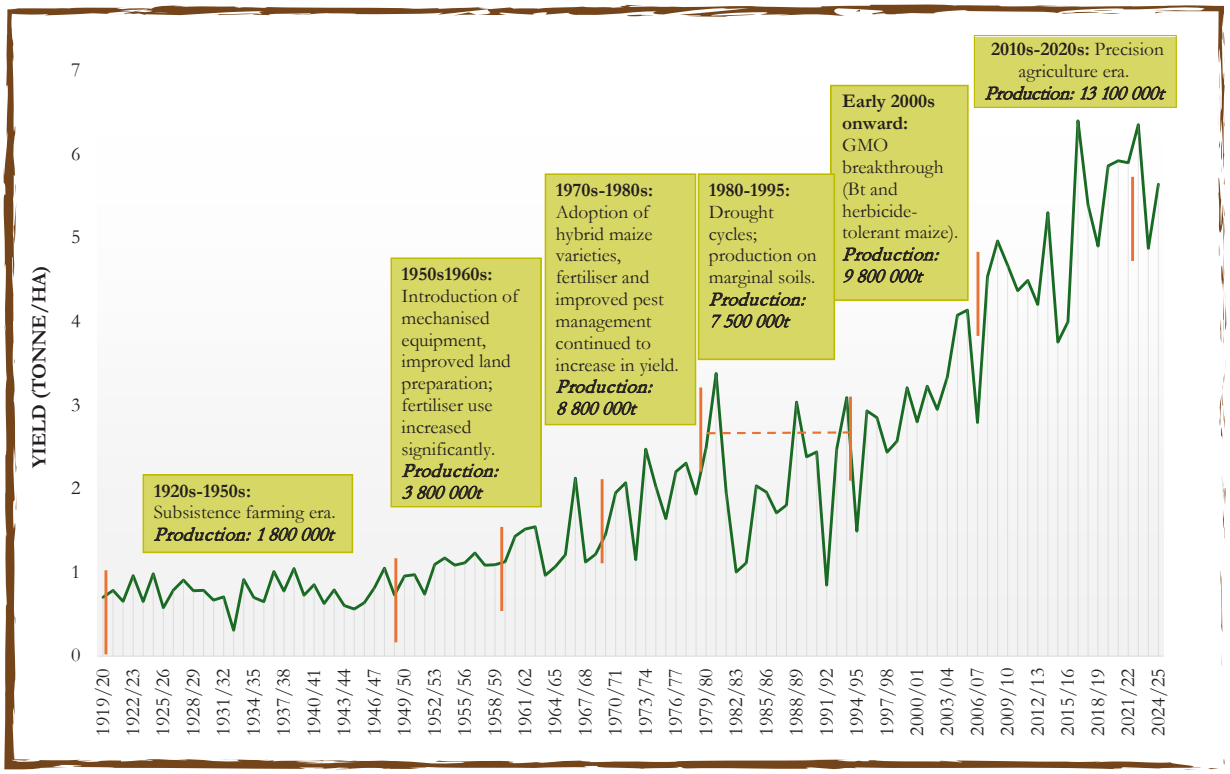


Figure 2: Maize production in South Africa, 1919 to 2025.



CONSUMPTION TRENDS: TO PRESENT

Figure 3: Overall meat consumption in South Africa, 1960 to 2024.

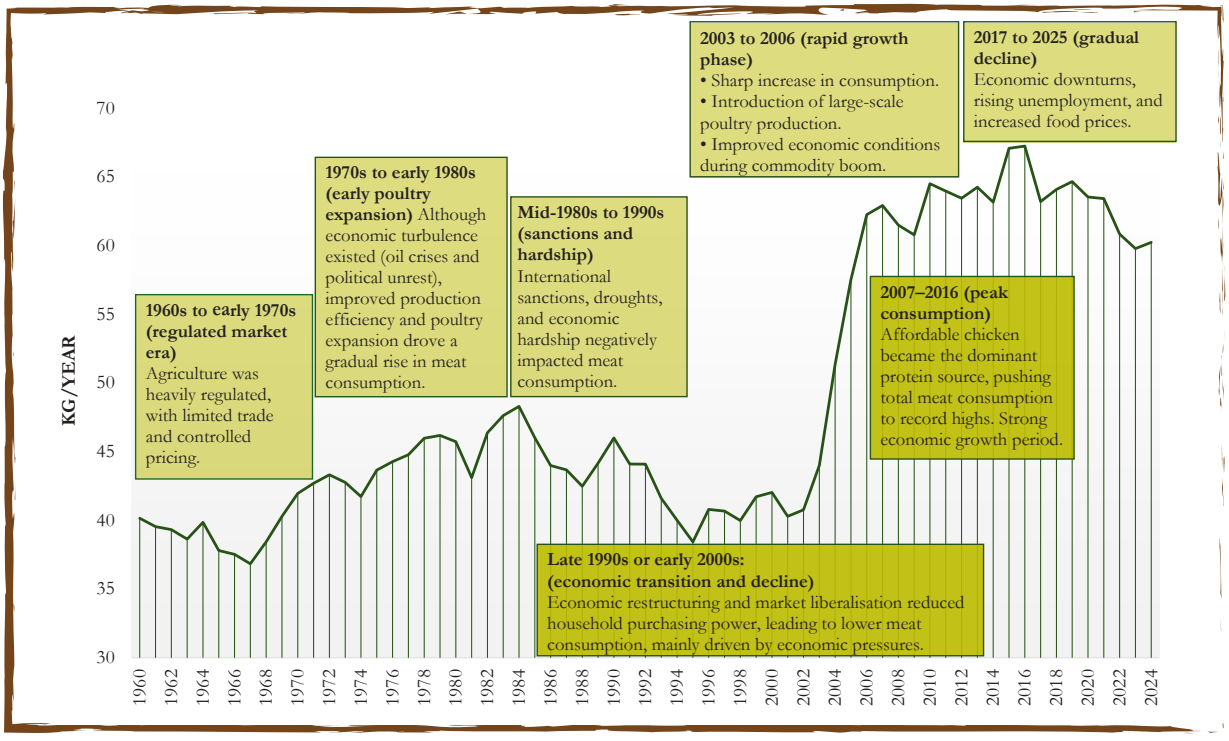
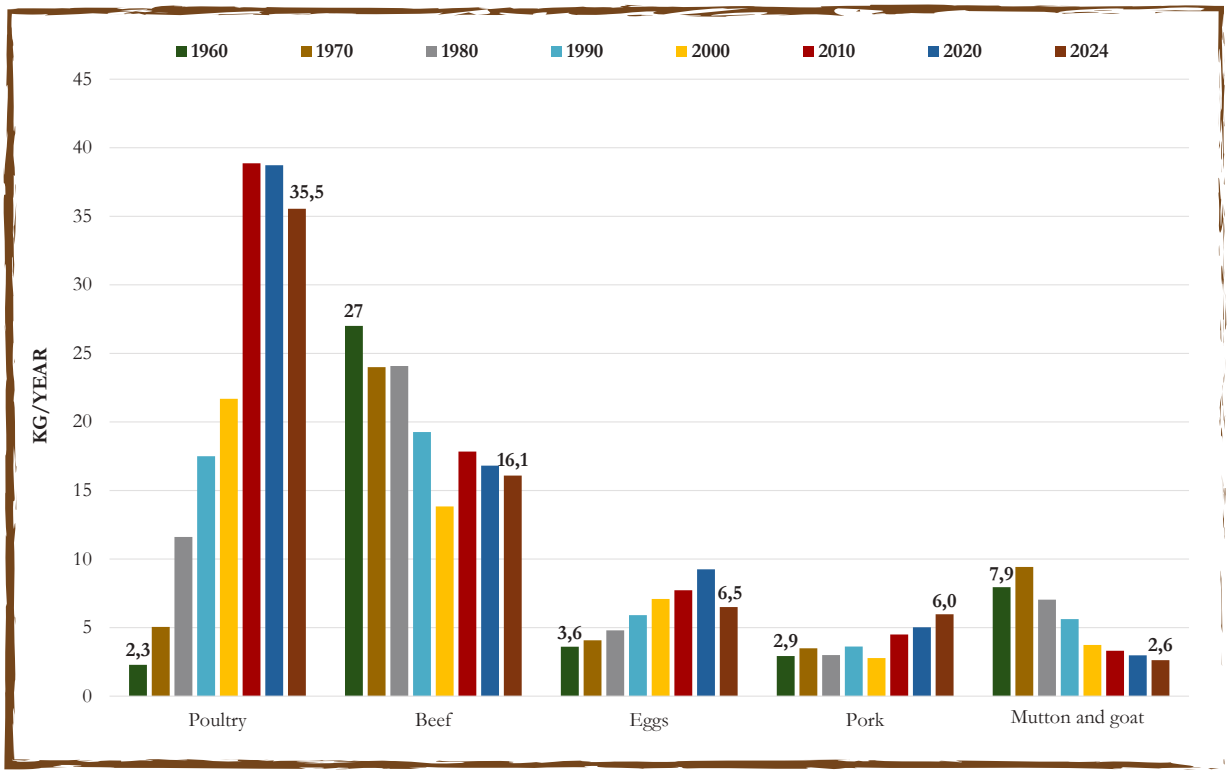


Figure 4: Per capita consumption of protein sources in South Africa, 1960 to 2024.



80 years of feed formulation: What changed and what did not

By Petru Fourie, operations manager, AFMA, and Heiko Köster, chief commercial officer, FeedHub

When South Africa's first balanced feed mixers started turning in the 1930s and 1940s, formulation was more art than science. Nutritionists leaned heavily on fishmeal, cereals, and basic mineral salts. Today, a modern poultry, pig, or dairy ration may include over 30 ingredients, each selected, assessed, and precisely balanced down to fractions of a percent.

Yet, beneath all this progress, some principles have never changed. As AFMA celebrates its 80th anniversary, it is worth asking: What changed in feed formulation and what stayed the same?

Fundamentals that never changed

Animal health and performance

Whether formulating a veld lick for a cow or a high-density starter feed for broilers, the first goal has always been to support animal health, growth, and reproductive efficiency.

Local raw material adaptation

From early maize- and lucerne-based rations to today's soya-focussed diets, South African formulations have always responded to local crop availability and cost dynamics. For example, AFMA records from the 1960s already note regional phosphorus deficiencies and the need to adapt formulas accordingly, a principle that remains central today.

Cost-per-output mindset

Long before 'least-cost formulation' became industry jargon, AFMA meeting minutes from the 1970s emphasised evaluating feed value per litre of milk, per kilogram of gain, or per egg, not just bag price. This performance-based thinking remains a non-negotiable pillar.

Groundbreaking innovations

The rise of amino acid balancing: Starting in the 1970s and accelerating in the 1980s, South African formulators began reducing crude protein levels by adding synthetic lysine, methionine, and later more amino acids such as arginine, threonine, isoleucine, valine, leucine, and tryptophan. This reduced feed costs significantly, while lowering nitrogen excretion, benefiting both producers and the environment.

From fishmeal to oilcake: As documented in AFMA technical minutes and *Chairman's Reports*, the 1990s marked the gradual replacement of fishmeal with soya bean- and sunflower oilcake. This shift was driven by sustainability and consistent availability concerns, price volatility, and improved digestibility of plant proteins.

Feed enzymes and additives: Enzymes such as phytase and xylanase transformed how phosphorus and energy were released from plant-based ingredients. Probiotics, organic acids, and yeast extracts emerged as gut health tools. Antibiotics are progressively being used less since the 1990s.

Precision nutrition: What began as basic grower and finisher stages have evolved into multi-phase feeding strategies, especially in poultry and pigs. Each phase now matches nutrient needs more precisely, optimising feed conversion, growth, and carcass yield.

Trace mineral and vitamin premixes: In the 1970s and 1980s, consistent premix use became the norm, ensuring reliable nutrient delivery and supporting uniform growth, a cornerstone of today's precision nutrition strategies.

Data and digital tools: By the late 1980s and early 1990s, computer-assisted least-cost formulation gained traction. Today, software models integrate real-time prices, adjust nutrient matrices dynamically, and support mill-to-farm feed tracking, a significant leap from handwritten ledgers.

Regulatory influence

South Africa's feed formulation practices have long been shaped by regulatory oversight, especially under *Act 36 of 1947*. This legislation governs ingredient registration, safe inclusion levels for substances such as urea and ionophores, labelling standards, and feed additive approvals.

AFMA has been a key industry partner in ongoing discussions with the Registrar, ensuring that safety, innovation, and practicality remain balanced. This regulatory engagement has helped embed science-backed decision-making into both formulation protocols and compliance systems.

Research and testing

As feed formulation advanced, so did nutrient analysis techniques. In the early decades, proximate analysis, testing for crude protein, fibre, and ash formed the foundation. Over time, laboratories adopted more advanced tools, such as:

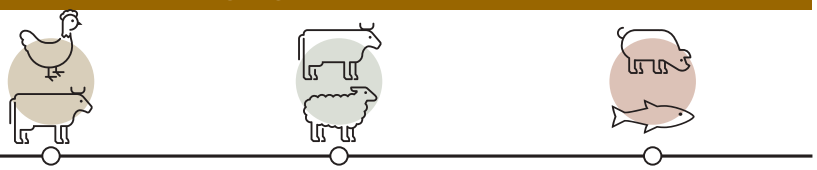
- Near-infrared spectroscopy (NIR) for rapid moisture and protein analysis.
- Mycotoxin screening to detect feed contamination risks.
- Microbial profiling for gut health product validation.

These tools have enhanced ingredient consistency, safety, and nutrient availability, forming the backbone of modern feed precision.

Shifts in species-specific focus

These shifts required greater flexibility in formulation designs and a broader ingredient database.

Formulation trends have evolved alongside changing production priorities:



1980s to 1990s

Poultry and dairy were dominant, with a focus on egg production and milk yield.

1980s to 1990s

Feedlot and ruminant nutrition gained ground, driven by beef marketing reforms and scaling dairies.

2000s to 2020s

Swine nutrition, aquafeed development, and smallholder-specific products became more prominent, along with custom rations for contract growers and niche species.

Feed-to-food chain transparency

Since the 2010s, feed formulation has increasingly formed part of traceability systems and sustainability certifications. Feed safety audits, ISO-compliant traceability protocols, and environmental reporting now require feed data that links directly to livestock outputs. Metrics such as nitrogen and phosphorus excretion, carbon footprint, and water use have added new dimensions to formulation decisions.

AFMA has supported its members in adapting to these demands, advocating for realistic regulatory timelines, and offering guidance on formulation traceability, additive compliance, and documentation practices. Feed is no longer just a production input; it is a part of the social and environmental responsibility conversation.

Past and present challenges

While technological leaps have been transformative, some challenges persist, and new ones have arisen:

- **Raw material price volatility:** Volatility in maize and soya bean oilcake prices continues to affect formulation strategies.
- **Balancing nutrition with affordability:** The tension between high-performance rations and producer budgets has been discussed since AFMA's earliest records.
- **Antibiotic reduction and gut health:** Once routine, antibiotic growth promoters are now largely phased out, replaced by complex gut health strategies using pre- and probiotics, acidifiers, yeast extracts, and other non-antibiotic solutions.
- **Sustainability pressures:** The last decade has introduced new dimensions such as greenhouse gas footprints, nutrient excretion, water use, and the social expectations around the environmental impact and animal welfare.

Confidently into the future

Formulation today sits at the crossroads of tradition and transformation. The original principles, animal performance, cost-efficiency, and local adaptation, remain firmly in place. But advances in biotechnology, data science, and environmental stewardship are reshaping how these principles are executed. As AFMA moves into its ninth decade, feed formulation will increasingly be defined not just by what is in the bag, but by what it delivers on-farm, to the consumer, and society at large.

AFMA's feed formulation journey mirrors the broader evolution of the feed industry – driven by science, shaped by economics, and anchored in a deep commitment to animal health and producer livelihoods.

Timeline snapshot: Key formulation milestones.

Year	Milestone
1940s to 1950s	Dominance of fishmeal and cereal-based rations.
1960s	Focus on local mineral adaptation; first trials on vitamin inclusion.
1970s	Rise of amino acid balancing and crude protein reduction; first formal phase feeding strategies discussed.
1980s	Widespread adoption of trace mineral premixes; start of computer-assisted least-cost formulation.
1990s	Shift from fishmeal to soya bean oilcake; enzyme adoption begins.
2000s	Multi-phase feeding standardised; gut health additives introduced; antibiotic reduction intensifies.
2010s	Full digital integration; inclusion of sustainability metrics (such as nitrogen and phosphorus excretion).
2020s	Focus expands to climate impact, circular economy, alternative protein sources, and animal welfare.

Through every era – from fishmeal to synthetic amino acids, from simple rations to data-optimised, multi-phase formulations – the core mission endures: better feed for better food, sustainably and affordably. ❖

"As you celebrate 80 years of excellence, innovation, and global impact, **R-Biopharm South Africa** would like to extend its heartfelt congratulations on this incredible milestone.

We are so proud to be an AFMA affiliate member – a significant step that aligns perfectly with your mission to support safe, sustainable, and quality-driven practices in the animal feed sector.

Here's to continued growth, meaningful collaboration, and the next chapter of success!"

How poultry nutrition moulded AFMA's journey: A story of science

By Petru Fourie, operations manager, AFMA

When the Animal Feed Manufacturers Association – then known as the Association of Balanced Feed Manufacturers – first took shape in the 1940s and 1950s, feed production in South Africa was still dominated by broad 'general purpose' rations.

Most livestock, including poultry, were fed simple blends of maize and other cereals such as wheat, along with some protein oilcakes, often guided more by tradition than science. In the 1950s and 1960s, AFMA played a central role in coordinating collective imports of critical feed ingredients such as fishmeal and phosphates, supporting supply security before local processing capacity grew.

Where science took over

However, by the early 1960s, something began to shift. South Africa's poultry industry, once largely backyard flocks, was starting to transform into an organised, industrial protein sector. Broiler houses were growing larger, breeder farms were becoming more specialised, and the demand for uniform, cost-effective, high-performing poultry meat was rising fast.

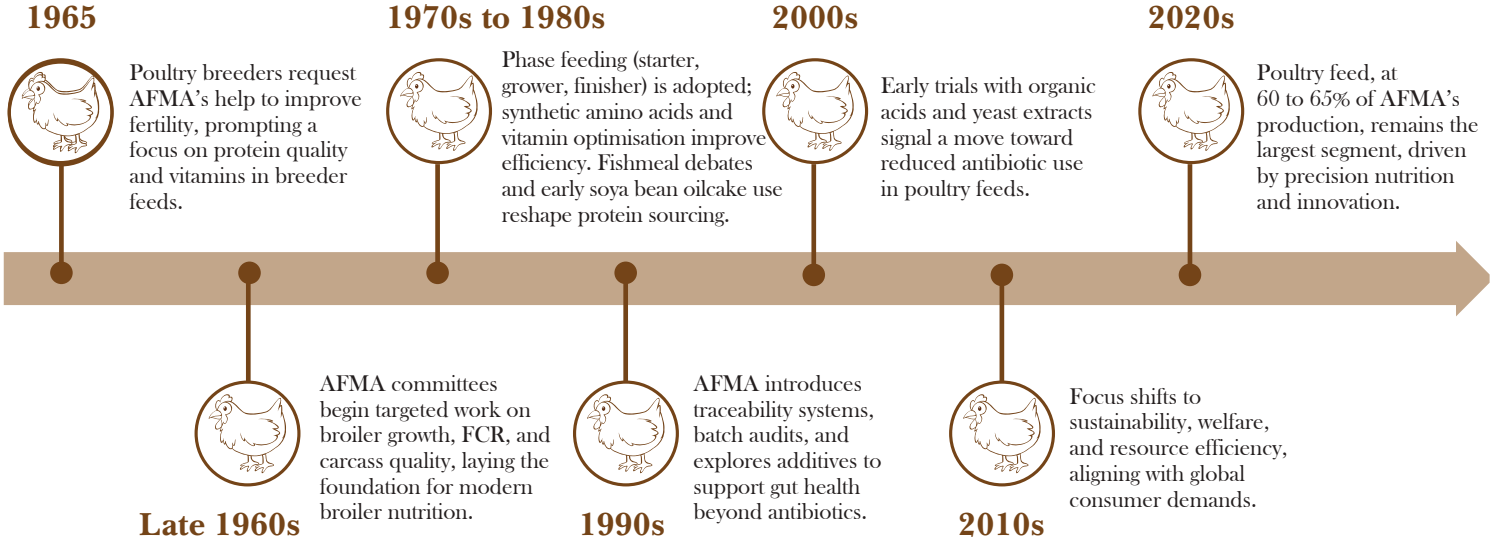
In 1965, this transformation sparked a pivotal request: Poultry breeders formally approached AFMA with concerns over declining fertility and hatchability. Minutes from that year note the breeders' call for "special attention to be given to protein quality and vitamin content in relation to fertility", an early sign that nutrition was no longer just a feed mill's responsibility but a critical lever in production outcomes.

AFMA's response was decisive. Technical subcommittees were convened, focussing on refining breeder rations to improve reproductive performance. By the late 1960s and 1970s, AFMA's influence extended to shaping South African Bureau of Standards (SABS) specifications for feed ingredients and actively engaging in regulations under *Act 36 of 1947*.

Broilers under the microscope

Attention soon turned to broilers. In the late 1960s and throughout the 1970s, AFMA's technical committees launched targeted initiatives to improve feed conversion ratios (FCRs), growth uniformity, and carcass quality. The classic three-phase feeding strategy – starter, grower, and finisher – emerged from these

Timeline snapshot: Poultry nutrition.



efforts, dramatically improving feed efficiency and setting the foundation for the modern broiler industry.

The 1970s also saw the introduction of synthetic amino acids, such as lysine and methionine, into poultry feeds. These breakthroughs allowed lower crude protein diets without sacrificing performance, reducing feed costs while mitigating nitrogen losses. This was a significant step for both efficiency and sustainability.

From the late 1970s onward, AFMA encouraged members to establish or share laboratory facilities for feed quality control, greatly improving ingredient consistency and safety. Declining yellow maize protein (as low as 7%) and poor oilcake quality prompted imports of higher-quality oilcakes, mainly groundnut and small amounts of soya bean oilcake.

Fishmeal debate

Meanwhile, AFMA's archives from the late 1970s and early 1980s show debates over fishmeal dependency. Poultry starter diets at the time commonly included up to 12% fishmeal, valued for its amino acid profile. However, price volatility and quality deterioration sparked industry concern. As one *Chairman's Report* noted, "fishmeal quality deterioration and its increasing cost burden on feed manufacturers" forced the search for alternatives.

Safety and new strategies

In the 1990s, AFMA's technical role expanded. New traceability systems for premixes and micro-ingredients were introduced to meet rising safety standards and local consumer expectations. By the 2000s, AFMA's focus widened to include environmental stewardship, welfare considerations, and advanced gut health strategies. Early investigations into additives such as organic acids and yeast extracts signalled the industry's move toward alternatives to routine in-feed antibiotics.

Modern poultry nutrition

By the 2010s, nutrition strategies placed greater emphasis on resource efficiency, environmental impact, and welfare, reflecting both global trends and local retailer expectations. Today, poultry feed makes up around 60 to 65% of all compound feed manufactured by AFMA members, making it the largest and most dynamic segment of the industry.

Poultry nutrition's journey within AFMA is not just about feed formulation, it is a story of shared discovery, technical leadership, and building an entire protein value chain capable of feeding a nation. From early fertility trials to today's precision nutrition, it stands as a testament to AFMA's role in building trust, and supporting an industry that nourishes both animals and the nation. ❖

Hall Of Fame

AFMA Intervarsity Writer's Cup

Category: Own research

YEAR	UNIVERSITY	STUDENT
2019	Stellenbosch University	Sarah Jane Davies
2020	University of Pretoria	Amelia du Preez
2021	Stellenbosch University	Zarinah Skippers
2022	North-West University	Enathi Dinga
2023	Stellenbosch University	Michelle Gouws
2024	Stellenbosch University	Mighael van Schalkwyk
2025	Stellenbosch University	Cherise Basson

Category: Literature review

YEAR	UNIVERSITY	STUDENT
2020	University of Pretoria	Ida Linde
2023	University of Pretoria	Gerhard Claassen
2024	University of Pretoria	Jamie Fourie
2025	University of Pretoria	Anri Pienaar

AFMA's role in South Africa's ruminant feed journey

By Petru Fourie, operations manager, AFMA

Across South Africa's heartland, where livestock farming is shaped by the changing seasons of the veld, AFMA's involvement in ruminant nutrition began. In the early years, feeding cattle and dairy herds was not about replacing what nature provided but about finding ways to supplement it effectively.

Poultry production initially drove the feed industry forward, but it was the complexity of ruminants, their varied diets, long production cycles, and reliance on changing environmental conditions, that shaped AFMA's technical expertise and long-term contribution to the sector.

Where nature set the rules

By the late 1950s, AFMA had already recognised that to feed cattle and dairy herds effectively, one had to supplement, not replace, what the veld offered. In 1959, the Association tried to launch a standardised dairy feeding programme, the so-called 'dairy afternoon', but, as chairperson Dr Munro Griessel admitted at the time, it "proved abortive… because of the absence of reliable statistical data and the reluctance of some parties to provide same."

Even so, the setback did not stop progress. That same year AFMA worked with Dr Cowneswald of Onderstepoort, who pulled together a panel of top nutritionists. These early efforts, combined with the first South African Bureau of Standards (SABS) feed standards, paved the way for some of South Africa's earliest commercial dairy feed specifications – a big step in shaping how ruminants were fed for years to come.

Innovation born of necessity

By the 1970s and early 1980s, AFMA members were developing energy-rich dairy concentrates to boost milk yields, molasses-urea licks to support grazing during the dry season, and regionally adapted mineral mixes to meet local soil needs. Phosphate use was part of ruminant feed strategies, but large-scale supplementation campaigns only gained traction in the 1980s as deficiencies became more widely recognised and addressed.

These solutions came from a deep understanding of local conditions and strong partnerships with research bodies such as Onderstepoort and regional agricultural colleges, which kept AFMA's technical expertise rooted in credible science.

Changing minds, not just rations

During the 1960s and early 1970s, AFMA worked to change how producers viewed feed. It was not just a cost per bag; it was an investment that paid back in litres of milk and kilograms of meat. AFMA promoted the concept that well-formulated feeds improved both productivity and profitability.

The rise of feedlots

In the 1990s, shifts in the red meat industry and growing urban demand spurred rapid expansion of commercial feedlots. This transformation built on developments from the 1980s, when droughts and protein shortages forced the industry to innovate with high-performance rations. During this period, AFMA's technical work on maize-protein balancing and participation in protein strategy discussions helped prepare the ground for modern feedlot nutrition practices. As feedlots grew, AFMA continued to promote scientifically formulated diets and practices aimed at improving feed efficiency.

At the same time, the industry began to recognise the importance of accurate data and on-farm testing. This shift in thinking became critical as dairies expanded in the 1990s. Mechanisation, larger herds, and tighter reproductive cycles demanded feeds that were not only balanced but also stable, digestible, and tailored to each production phase.

A turning point of principle

By the mid-1980s, AFMA found itself at a crossroads. The industry was investing more actively in ruminant nutrition research, laying the groundwork for technical expertise that would shape feeding practices for decades to come. Discussions on phosphorus management and mineral supplementation were gaining traction, with urea-based dry-season licks becoming widely used as part of drought and grazing support strategies.

Looking ahead, the industry also began considering the need to develop its own expertise pipeline. By the late 1980s, proposals to fund postgraduate research in ruminant nutrition reflected AFMA's commitment to strengthening technical capacity and building the skills needed for future innovation.

Standards and influence

As the industry matured, AFMA's role extended beyond formulation into safeguarding feed safety, traceability, and long-term sustainability. Ongoing engagement with the Registrar of *Act 36 of 1947* ensured the responsible use of non-protein nitrogen, ionophores, and trace minerals, while also reinforcing accurate labelling and withdrawal periods. Over time, some large dairy and beef operations moved toward in-house nutritionists and on-farm mixing.

AFMA's legacy in ruminant nutrition was not built on loud revolutions, but on consistent, careful progress, shaped by veld trials, committee debates, producer feedback, and science-led refinement.

MILESTONE SNAPSHOT: AFMA AND THE RUMINANT SECTOR

- **1970s** – Dairy concentrates and dry-season protein supplements become mainstream
- **1980s** – Bypass proteins and molasses-urea blocks began to gain traction
- **1990s** – Feedlot ration development advances with maize/protein balancing
- **2000s** – Act 36 focus deepens on urea, monensin, and trace mineral safety
- **2010s** – Adoption of risk-based formulation and full-cost ration modelling
- **2020s** – Pivot to traceability, and sustainability standards

Conclusion

From supplementing veld grazing in the 1950s to guiding modern feedlot and dairy nutrition, AFMA's journey reflects decades of steady, science-driven progress. Through droughts, protein shortages, and regulatory changes, the Association has remained a trusted partner to the livestock sector. ❖

"On behalf of the **Chem Nutri Analytical** team, we extend our heartfelt congratulations to AFMA as you celebrate 80 years of leadership and service to the animal feed industry. Your unwavering commitment to advancing the sector, promoting responsible practices, and fostering industry collaboration has set a standard of excellence.

We are proud to be associated with an organisation that continues to shape the future of animal nutrition in South Africa. Wishing you continued success for the decades ahead!"

Evolution of the AFMA logo

AFMA's visual identity has evolved alongside its strategic direction. The logo transformation reflects AFMA's shift from an informal association to a professional, standard-setting authority in the feed sector.

1993 – The original black AFMA triangle design.

1995 to 2000 – Updated to blue version, retaining triangle emblem.

2004 – A sleeker, more modern light blue triangle is introduced.

2006 – The rebranding process begins, integrating AFMA's slogan and expanding its identity.

2019 – The modernised AFMA logo, including the tagline 'Safe Feed for Safe Food', is officially registered as the AFMA trademark.

AFMA
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Animal Feed Manufacturers Association

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AFMA's enduring commitment to protecting the feed and food chain

By Cilé-Mari Schultz, technical intern, and Bonita Cilliers, technical and regulatory advisor, AFMA

As AFMA marks 80 years of industry leadership, one of its most impactful and enduring contributions to South Africa's agricultural sector takes centre stage: feed safety.

A single compromised ingredient can have far-reaching consequences – impacting animal health, disrupting supply chains, and ultimately threatening food safety. This is why feed safety is not just a technical matter; it is a public health imperative and a shared responsibility across the value chain.

Since its founding in 1945, AFMA has recognised this responsibility. Under its strategic pillar 'Safe Feed for Safe Food', the association has led the development and coordination of voluntary, industry-driven feed safety programmes. These initiatives are designed not merely to meet minimum legal requirements, but to anticipate risk, detect contamination early, and ensure traceability across every step of the feed supply chain.

Over the past two decades, AFMA has transformed feed safety from a reactive, fragmented effort into a proactive, data-driven system built on trust, transparency, and continuous improvement. This milestone anniversary offers a timely opportunity to reflect on the journey so far – and more importantly, to look ahead at how innovation will shape the feed safety landscape for decades to come.

In an era where consumers demand transparency, regulators expect traceability, and climate variability introduces new risks, the industry can no longer afford to treat feed as a background input. It must be seen, and managed, as a strategic safeguard for food security and public trust. AFMA's commitment remains clear: to protect the entire value chain by ensuring feed safety is never compromised.

***Salmonella* monitoring programme:** AFMA's *Salmonella* monitoring programme is the longest-running initiative of its kind in the South African feed industry. Since its inception in 2005, over 175 000 samples have been submitted by 47 member companies, covering raw materials, feed mill environments, and finished products.

Results are aggregated into a national database, reviewed quarterly by AFMA's technical sub-committee. The data reveals that contamination is most common in incoming raw materials yet rarely found in finished feed – highlighting the effectiveness of mill-level containment and hygiene controls. This programme is a key pillar of industry-wide risk reduction and continuous improvement.

Mycotoxin monitoring programme: Launched in partnership with The Southern African Grain Laboratory (SAGL) in 2014 and supported by the Maize Trust, this programme evaluates maize quality at the point of delivery to feed and food mills. Over the past ten years, more than 2 500 post-storage maize samples have been analysed (over 1 200 of which were submitted by AFMA member feed mills).

Samples are screened using advanced UPLC-MS/MS methods for key mycotoxins: aflatoxins, deoxynivalenol, fumonisins, ochratoxin A, zearalenone, and T2/HT2. Given the maize-dependent nature of South Africa's feed sector and its climate variability, this longitudinal dataset is vital for guiding ingredient procurement, formulation, and storage practices.

Dioxins and PCBs monitoring: PCBs are regulated under *Act 36 of 1947* as undesirable substances due to their persistence and potential to bioaccumulate in animal tissues. Recognising these risks, AFMA launched its monitoring programme in 2011, focussing on high-risk ingredients such as animal by-products, oils, and certain minerals.

To date, more than 2 600 samples have been analysed, with approximately 62% screened qualitatively for PCBs and 38% undergoing quantitative dioxin analysis. Due to limited local capacity for dioxin testing, samples are sent to ISO-accredited international labs – adding cost but ensuring accuracy. In South Africa, PCB screening is available and used as an indicator of potential dioxin contamination.

Proactive monitoring in action

For over two decades, AFMA has championed proactive feed safety through structured surveillance of key contaminants: *Salmonella*, mycotoxins, and dioxins/polychlorinated biphenyls (PCBs). These voluntary, industry-led monitoring programmes combine routine sampling, risk-based analysis, and end-to-end traceability – delivering insights that far exceed regulatory compliance.

These three programmes not only inform daily decision-making within feed businesses but also reinforce industry alignment with evolving global food safety expectations, solidifying AFMA's commitment to Safe Feed for Safe Food.

Industry-led monitoring programmes

Year	Initiative	Milestone
2005	Salmonella monitoring	175 000+ samples to date
2009	Early warning system	Never formally activated, but always vigilant
2011	Dioxins/PCBs monitoring	2 600+ samples to date
2014	Mycotoxin monitoring	5 700+ samples to date

Encouragingly, all test results for PCBs and dioxins – conducted through AFMA's voluntary monitoring programme – have remained well within South Africa's legal limits for undesirable substances.

Prevention over reaction

In 2009, AFMA introduced the early warning system (EWS) as a structured, pre-emptive mechanism to identify, verify, communicate, and manage emerging risks in the feed sector. Designed to flag threats such as melamine, heavy metals, and adulterated imports, the EWS forms a critical component of AFMA's proactive risk management strategy.

Although the system has not required formal activation to date, its presence has significantly enhanced supplier oversight, improved incident preparedness, and strengthened industry-wide vigilance.

2025 Gluten 60 incident (China): While initial microscopic testing of imported Gluten 60 indicated compliance, follow-up analysis revealed undeclared additives including ammonium sulphate, maize bran, and approximately 5% unidentified material. Although AFMA was not directly involved, the association shared the information – received from an external source – with members to promote awareness and caution. This allowed companies to review their supply chains and act accordingly.

2017 Fumonisin spike (South Africa): The SAGL Mycotoxin monitoring programme detected elevated levels in maize samples, prompting rapid industry response to mitigate animal health risks and protect product quality.

These incidents underscore the value of early detection systems and reinforce the industry's commitment to prevention as the most effective defence in ensuring feed and food safety. The EWS gives us the foresight to prevent what others might only react to.

These incidents, alongside local examples, demonstrate that even a single failure in feed safety can have both national and global consequences. Continuous monitoring is not a luxury; it is a necessity.

Smarter safety through innovation

As the feed industry modernises, so must its safety systems. The future of feed safety will be defined by digital integration, automation, and predictive intelligence.

- **Artificial Intelligence (AI) and machine learning** will play a key role in anomaly detection, contamination forecasting, and decision support based on historical trends and climate data.
- **Image recognition** tools may soon assist with automated screening of raw materials, identifying defects or foreign material before human intervention is needed.
- **Blockchain** and the **Internet of Things (IoT)** offer opportunities for secure, real-time traceability from origin to end-user – building trust across the supply chain.

As global standards evolve, AFMA remains committed to benchmarking its systems against globally recognised best

What the world has taught us

AFMA's feed safety programmes have evolved in tandem with – and in response to – global crises that reshaped policy, consumer confidence, and regulatory frameworks:

Belgium (1999): Dioxin-contaminated oil in animal feed resulted in over €1 billion in recalls and international trade disruptions.

United States (2007): Melamine laced with contaminated wheat gluten in pet food killed thousands of animals and led to sweeping reforms in ingredient traceability.

Germany (2011): Dioxin-tainted feed fat impacted 4 700 farms, prompting European Union-level feed reform and improved contaminant controls.

Netherlands (2013): A feed premix contaminated with dioxins triggered multiple pork and poultry recalls across Europe.

France (2021): A soya-based compound feed containing excess copper and unapproved additives led to temporary bans and producer protests.

practices, ensuring the South African feed industry is both resilient and globally competitive.

Even in the absence of major incidents, vigilance must never be relaxed. As SAGL data shows, seasonal variability, climatic shifts, and changing ingredient origins all affect contamination risk. Just because nothing has gone wrong does not mean nothing will. The absence of outbreaks is proof that monitoring works – not that it is not needed.

Feed safety, future ready

AFMA's legacy in feed safety is grounded in science, strengthened by innovation, and upheld by the voluntary commitment of its members. Through early warning systems and proactive monitoring, the industry has shifted from reactive responses to preventive risk management, establishing a resilient foundation for feed and food safety. 'Safe feed for safe food' has become more than a slogan; it is a shared responsibility that drives continuous improvement and builds public trust.

The message is clear: When feed is safe, food is safer. ❖

For more on AFMA's monitoring programmes or to get involved, contact technical@afma.co.za or visit *www.afma.co.za*

"**dsm-firmenich Animal Nutrition & Health** wishes to extend our warmest congratulations to AFMA on the remarkable occasion of your 80th anniversary. This incredible milestone is a testament to your enduring dedication, visionary leadership, and the significant impact you've had on the animal feed and agricultural industry, in South Africa and the rest of the world.

For eight decades, AFMA has not only witnessed but actively shaped the evolution of our field. Your commitment to innovation and sharing powerful knowledge has been instrumental in driving progress and fostering a vibrant community. We particularly applaud your agility in adapting to and indeed spearheading the changes that have transformed the industry over the years. Your success is a true inspiration, and we look forward to seeing the continued positive influence of AFMA for many years to come."

Hall Of Fame

AFMA Person of the Year Award

YEAR	RECIPIENT
1993	Dr Munro Griessel
1994	Hansie Bekker
1995	Cliff Saunders
1996	Dr Barney van Niekerk
1997	Graham Ebedes
2002	Prof Rob Gous
2003	Dr Leon Ekermans
2004	Dr Johan Willemse
2005	Prof Jocelyn Webster
2006	Tommy Jamie
2007	Jannie de Villiers
2008	Loutjie Dunn
2009	Chris Schutte
2011	Dr Konrad Keyser
2013	De Wet Boshoff
2014	Dr Deon Barnard
2015	Dr Heinz Meissner
2017	Heiko Köster
2019	Terry Wiggill
2021	Dr John Purchase
2023	Wouter de Wet
2024	Wandile Sihlobo
2025	Wiana Louw

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The bioprotection mix to prevent the toxic effects caused by all mycotoxins.

*Authorized by Regulation (EU) 1060/2013, 1016/2013, 1115/2014, 2017/913, 2017/930, 2018/1568, 2021/363 and FDA approved (21 CFR §573.485)

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dsm-firmenich

From field to facts: The story mycotoxin data tells about maize

By Martin Brits and Wiana Louw, SAGL

AFMA members played a pivotal role in motivating the expansion of mycotoxin sampling within the annual crop quality surveys. With financial support from AFMA, additional samples from selected regions were incorporated over three seasons, significantly enriching the dataset. This effort strengthened the case for further funding from the Maize Trust, which enabled a continued increase in the number of annual mycotoxin analyses included in the survey.

Building on this success, AFMA supported the establishment of a post-storage, pre-processing mycotoxin survey for maize. In this ongoing project, AFMA members are responsible for collecting and submitting samples to The Southern African Grain Laboratory (SAGL) during different cycles. These initiatives have resulted in a robust and valuable database of mycotoxin results, which supports effective management strategies across the field-to-feed value chain.

Mycotoxins in maize: A review

Over the past nine seasons mycotoxin analyses were performed in 5 715 maize samples (*Table 1*). The pre-storage samples collected during the annual maize crop quality survey included 1 620 white maize samples and 1 530 yellow maize samples. The post-storage maize samples collected during the annual post-storage pre-processing project consisted of 1 314 white and 1 251 yellow maize samples. This extensive sampling carried out through the annual quality projects provides a detailed overview of mycotoxin occurrence and levels in maize at different stages.

Table 1: The number of mycotoxin analyses performed over nine seasons in pre- and post-storage maize samples.

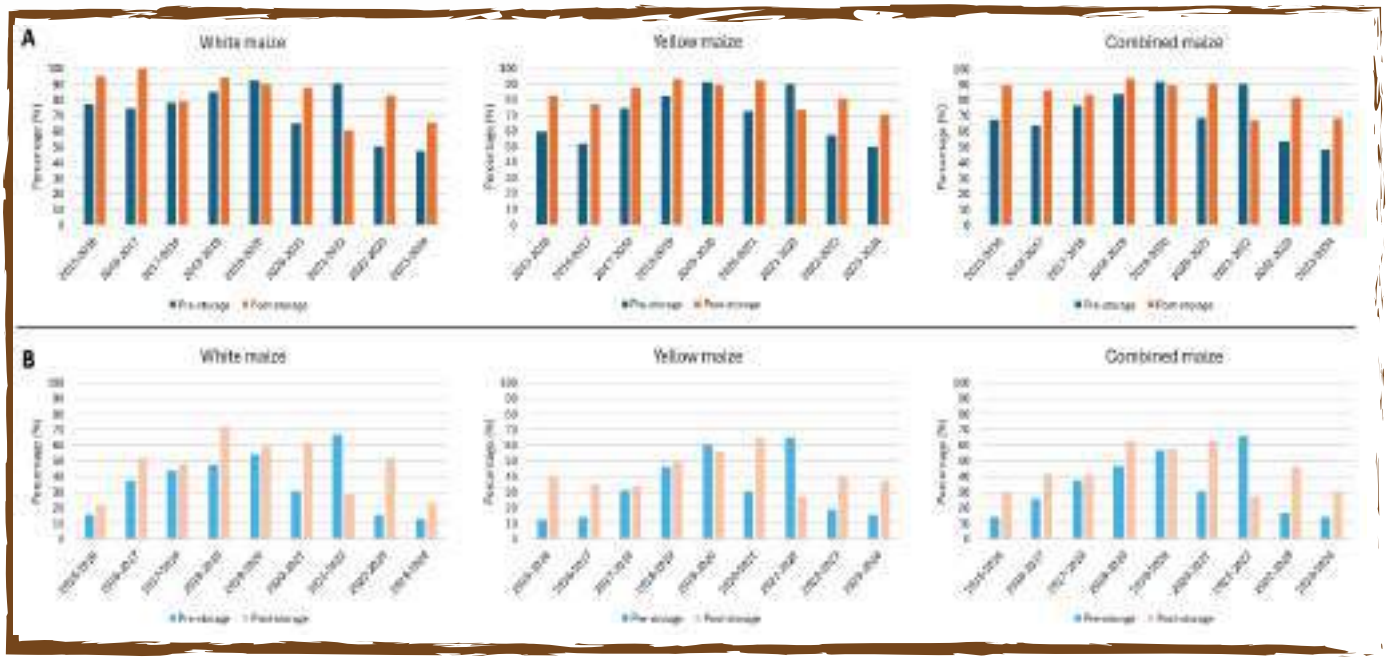
	Pre-storage maize samples			Post-storage maize samples		
Season	**White maize**	**Yellow maize**	**Total**	**White maize**	**Yellow maize**	**Total**
2015-2016	156	194	350	126	94	220
2016-2017	179	171	350	58	88	146
2017-2018	175	175	350	81	68	149
2018-2019	175	175	350	177	123	300
2019-2020	200	150	350	172	170	342
2020-2021	186	164	350	170	162	332
2021-2022	185	165	350	173	171	344
2022-2023	182	168	350	206	177	383
2023-2024	182	168	350	151	198	349
Total	**1 620**	**1 530**	**3 150**	**1 314**	**1 251**	**2 565**

Mycotoxin occurrence in maize, presented as the percentage positive samples over the nine seasons is shown in *Figure 1*. The percentage pre-storage samples containing at least one mycotoxin (*Figure 1A*) ranged from 47 to 93% for white maize and 49 to 91% for yellow maize. For the post-storage samples (calculated as an average of the three sample collection cycles) this ranged from 61 to 100% for white maize and 71 to 93% for yellow maize. In general, the individual seasons' percentage positive samples for at least one mycotoxin tend to be higher in the post-storage samples compared to the pre-storage samples.

The percentage pre-storage samples containing more than one mycotoxin (*Figure 1B*) ranged from 13 to 66% for white maize and 12 to 65% for yellow maize, and the percentage post-storage samples containing more than one mycotoxin ranged from 22 to 72% and 27 to 65% for white and yellow maize, respectively. Similar to the overall mycotoxin occurrence, the samples containing more than one mycotoxin tend to be higher in the post-storage samples compared to the pre-storage samples.

However, the data still shows large variations for the different seasons where

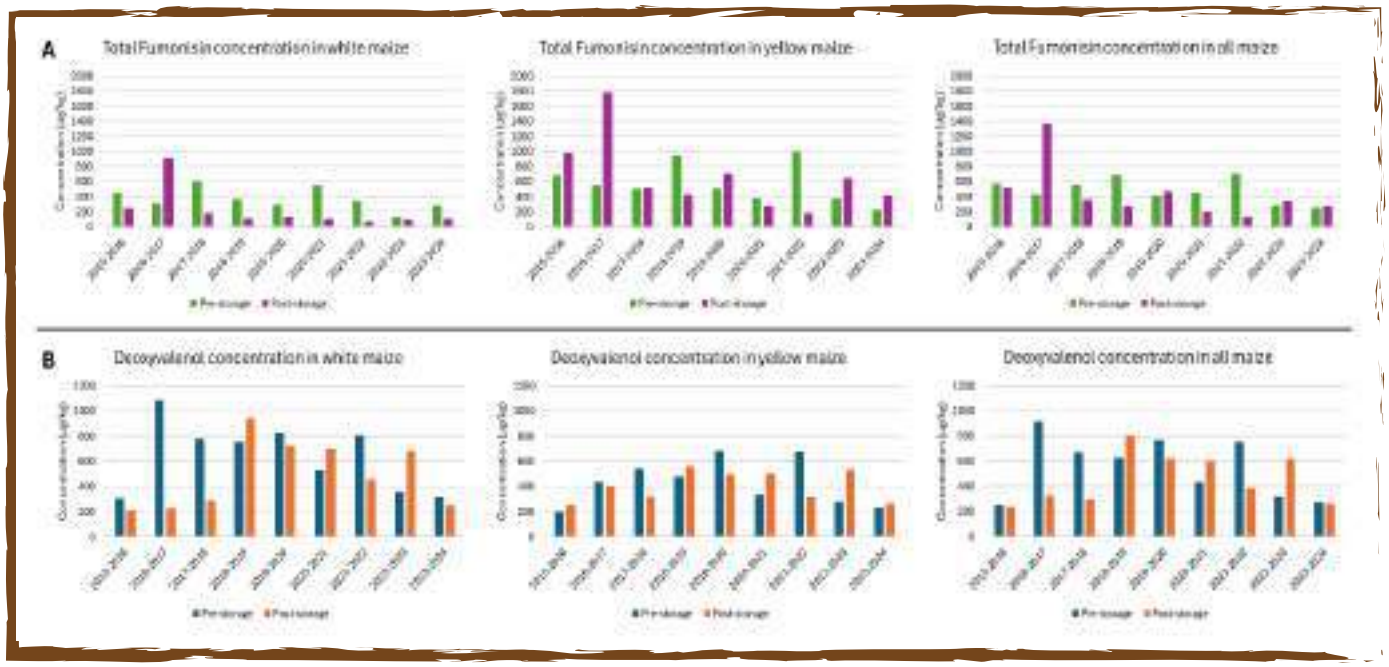
Figure 1: Mycotoxin occurrence in white and yellow maize over nine seasons for pre-storage and post-storage samples. The post-storage results are an average of the three sample collection cycles. A shows the percentage positive samples containing at least one mycotoxin; B shows the percentage positive samples containing more than one mycotoxin.



similar percentage positive samples were reported for white and yellow maize in the pre- and post-storage samples collected during the 2019/20 season, and more positive samples were detected in the pre-storage maize samples in the 2021/22 season compared to the post-storage samples. While the large amount of data provides an approximate trend between pre-and post-storage samples, long-term data over more seasons is required, and mycotoxin monitoring should continue.

The mean concentrations for the sum of fumonisin B_1, B_2, and B_3 (as the total) and deoxynivalenol in the positive samples are shown in *Figure 2*. Large variations in concentrations for both the total fumonisin (*Figure 2A*) and deoxynivalenol (*Figure 2B*) are observed for pre- and post-storage maize. It is interesting to note that white maize tends to have lower fumonisin concentrations

Figure 2: Mycotoxin mean concentrations in positive white and yellow maize over nine seasons for pre-storage and post-storage samples. A shows the mean fumonisin concentrations (µg/kg); B shows the mean deoxynivalenol concentrations (µg/kg).



compared to yellow maize for both pre- and post-storage samples. Deoxynivalenol concentrations, however, appeared to be slightly higher in white maize compared to yellow, though it was not a strong trend.

Aflatoxins (not shown) were detected in pre-storage samples collected during the 2018/19, 2019/20, and 2023/24 seasons. In contrast, they were found in post-storage samples only during the 2015/16 and 2016/17 seasons. This again emphasises the continued monitoring of mycotoxins and the need for long-term data over more seasons.

Why mycotoxin monitoring matters

The collaborative efforts with AFMA have advanced mycotoxin monitoring in South African maize and resulted in a robust nine-season dataset from pre- and post-storage samples. This extensive data over nine production seasons offers valuable insights into mycotoxin trends and underscores the impact of storage on contamination levels.

Although substantial seasonal variations were observed, increases in mycotoxin occurrences both in pre- and post-storage stages could be observed. White maize generally presented lower fumonisin concentrations than yellow maize and deoxynivalenol levels tend to be elevated in white maize. Aflatoxins, a critical regulatory concern, were detected intermittently in both pre- and post-storage samples across various seasons.

For national mycotoxin regulations, these findings underline the critical need for continuous monitoring throughout the entire maize value chain from field to processing. Such sustained data collection provides the necessary evidence to inform and potentially support existing mycotoxin regulatory limits in maize, thereby safeguarding food and feed safety and upholding market integrity. ❖

For more information, visit *www.sagl.co.za* or phone 012 807 4019.

AFMA membership: A tale of growth

By Wimpie Groenewald, member liaison officer, AFMA

From its humble beginnings in the 1930s, marked by the installation of South Africa's first five-tonne electric feed mixer, the country's animal feed industry began its journey towards structured organisation and professionalisation.

In 1945, the establishment of the Association of Balanced Feed Manufacturers marked the industry's first formal step towards collective representation. Two years later, in 1947, the Association hosted its first annual general meeting, setting the stage for what would later become the Animal Feed Manufacturers Association (AFMA), the recognised voice of Southern Africa's feed industry.

Expansion and consolidation

By 1956, AFMA's predecessor had achieved significant growth, adding eight new members and approaching full representation of the national feed industry. By 1957, the Association had 47 full members covering approximately 99% of South Africa's feed tonnage, a level of consolidation rare in the sector at the time. Membership remained stable through 1958.

However, the early 1960s saw fluctuating numbers. Membership fell to 30 full members in 1961, though associate membership was recorded for the first time. A shift towards industry-defined standards emerged in 1965, as the Association moved away from reliance on the SABS Bureau Mark, signalling the start of independent self-regulation.

In 1962, with the move to a more independent office space and a new membership fee structure (R10,50 per member plus a levy of ½ cent per tonne of feed), the organisation laid the groundwork for a more predictable revenue model and professionalised membership administration. This step allowed AFMA to expand its services and deepen its technical engagement, drawing more feed companies into the fold.

In 1976, rising member concerns regarding voting fairness and representation led to the formation of AFMA's first constitutional subcommittee and costing standards committee – one of the Association's earliest governance reforms. By 1980, membership had rebounded strongly to 61 full members from 35 recorded a decade earlier. This growth was solidified in 1983 when AFMA reached 68 members, representing 94% of national feed sales.

A key development in the 1980s was the formalisation of associate membership, allowing suppliers, equipment providers, and non-manufacturing stakeholders to participate in the AFMA ecosystem. This diversification was important for broadening AFMA's influence across the value chain.

Yet, by 1986, membership declined slightly to 50 full members, prompting structural and ethical reforms related to pricing practices, constitutional alignment, and emerging competition legislation.

Compliance and diversification

In the early 2000s, AFMA formalised its compliance framework, culminating in the 2006 registration of its 'Safe Feed for Safe Food' trademark. A major milestone followed in 2008 when compliance with the CoC became mandatory for all members. Meadow Feeds became the first full member to comply, followed by Ceva Animal Health as the first associate member in 2009. These achievements underscored AFMA's leadership in food safety and regulatory enforcement.

Between 2008 and 2015, the CoC evolved into AFMA's core standard, supported by audit protocols, transport standards, and traceability systems. This period also saw rapid membership growth, particularly among associate members (reaching 82 by 2015) as the organisation welcomed traders, service providers, and premix suppliers.

By 2011, AFMA had expanded its focus to include industry training and accreditation, offering members access

Milestones achieved

The 1990s were a period of operational expansion and governance reform. *Chairman's Reports* from this decade note efforts to restructure voting rights and decision-making models to ensure fair representation of both large-scale and smaller feed producers.

AFMA began placing greater emphasis on data transparency and performance benchmarking as member benefits. Monthly sales reporting and the launch of the *AFMA Matrix* magazine (1992) were key member-focussed initiatives that provided value beyond traditional lobbying or regulatory roles.

AFMA also began to intensify efforts to represent the sector in international trade and regulatory matters, further underlining the importance of broad membership engagement to legitimise its policy voice.

The Association's role expanded internationally in 1987 by joining the International Feed Industry Federation (IFIF), representing a shift towards global industry engagement. A year later, in 1988, the Association formally rebranded as the Animal Feed Manufacturers Association, establishing itself as a non-profit entity. This was a pivotal step in modernising its structure and operations.

Throughout the early 1990s, AFMA advanced its internal governance framework, redefining membership categories and introducing its first Code of Conduct (CoC) in 1992. Though initially unpublished, this internal Code marked the industry's commitment to voluntary regulation of practices such as the use of poultry litter in animal feed.

The mid-1990s were defined by a strategic shift from voluntary guidelines to enforceable, auditable codes. This shift began with the adoption of the *Salmonella* Control Code in 1994 and 1995, which was finalised and circulated among members. Membership fluctuated during this period but remained anchored by AFMA's efforts to standardise and professionalise the industry.

to technical workshops, global symposiums, and formal feed miller qualifications, reinforcing its role as both a regulatory and professional development leader.

Regional leadership

By 2015, AFMA had extended its influence beyond South African borders, collaborating in the establishment of regional industry bodies such as the Southern Africa Feed Manufacturers Association (SAFMA) and the Tanzania Feed Manufacturers Association (TAFMA). This regional expansion was complemented by increased collaboration with agricultural and food safety institutions across Southern Africa.

In 2018, AFMA supported the formation of the Zambian Animal Feed Manufacturers Association (ZAFMA), modelled on AFMA's governance principles. This initiative, along with mentorship of the Association Kenya Feed Manufacturers (AKEFEMA), further positioned AFMA as a leader in regional industry development.

Adaptation and structures

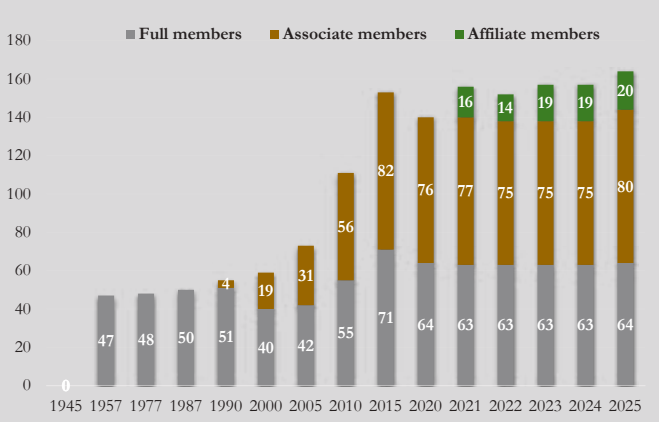
Despite pandemic-related disruptions in 2020, AFMA maintained regional engagements while innovating its compliance systems. By mid-2021, audits resumed, expanded to a 12-point system, and pre-screening phases were introduced to enhance audit rigor.

In 2022, AFMA formally introduced its **Affiliate Membership category**, reorganising certain associate members (such as laboratory service providers and equipment suppliers) into this new group. Warehouse audits also became mandatory, reinforcing AFMA's commitment to stringent operational oversight.

By 2025, AFMA had introduced remote audits for traders without warehousing and for manufacturers located in Southern African Development Community (SADC) countries not exporting into South Africa – a pragmatic step towards embracing modern inspection methods while expanding membership inclusivity.

During this time, AFMA also formalised warehouse audits and off-site storage inspections, ensuring all members upheld exacting standards of traceability and feed safety – regardless of their operational footprint.

Demographics of AFMA membership over the past 80 years.



Hall Of Fame

AFMA Technical Person of the Year Award
(Also known as the Dr Barney van Niekerk Award)

YEAR	RECIPIENT
1998	Dr Martin Neitz
1999	Dr Erhard Briedenhann
2000	Dr Lourens Erasmus
2001	Dr Hinner Köster
2002	Rick Kleyn
2004	Dr Tertius Brand
2005	Loutjie Dunn
2008	Dr Pieter Henning
2009	Prof Christiaan Cruywagen
2010	Stephen Slippers
2012	Hannes van der Westhuyzen
2014	Dr Hannes Viljoen
2015	Kenneth Botha
2016	Dr Christél Coetzee
2018	David Brandt
2019	Dr Peter Plumstead
2020	**Chantelle Fryer**
2023	Brett Roosendaal
2024	Dr Vlok Ferreira

Conclusion

Across its 80-year history, AFMA has transformed from a national representative body to a regulatory and ethical standard-bearer for the Southern African animal feed industry. Today, AFMA membership represents not only technical alignment but also shared commitment to food safety, fair trade, innovation, and industry advancement. ❖

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The evolution of AFMA's Code of Conduct

Since its founding, AFMA has championed the professionalisation and ethical development of the animal feed sector in Southern Africa. Central to this mission has been the creation of the AFMA Code of Conduct (CoC), a framework that has evolved from informal ethical agreements into one of the continent's most robust, auditable self-regulatory systems.

As the industry matured, so too has the CoC, adapting to emerging risks, technological changes, and global standards. This article traces the remarkable journey of the CoC, showcasing how AFMA has institutionalised accountability while promoting trust, safety, and international alignment across the feed value chain.

Laying the groundwork

AFMA's commitment to ethical practices began long before formal compliance systems were the norm. In the 1960s, then operating as the Association of Balanced Feed Manufacturers, AFMA spearheaded the push for the specifications of poultry feed under South African Bureau of Standards (SABS) standardisation and discouraged unregulated home-mixing. A defining moment came in 1965 when members voluntarily withdrew from using the SABS bureau mark, signalling a collective confidence in self-regulation.

By the 1970s, industry concerns around pricing transparency and governance catalysed the formation of AFMA's first constitutional and costing subcommittees. These laid the groundwork for modern compliance, establishing early systems of accountability and procedural integrity. In 1976 AFMA drafted its first Code of Practice (COP) for feed manufacturing, marking the beginning of formal self-regulation and a commitment to quality. The year 1981 earmarked the refinement of the draft COP into a more detailed framework covering production hygiene, ingredient integrity, and formulation practices.

Codification and formalisation

The 1990s marked the transition from ethical norms to formalised standards. In 1992, AFMA introduced its first internal CoC, targeting hygiene risks such as poultry litter in feed. Although unpublished, this set a critical precedent for future safety and hygiene benchmarks. That same year, AFMA launched *AFMA Matrix*, a quarterly publication that remains instrumental in disseminating best practices and compliance updates to this day.

A landmark achievement followed in 1994 with the adoption of a COP for *Salmonella* control, modelled after European Feed Manufacturers' Federation guidelines. By 1996, the COP had formalised feed hygiene and risk management practices. Concurrently, AFMA began drafting a good manufacturing practices (GMP) code, shifting focus from product registration under *Act 36 of 1947* to facility-level quality control. The draft, submitted to the Registrar in 1999, would become a precursor to today's compliance framework.

Voluntary to mandatory compliance

The turn of the millennium ushered in a new era for AFMA. In 2004, the Board approved the development of a formal, auditable CoC. A year later, the first official draft was released, coinciding with rising global concern over feed safety, traceability, and consumer protection.

In 2006, AFMA registered its iconic slogan Safe Feed for Safe Food and by 2008, compliance with the CoC became mandatory for all members. This landmark policy shift marked the transition from voluntary ethics to enforceable standards. Independent audits were initiated through Afri Compliance, using a rigorous nine-point audit framework.

Meadow Feeds became the first full member to meet all requirements, with Ceva Animal Health following as the first associate member in 2009. This era also laid the groundwork for structured enforcement, membership accountability, and continuous improvement through third-party evaluation.

Regional integration

Between 2010 and 2025, AFMA's CoC evolved into a mature, regionally recognised, and digitally enabled compliance system. The audit framework expanded to ten points in 2010, incorporating transport standards for biosecurity and traceability, and by 2014 most members had completed their third audit cycle. Regional recognition followed, with Meaders Feeds becoming the first Southern African Development Community (SADC)-compliant member in 2011 and AFMA collaborating with the Southern African Feed Manufacturers Association (SAFMA) and SADC initiatives by 2015.

From 2016 onward, AFMA assumed full responsibility for the audit process, rolling out the system in phased stages, boosting

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efficiency and transparency. The CoC inspired regional adoption, including the Zambian Animal Feed Manufacturers Association (ZAFMA) in 2018 and Association Kenya Feed Manufacturers (AKEFEMA) in 2020. After a brief Covid-19 pause, audits resumed in 2021 with a 12-point audit framework, pre-audit screening, and full in-house administration.

To strengthen oversight, AFMA introduced affiliate membership and warehouse audits in 2022 and, by 2025, remote audits for SADC-based traders and facilities. These innovations reflect a maturing, adaptable system that supports both local and regional feed industry accountability.

Modernising for the future

The CoC is now in Phase 3 of a major modernisation initiative. Focus areas include benchmarking the Code against the 2021 audit criteria, pilot testing, assessment body expansion, and implementation. One of AFMA's most critical priorities is expanding the pool of accredited assessment bodies. While Afri Compliance remains the sole provider, various additional certification bodies currently used by members are under review. All providers will use a unified AFMA audit template to ensure consistent application across the board.

Certification benchmarking

A member survey conducted in early 2025 revealed that 57% of AFMA members – including 65% of associate members and 48% of full members – operate without formal certifications such as hazard analysis and critical control points (HACCP), GMP, or International Organization for Standardization (ISO). Instead, they rely exclusively on the AFMA CoC as their primary quality system.

To ensure global alignment while maintaining local practicality, the code was benchmarked across four dimensions:

- Quality and food safety systems (ISO 9001, ISO 22000, GMP+).
- Prerequisite programmes (PRP) and GMP standards (Codex, FAO, PAS 222, SANS 489).
- Global feed codes (FeedAssure, FSC36, FeedSafe, FEDIAF).
- Local benchmark (SAPPO Pork 360).

Based on the findings, AFMA is in the process of revising the 2021 version of the CoC audit manual and audit sheets to ensure a fit-for-purpose model that balances rigour with applicability for South African operations.

A tiered compliance model is currently under development. Aligned with ISO 22000 and global feed codes, this approach scales compliance requirements based on a facility's size and operational complexity, while maintaining integrity. This model is aimed to provide a clear entry point for smaller operators and a comprehensive structure for larger operations.

Legislation and recognition

The updated code is expected to play a critical role under South Africa's upcoming *Feeds Bill*, where facility licencing will be required. Interestingly, the code is also gaining traction as a pre-approval standard in sectors such as dairy. AFMA will continue to advocate for its formal recognition in national compliance trends and continuous improvement.

AFMA requires all full and associate members to undergo audits every two years. Since June 2023, 12% of audited facilities were found non-compliant. Issues included improper labelling, unregistered raw materials, absence of South African Council for Natural Scientific Professions (SACNASP) nutritionists, hygiene lapses, biosecurity gaps, and regulatory non-conformance.

These insights are used to inform training initiatives, future audit revisions, and targeted member support, ensuring continuous improvement across the industry.

A living system

The AFMA CoC is not a once-off achievement – it is a living system. It reflects the evolution of the industry, adapts to new risks, and embodies the values of science, transparency, and shared responsibility. As South Africa's feed sector continues to grow and diversify, the Code remains central to AFMA's mission: promoting Safe Feed for Safe Food while building a trusted, self-regulated, and globally competitive industry.

In its 80th year, AFMA looks forward with pride and purpose. The CoC is more than a compliance framework – it is the embodiment of the industry's integrity. And as we innovate, adapt, and lead, it will continue to serve as the foundation of trust across the entire feed value chain.

COC timeline

1960s to 1980s: Laying the groundwork

- **1962:** AFMA (then the Association of Balanced Feed Manufacturers) drives SABS feed specifications.
- **1965:** Members voluntarily withdraw the SABS bureau mark, signalling confidence in self-regulation.
- **1970s:** First constitutional and costing subcommittees established, laying foundations for governance and accountability.

1990s: Codification and formalisation

- **1992:** First internal CoC introduced; *AFMA Matrix* launched to share best practices.
- **1997 to 1999:** GMP code drafted and submitted to the Registrar, shifting focus to facility-level quality control.

2000s: From voluntary to mandatory compliance

- **2004:** AFMA Board approves the development of a formal, auditable CoC.
- **2005:** First official draft released.
- **2006:** Slogan 'Safe Feed for Safe Food' registered.
- **2008:** CoC compliance made mandatory for all members; nine-point third-party audits introduced.
- **2009:** Meadow Feeds and Ceva Animal Health achieve first member compliances.

2010 to 2025: Maturity, transformation, and regional integration

- **2010:** Audit scope expands to ten points; transport protocol introduced for biosecurity and traceability.
- **2011:** Meaders Feeds becomes the first SADC member to comply.
- **2014:** Most members complete their third audit cycle, demonstrating systemic maturity.
- **2015:** AFMA collaborates with SAFMA and SADC initiatives, positioning the code as a regional benchmark.
- **2016 to 2017:** AFMA assumes full responsibility for audits; phased rollout of electronic audit system begins.
- **2018 to 2020:** Regional adoption grows: ZAFMA and AKEFEMA align with AFMA standards.
- **2021:** Post-Covid-19 audits resume with 12-point framework, pre-audit screening, and full in-house administration.
- **2022:** Affiliate membership introduced; warehouse audits mandated.
- **2025:** Remote audits launched for SADC traders and regional facilities, improving flexibility and reach.

2025 and beyond: Phase 3 modernisation

- Expansion of accredited assessment bodies for greater audit capacity.
- Global benchmarking against ISO 22000, FeedSafe, FeedAssure, and SAPPO Pork 360.
- Tiered compliance model under development, scaling requirements for small and large operators.
- Alignment with South Africa's upcoming *Feeds Bill*, supporting facility licencing.
- Bi-annual audits continue to drive safety, biosecurity, and continuous improvement.❖

"**Meaders Feeds Ltd** wishes to extend its sincere congratulations to AFMA on reaching this significant 80-year milestone. This anniversary stands as a testament to AFMA's enduring commitment to the growth, integrity, and advancement of the animal feed industry in South Africa. As a proud member and industry partner, we value the role AFMA has played in shaping the sector and look forward to continued collaboration in the years ahead."

"Congratulations to AFMA on 80 years of unwavering support and success; being our voice and representation in the animal feed industry.

Over the years **Voermol** has focussed on improving our customers' operations through expert advice on animal feed and best management practices, underpinned by innovative quality products and systems.

We are proud to be a member of AFMA and wish the Association everything of the best. May you continue to progress to greater heights as an industry body."

"On behalf of the **Yara** team, we extend our heartfelt congratulations to AFMA on reaching this incredible milestone. Your 80-year journey is a testament to your unwavering commitment to excellence, integrity, and the advancement of South Africa's animal feed industry.

Your leadership, innovation, and dedication have helped shape a more sustainable and progressive agricultural sector, and we are proud to be associated with an organisation of such calibre.

Here's to the legacy you've built – and to a future filled with continued success, growth, and positive impact."

Hall Of Fame

AFMA Student of the Year Award

(In honour of Dr Koos van der Merwe)

YEAR	RECIPIENT	UNIVERSITY
1990	Diederick Johannes van der Linde	Stellenbosch University
1991	Theunis Gerhardus Nicolaas Visser	University of Pretoria
1992	Andries Jacobus Uys	Stellenbosch University
1993	Ntabisheng Segoale	University of Fort Hare
1994	Heinrich Martin Bohme	Stellenbosch University
1995	Liesl Burger	Stellenbosch University
1996	Leigh Mcloughlin	University of Natal
1997	Gerna Haroldt	Stellenbosch University
1998	Gert Daniel Jacobus Scholtz	University of the Free State
1999	John D Thornton	Stellenbosch University
2000	Marc de Beer	Stellenbosch University
2001	Dean Backhouse	University of Natal
2002	Steven George Payne	Stellenbosch University
2003	Evelyn Rhoda Malleson	University of Pretoria
2005	Natalie Mara le Roux	University of Pretoria
2006	Marcia Malan	Stellenbosch University
2007-2008	Dieter Cecil Fleischman	University of Pretoria
2009-2010	Magdel Nel	Stellenbosch University
2010-2011	Rainer Rauch	University of Pretoria
2011-2012	An Maria Jozefa Jacques	University of Pretoria
2012-2013	Elna Swart	University of Pretoria
2013-2014	Roné de Klerk	University of Pretoria
2014-2015	Simone Biggs	Stellenbosch University
2015-2016	Keara O'Reilly	University of Pretoria
2017-2018	Micaela Sinclair-Black	University of Pretoria
2018-2019	Anna-Marie Verhoef	University of Pretoria
2022-2023	Hendrik Human	University of the Free State
2023-2024	Jamie Leigh Fourie	University of Pretoria
2024-2025	Elzané Liebenberg	University of the Free State

AFMA CHAIRPERSONS' GALLERY: FROM 1951 TO THE PRESENT

Dr PM Oosthuizen
1951 to 1955

Mr L Jaffee
1955 to 1967

Mr E Hausmann
1967 to 1973

Mr B Kaplan
1973 to 1977

Mr GJ Scholtemeijer
1977 to 1983

Dr GD Mordant
1983 to 1985

Mr GP Nieuwoudt
1985 to 1987

Dr GC Mostert
1987 to 1988

Dr M Griesel
1988 to 1995
1998 to 2002

Mr G Ebedes
1995 to 1997

Mr L Wolthers
1997 to 1998

Dr E Briedenhann
2002 to 2005
2007 to 2010

Dr HH Köster
2005 to 2007

Mr L Dunn
2010 to 2018

Mr WA de Wet
2018 to 2022

Mrs A Hunter
2022 to present

AFMA LEADERSHIP: 1957 TO DATE

1957 to 1959
Secretariate
Transvaal Chamber of Industries (Mr Atkinson)

1959 to 1962
Secretariate
Mr Appel

1962 to 1982
Secretariate
Jack Fick

1983 to 1989
Secretariate
Graandienste (Edms) Bpk (Dr Roger du Toit)

1990 to 2006
General manager
Hansie Bekker

2006 to 2022
General manager / Executive director
De Wet Boshoff

2023 to present
Executive director
Liesl Breytenbach

"On behalf of the Yara team, we extend our heartfelt congratulations to AFMA on reaching this incredible milestone. Your 80-year journey is a testament to your unwavering commitment to excellence, integrity, and the advancement of South Africa's animal feed industry.

Your leadership, innovation, and dedication have helped shape a more sustainable and progressive agricultural sector, and we are proud to be associated with an organisation of such calibre.

Here's to the legacy you've built – and to a future filled with continued success, growth, and positive impact."

Accreditation demystified: Why it matters and what you should know

By Reagan Bowers, managing director, Chem Nutri Analytical

Laboratory accreditation is formal third-party recognition that a laboratory is competent to perform specific tests. In South Africa, this recognition is granted by the South African National Accreditation System, or SANAS, under the globally accepted ISO/IEC 17025 standard.

Accreditation is not just paperwork or a badge – it is a comprehensive system of quality assurance. It involves ongoing audits by technical experts, verification of equipment, rigorous method validation, and consistent demonstration of technical competence over time.

But, and this is critical, accreditation applies to specific test methods, not to the entire laboratory. A laboratory may be accredited overall, but only certain results are supported by that accreditation. Knowing which results are accredited is key to making decisions that protect your operation and your product.

Why accreditation matters

An accredited result confirms that the method used was independently validated, fit for purpose, and tailored to the sample matrix. It confirms that the laboratory's competence has been verified by expert assessors and that the result includes a defined level of uncertainty – a known range of potential error. Most importantly, it gives you a result that can be used with confidence in legal, trade, or compliance matters.

A non-accredited result may appear identical on paper, but it does not meet the same level of scrutiny. Even when generated by a competent lab, it lacks legal defensibility, independent oversight, and the certainty required in high-stakes contexts (*Table 1*).

There is an old saying in the industry: I sent the same sample to three labs and received three different results. Our advice is simple: Accept the result from the lab that used an accredited method. Without validation, traceability, and oversight, you are comparing opinions – not measurements. Only an accredited method delivers a result that can be relied upon, challenged, and defended.

The pricing paradox occurs when non-accredited testing costs more. It is often assumed that accredited laboratories are more expensive. Yet, in South Africa, we frequently see the opposite, with non-accredited labs charging more while offering less. These higher costs are often driven by brand positioning, client perception, or the lab's service model – not technical quality.

The problem is, without accredited methods and oversight, the client is paying for results that may not be verifiable, defensible, or compliant. This creates the illusion of quality without the foundation. In short: Paying more does not guarantee you are getting more, especially when accreditation is absent.

Selecting a laboratory

Choosing the right laboratory is one of the most important quality decisions you can make. A SANAS-accredited laboratory provides formal assurance that it operates under a rigorous, independently audited quality management system.

But do not stop at checking whether a lab is accredited – always request the **schedule of accreditation**, which lists the exact methods the lab is approved to perform under ISO/IEC 17025. If the method you need is not listed, the result will not be accredited.

Assess your own context too. If you are facing a product rejection, a trade dispute, or a regulatory compliance issue, then using an accredited method is essential. Even in routine cases, consider whether you are willing to rely on an estimate – or whether your business deserves a result that can stand up to scrutiny.

Using accredited results

Accredited reports are not just technical outputs; they are controlled documents. SANAS R04-14 outlines specific rules for their use – and for good reason. These reports may not be reformatted or reproduced without written approval. Any attempt to edit or re-interpret them – even by well-meaning clients – may invalidate the accreditation. Furthermore, the SANAS logo and accreditation number cannot be reused or applied to secondary documents. If the context or format is changed, the result loses its legal and scientific weight.

These safeguards exist to protect all parties – the client, the laboratory, and regulators – by ensuring that the integrity and traceability of the original data is preserved at all times. If you are unsure whether a report may be shared or summarised, always consult the issuing laboratory.

Clarifying legal requirements

South African law draws an uneven line between food and feed testing. Under the *Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act 54 of 1972)*

Table 1: Accredited vs non-accredited testing.

Aspect	Accredited method	Non-accredited method
Method validation	Scientifically validated	Often not validated
Traceability	Full chain (sample, analyst, method calibration)	Rarely documented
Oversight	Independent audits (SANAS)	Internal or none
Measurement uncertainty	Declared and calculated	Undefined or missing
Legal defensibility	Admissible in regulatory or legal settings	Easily disputed
Repeatability	Confirmed through PT schemes and method stats	No verified repeatability
Cost justification	Linked to quality system and reliability	Lower cost, but higher risk

and the *Regulations Relating to the Labelling and Advertising of Foodstuffs (R3287 of 2023)*, any food product making a nutrition or health claim must be tested using SANAS-accredited methods, or methods recognised by the International Laboratory Accreditation Cooperation (ILAC) in accordance with Regulation 46. These results must be validated through chemical analysis and comply with *Codex CAC/GL 50-2004* sampling standards to be legally recognised.

In contrast, the *Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act 36 of 1947)* requires that feed products be tested by an accredited laboratory but does not explicitly mandate the use of SANAS-accredited methods for specific analytes. While this ensures a baseline of laboratory quality, the absence of method-level accreditation requirements leaves room for variability in analytical approaches.

This gap means that results submitted for feed registration or compliance may not always meet the same level of traceability, validation, or legal defensibility required under food law. Yet the ingredients tested – soya beans, maize, oilcake – are common to both food and feed. Treating feed testing as a lesser priority undermines the integrity of South Africa's food safety system and leaves a gap in scientific and legal protection.

Methods for feed registration

If South Africa were to amend *Act 36 of 1947* to require accredited methods – not just accredited laboratories – for feed testing, we would close a major safety and trade gap. This shift would strengthen our scientific credibility, protect public health, and reinforce legal defensibility in the event of recalls, rejections, or trade disputes. It would also align South Africa with the One Health model, which recognises that animal health, human health, and environmental health are interconnected.

The benefits extend to market access too. Countries such as Kenya, Ghana, Botswana, and Zambia are already moving towards full method accreditation for feed testing – particularly for export. South Africa, with its technical infrastructure and SANAS system in place, is uniquely positioned to lead the continent in feed safety excellence.

A call to industry

Chem Nutri Analytical is proud to be SANAS accredited and we are committed to helping our clients understand what that accreditation means – how to verify it, how to apply it, and how to use it responsibly.

Accreditation is not about prestige. It is about protection for your product, your business, your clients, and the people who rely on the food system every day. We invite laboratories, regulators, and industry leaders to raise the bar. Let us stop treating accreditation as a tick box. Let us recognise it for what it truly is: a shield for your business, and a compass for your quality.

You can verify a lab's accreditation and its scope at *www.sanas.co.za*, where SANAS maintains a searchable public database.

For more information, send an email to reagan@chemnutri.co.za or visit *www.chemnutri.co.za*

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The power of long-term relationships

By Dr Marlene Louw, CEO, South African Pork Producers' Organisation

Long-term business relationships in agriculture are more than just good practice – they are a strategic asset. In a sector shaped by seasonal cycles, unpredictable weather, and shifting market dynamics, trust and consistency are vital for long-term success. This has been proven time and again over the past five years.

Examples include fruit exporters with limited shipping availability during the Covid-19 pandemic. Long-standing relationships between fruit exporters and shipping companies enabled refined demand planning, which allowed shipping companies to prioritise space for recurring clients. Similarly, looming fertiliser shortages following the outbreak of the Russia-Ukraine war led input suppliers to prioritise the requirements of their long-standing clients.

A culture of respect

Similar principles also apply beyond the client-supplier relationships. Strong relationships between producers, suppliers, processors, and industry bodies create a foundation of stability in a broader ecosystem. When businesses know that they can rely on each other, they are better equipped to plan, invest, and respond to challenges.

We believe that long-term relationships:

- **Foster collaboration and innovation**. Over time, partners develop a deeper understanding of each other's operations and goals, enabling joint problem-solving and shared growth. Whether it is improving sustainability practices, adopting new technologies, or navigating regulatory changes, long-term partnerships make it easier to move forward together.
- **Support transparency and traceability**. When producers, processors, and retailers work together consistently, they can deliver products that meet ethical and environmental standards.
- **Attract investment**. Financial institutions and stakeholders are more likely to support agricultural ventures that demonstrate stability and long-term planning.

Long-term relationships create a culture of mutual respect and shared purpose. They shift the focus from short-term gains to sustainable success. It is in this spirit that the South African Pork Producers' Organisation is a proud supporter of *AFMA Matrix* magazine. ❖

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PRETORIA PROTEIN

Maintaining protein integrity through process and precision:

Role of the laboratory at Pretoria Protein Company

Delivering consistent, high-protein soya bean meal requires ongoing control, accurate data, and deliberate decision-making at every stage of the process. At Pretoria Protein Company, the laboratory is central to this approach.

Designed not merely to analyse the final product, the laboratory is integrated into the complete operational workflow, from intake grading to final dispatch. Its purpose is both to maintain control over the process and to test the outcome. Through regular sampling, real-time monitoring, and proactive adjustments, the laboratory supports the plant's main goal: to produce a high-specification protein base for the animal feed industry.

All incoming soya beans are graded upon arrival. The laboratory conducts analyses on moisture, protein, and oil content, as well as other key quality parameters. This allows for beans to be stored by grade, giving the production team greater flexibility to blend batches for a more consistent and predictable input. This step is especially important because of the natural variability in soya crops across different seasons and regions. By achieving greater consistency at intake, the laboratory establishes a solid foundation for quality from the very beginning.

Embedded monitoring

Unlike many other crushing plants, Pretoria Protein Company's production model does not focus on oil extraction but on maintaining the integrity of the protein in the soya bean meal. This is evident in how the process is managed and in how the laboratory operates.

Sampling is conducted hourly at various points along the production line. Tests for protein, fat, fibre, moisture, urease activity, and KOH solubility enable the team to monitor quality in real-time. This continuous flow of information allows for immediate adjustments, reducing the risk of deviation and ensuring the final product remains within the required specifications.

In addition to composition, key physical factors are closely tracked. Flake thickness and cracked bean size are monitored to ensure mechanical efficiency and product stability. These physical properties directly influence oil recovery, conditioning, and pressing performance, and are strictly controlled to maintain consistent output.

Standard oil analyses include testing for moisture and sediment, colour (red and yellow values), phosphatides, and rancidity. These tests ensure the oil meets the required standards for appearance, shelf life, and overall quality, thereby guaranteeing a safe and marketable end product.

Not just product sorting

Pretoria Protein Company follows a quality assurance philosophy instead of relying on end-point quality control. The aim is not to sort the final product into different grades after testing, but to manage the process so that every batch meets specifications from the start.

At dispatch, a final check is carried out on each load to confirm compliance with the agreed specifications. A certificate of conformance (COC) is issued only after this check, providing customers with documented assurance of product quality and traceability. The lab also evaluates particle size distribution, a key factor for feed manufacturers. Uniform grinding enhances processing and formulation consistency, helping customers attain better handling and feed performance.

To ensure the reliability of laboratory data, the Pretoria Protein Company follows a process of result validation. Selected samples are routinely sent to accredited external laboratories for independent analysis. These third-party verifications serve as a benchmark, confirming that internal testing methods stay accurate, consistent, and in line with industry standards.

Skilled people, reliable results

A key factor for success in any laboratory is its staff's capability. Pretoria Protein Company's laboratory technicians are trained not only in technical procedures, but also in interpreting results and understanding their effects on operations. This supports informed decision-making and prompt intervention when necessary.

In summary, Pretoria Protein Company's priority is producing high-quality soya bean meal, in addition to maximising oil yield. By focussing on preserving the full nutritional value of the soya bean meal (rather than extracting oil at the expense of protein integrity), the process is designed to deliver a consistent, nutrient-rich product for monogastric feed.

For more information, send an email to info@pretoriaprotein.co.za or phone 012 004 1120.

A case study: What lies behind mycotoxin presence in animal feed?

By Maria-Eleni Dimitrakopoulou, George Marinos, Manos Karvounis, Giannis Stoitsis, Nikolaos Manouselis, Charalampos Thanopoulos and Chris Elliott

Mycotoxins, toxic secondary metabolites produced by certain filamentous fungi (moulds), pose a substantial threat when they infiltrate food supplies. Prominent mycotoxins include aflatoxins (AFL B1, B2, G1, G2, and M1) and ochratoxins such as ochratoxin A (OTA), which are produced by *Aspergillus* species, ochratoxins and patulin from *Penicillium* species, and fumonisins (FUM), deoxynivalenol (DON), and zearalenone (ZEN or ZEA or F-2) from *Fusarium* species (Pleadin *et al*., 2019).

The prevalence of mycotoxin contamination in agricultural commodities is a significant concern, as various fungi produce these toxins during both harvest and postharvest stages (Janik *et al*., 2020; Omotayo *et al*., 2019). This contamination poses a global threat, with a broad spectrum of mycotoxins causing severe health repercussions, including acute and chronic diseases in humans and domestic animals, collectively referred to as mycotoxicosis (Alshannaq and Yu, 2017; Kępińska-Pacelik and Biel, 2021; Magnoli *et al*., 2019).

Optimal nutrition practices are essential for animals to reach their genetically determined production potential; however, mycotoxins, even at lower concentrations, can disrupt nutrient digestion, absorption, metabolism, as well as animal physiology, reducing the availability of nutrients and energy, ultimately resulting in suboptimal production performance.

Mycotoxins and food animals

Additionally, mycotoxins have been extensively documented to have adverse effects on various organs and systems, including the gastrointestinal tract, liver, kidneys, as well as the nervous, reproductive, and immune systems in food animals (Mavrommatis *et al*., 2021; Yang *et al*., 2020). These effects can occur without necessarily impacting growth performance.

For example, research indicates that exposure to the majority of *Fusarium* and *Alternaria* mycotoxins can heighten animals' vulnerability to infectious diseases like coccidiosis in poultry and respiratory ailments in swine (Fraeyman *et al*., 2017). Transcriptome analyses in turkeys have revealed that aflatoxin B1 can regulate genes associated with cancer, cell cycle control, and lipid metabolism (Seval, 2022).

The production of mycotoxins is not a straightforward event but rather a nuanced interplay shaped by a convergence of variables. These toxic compounds are not arbitrarily generated; they emerge as a response to the fungi's interactions with their environment, reflecting an evolutionary adaptation designed to ensure their survival and competitive advantage (Kolawole *et al*., 2021)

Factors such as environmental conditions, substrate characteristics, and the specific life cycle of the fungi involved all play pivotal roles (Hao *et al*., 2023; Kos *et al*., 2023). Biological factors, such as the crop's susceptibility to fungal colonisation, play a critical role, as do environmental variables like temperature, rainfall, relative humidity, and damage caused by insects or birds. Additionally, crop management practices – such as planting and harvest timing, tillage, fertilisation, crop rotation, and irrigation – significantly influence contamination levels.

During harvest, factors like crop maturity, temperature, moisture content, and mechanical injury further contribute to mycotoxin risk. Postharvest processes, including transportation conditions, delays before drying, and the adequacy of drying and storage methods (e.g., aeration, temperature control, and pest management), are also pivotal in determining the extent of contamination (Borràs-Vallverdú *et al*., 2022; Neme and Mohammed, 2017; Ngum *et al*., 2022).

Therefore, the aim of this study was to examine the presence of various types of mycotoxins in animal feed, analyse the correlations among them, and explore potential links between mycotoxin occurrence and climate change. By elucidating these relationships, this research aims to contribute to more effective strategies for managing mycotoxin contamination in animal feed, thereby safeguarding animal health and productivity.

Results and discussion

Seasonal variations

This analysis examines the seasonality correlation of four major mycotoxins – AFL, DON ZEN, and OTA – in ruminants, pigs and poultry. Among these for ruminants, DON shows the highest seasonality impact at 10,32%. The other mycotoxins exhibit relatively low impacts, with AFL at 3,11%, ZEN at 3,57%, and OTA at 5,13%. For pigs and poultry, ZEN exhibits the highest seasonality impact at 13,92%, indicating a more pronounced seasonal variation.

This can be attributed to the composition of their feed, which typically contains a high proportion of wheat (approximately 50%). Wheat is highly susceptible to contamination by *Fusarium* species, which produce ZEN, particularly under favourable environmental conditions (Zhao *et al*., 2024). AFL follows with a 9,89% impact, while DON and OTA have lower impacts at 7,29 and 6,22%, respectively (*Table 1*).

Overall, the seasonality correlation of mycotoxins in both ruminants and pigs and poultry is relatively low, with none of the mycotoxins exceeding a 15% impact. This indicates that while there is some degree of seasonal variation in mycotoxin

Potato Meal **Tuna Meal**

Poultry Meal Palatability Enhancers

Milk Powders

Lamb Meal Duck Meal Lysine

Methionine Hemoglobine Soya Oilcake Valine

Plasma Powder Sugarbeet Ostrich Meal

Cotton seed Tryptophane **Venison Meal**

Gluten 60 **Poultry Blood Meal**

Beef Meat & Bone Meal Vegetable Meal

Turkey Meal Organic Poultry Meal Chicken MDM

Cotton Oilcake **Hydrolized Feather Meal**

Threonine

Poultry Fats & Oils Kangaroo Meal

Pork Meat & Bone Meal

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Table 1: Seasonal impact of mycotoxins in animal feed.

Mycotoxin	Seasonality impact: Ruminants	Seasonality impact: Pigs and poultry
AF	3,11%	9,89%
DON	10,32%	7,29%
ZEN	3,57%	13,92%
OTA	5,13%	6,22%

levels, it is not the predominant factor affecting their prevalence. This limited influence suggests that other factors, potentially exacerbated by climate change, play a more significant role in mycotoxin dynamics.

Traditionally, seasonal patterns, primarily driven by climatic conditions like temperature and humidity, have been considered primary determinants of fungal growth and mycotoxin production (Casu *et al*., 2024; Garcia-Cela *et al*., 2018). However, the data implies that climate change may be altering these patterns, leading to less predictability and a weakened seasonal signal in mycotoxin contamination.

Furthermore, the effectiveness of fungal control measures, such as fungicide application and crop resistance breeding, could contribute to reducing seasonal variations in mycotoxin contamination. Advances in fungicide formulations potentially mitigate the seasonal peaks typically associated with favourable fungal growth conditions (da Luz *et al*., 2017; Marques *et al*., 2017). Besides, the pH of the soil influences fungal growth and mycotoxin production. Fungi such as *Aspergillus* and *Fusarium* thrive in certain pH conditions, and maintaining an optimal pH can help mitigate their growth.

Nitrogen fertilisation is generally associated with higher levels of DON and ZEN contamination in maize kernels, as well as an increased risk of other fungal metabolites produced by *Fusarium* species. However, supplementing nitrogen fertilisation with manganese has been shown to reduce the number of mycotoxins in wheat grain (Scarpino *et al*., 2022; Stępień *et al*., 2023).

Integrated management strategies

Additionally, changes in agronomic practices can significantly impact mycotoxins' seasonality (Danso *et al*., 2018; Drakopoulos, Kägi, *et al*., 2021; Drakopoulos, Sulyok, *et al*., 2021; Phokane *et al*., 2019). Crop rotation, for example, disrupts the life cycles of mycotoxin-producing fungi like *Fusarium*, reducing the prevalence of toxins such as DON and ZEN (Dong *et al*., 2023). By interrupting fungal persistence in soil and residual plant material, crop rotation limits the conditions conducive to fungal proliferation.

For instance, studies have demonstrated that selection of nonhost species after cereals could exhibit a lower incidence and concentration of mycotoxins, highlighting the importance of rotation in mycotoxin management (Drakopoulos, Kägi, *et al*., 2021; Drakopoulos, Sulyok, *et al*., 2021; Islam *et al*., 2021). Proper planting density is also crucial, as overly dense crops create humid, poorly ventilated environments that favour fungal growth (Krnjaja *et al*., 2019).

Balanced irrigation practices are essential to avoid both drought stress, which can make plants more susceptible to infections, and over-irrigation, which can lead to waterlogged conditions conducive to fungal proliferation (Gerling *et al*., 2023; Herrera *et al*., 2023).

Additionally, insect damage is a critical factor; insects can create entry points for fungi and facilitate their spread, significantly increasing mycotoxin levels in crops (Gajecki *et al*., 2020). Together, these factors highlight the importance of integrated management strategies to control mycotoxin contamination effectively (Leslie *et al*., 2021; Simões *et al*., 2023).

While the analysis provides valuable insights into mycotoxin seasonality, it is important to acknowledge certain limitations. Sampling variability across years and locations could have influenced the results, as mycotoxin prevalence is highly sensitive to localised climatic and agronomic conditions. Furthermore, the dataset may not fully capture interannual variability or the effects of extreme weather events, which could obscure stronger seasonal patterns. Future studies could benefit from integrating larger, longitudinal datasets with finer geographic resolution to better capture the interactions between climate variability, agricultural practices, and mycotoxin contamination.

DON level time series analysis

The provided time series graph illustrates the DON in ruminants (*Figure 1*) and pigs and poultry (*Figure 2*) over a series of time steps (1 step:1 month). The graph includes the actual time series data and a trend line, providing insights into the fluctuations and overall trend of DON levels. More specifically, Food Fortress select feed with

Figure 1: Time series analysis of DON in ruminants' feed (resulted concentration in µg/kg), time step: 1 step = 1 month.

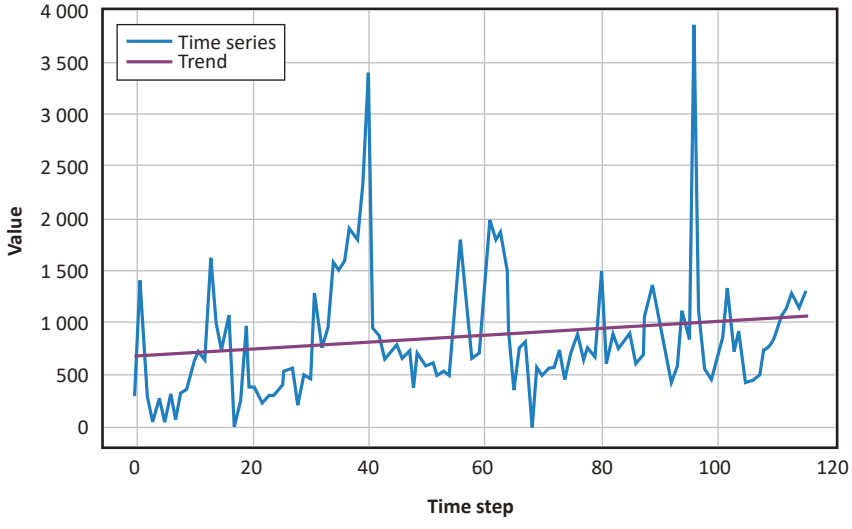
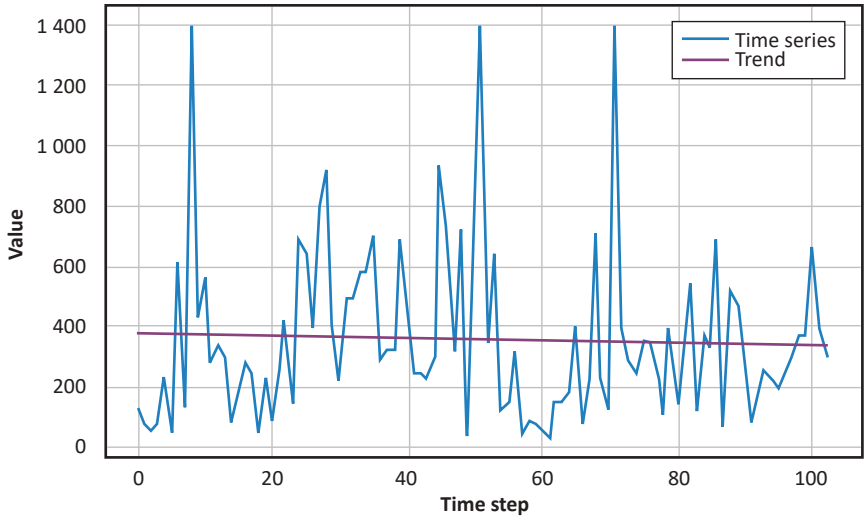


Figure 2: Time series analysis of DON in pig and poultry feed (resulted concentration in µg/kg), time step: 1 step = 1 month.



elevated levels of DON for inclusion in ram diets, given their lower susceptibility to its effects (Buszewska-Forajta, 2020).

Consequently, the trend indicates a gradual increase in DON levels over the analysed period, which may correspond to these management practices. In parallel, despite these practices being more prevalent in ram feed, there is still a notable presence of DON in pig and poultry feed, suggesting a requirement for supplementary measures to enhance contamination management practices effectively.

Overall, the observed fluctuations in DON levels over time likely result from the interplay of environmental factors (weather and seasonal conditions), agricultural practices (crop management, harvest timing, and storage), and variability in raw material used in feed production. These factors create a complex dynamic that influences mycotoxin contamination levels year by year. This persistence underscores the need for comprehensive management strategies across all types of animal feed to mitigate DON contamination.

Trends and patterns of DON, ZEN

To understand the temporal dynamics of mycotoxin contamination in animal feed, we conducted a time series decomposition analysis of DON and ZEN concentrations in pig and poultry feed. The results are presented in *Figure 3*.

The top chart of *Figure 3* shows the observed concentrations of DON and ZEN over time for both pig and poultry feed. The concentrations exhibit significant variability, with noticeable spikes indicating periods of higher mycotoxin contamination. Importantly, DON and ZEN concentrations are strongly correlated, likely because both mycotoxins are produced by *Fusarium* species, which can contaminate various feed ingredients.

The second chart displays the trend component, which highlights the long-term progression of mycotoxin levels. For both DON and ZEN, the trend lines indicate an overall increase in mycotoxin concentrations over the study period, with some fluctuations. Notably, there is a marked increase in concentrations around the midpoint of the time series, followed by a gradual decline. The third panel illustrates the seasonal component, capturing repeating patterns and cyclical behaviour in mycotoxin concentrations.

Pig and poultry feed exhibits pronounced seasonal variations, suggesting that mycotoxin levels are influenced by recurring factors such as climatic conditions and agricultural cycles. The seasonal patterns are particularly evident in DON concentrations, with regular peaks and troughs corresponding to specific times of the year.

The bottom panel represents the residual component, which accounts for the irregularities and noise in the data after removing the trend and seasonal effects. The residuals display random fluctuations around the zero line, indicating the presence of unexplained variability in mycotoxin levels. This component underscores the complexity of mycotoxin contamination dynamics, which are not fully captured by the trend and seasonal patterns alone.

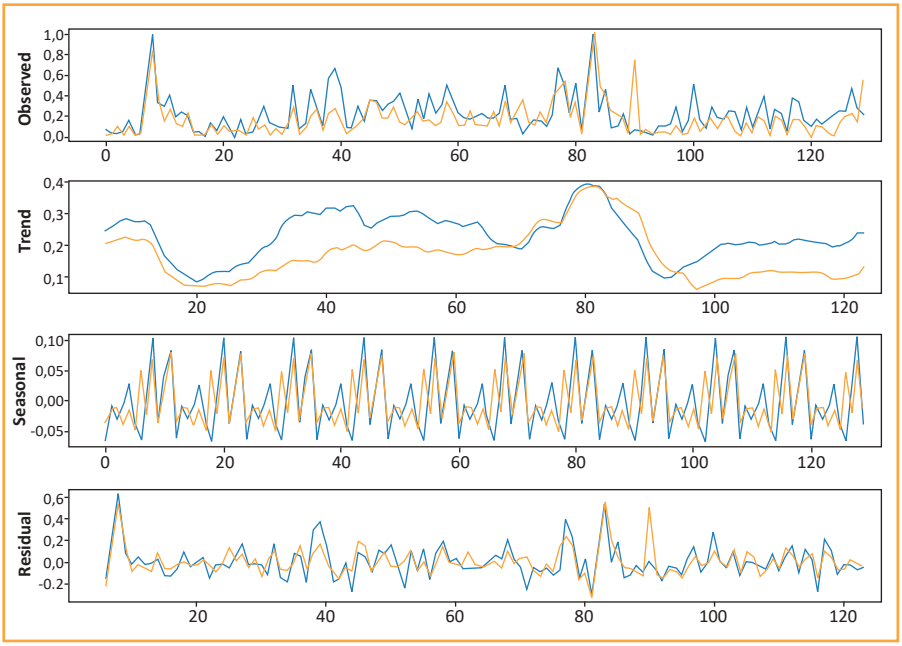
However, the strong correlation between DON and ZEN is significant, as it suggests that both mycotoxins are likely produced by the same *Fusarium* species contaminating the feed. This correlation is noteworthy because it not only implies a common source of contamination but also suggests that control measures targeting *Fusarium* species could effectively reduce levels of both mycotoxins. Additionally, the cooccurrence of DON and ZEN observed in this study is consistent with findings from other publications (Palumbo *et al*., 2020; Siri-anusornsak *et al*., 2022).

Numerous studies have reported that these mycotoxins frequently contaminate crops together due to their production by the same *Fusarium* species. For example, research has shown that the environmental conditions promoting *Fusarium* growth typically led to the simultaneous presence of multiple mycotoxins, including DON and ZEN (Birr *et al*., 2021; Ma *et al*., 2018). This agreement with other studies reinforces the need for integrated management approaches to address the dual contamination risk.

In general, mycotoxins frequently co-occur in feed raw materials due to the ability of fungal species to produce multiple mycotoxins simultaneously or the contamination of raw materials by multiple fungal species. The presence of DON and ZEN in animal feed raises concerns about residue transfer into animal-derived products, such as meat, eggs, and dairy, potentially posing food safety risks for human consumers. This carry-over is well-documented, with examples like the conversion of aflatoxin B1 to aflatoxin M1 or ZEN to α-ZEL and β-ZEL in milk (Tolosa *et al*., 2021).

Beyond the risks to animals' and humans' health, elevated levels of DON and ZEN in pig and poultry feed also have significant economic implications. DON, also known as vomitoxin, can impair animal health by causing feed refusal, reduced feed intake, and gastrointestinal issues, ultimately leading to lower

Figure 3: Time series decomposition of DON and ZEN concentrations in pig and poultry feed. The panels represent (from top to bottom) the observed data, trend component, seasonal component, and residual component for both mycotoxins. The blue line represents DON, and the orange line represents ZEN. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



growth rates and decreased production efficiency in pigs and poultry. These health effects not only compromise animal welfare but also result in economic losses due to reduced meat and egg production and increased costs associated with feed management and veterinary care (Liu and Applegate, 2020; Murugesan *et al*., 2015).

Given the shared origin of DON and ZEN contamination, integrated management practices targeting *Fusarium* species are critical. To minimise initial contamination, agricultural practices such as selecting resistant or less-susceptible crop varieties can play a critical role. For example, certain maize hybrids have demonstrated reduced susceptibility to *Fusarium* (Mesterhazy *et al*., 2020; Tran *et al*., 2021). Additionally, adopting crop rotation with nonhost plants and implementing intercropping systems can disrupt the lifecycle of *Fusarium* species and reduce inoculum levels in the field (Janssen *et al*., 2019).

For feed producers, strategies include testing raw materials for contamination before inclusion in feed, blending contaminated batches with clean materials to dilute toxin levels, and employing advanced processing techniques like mycotoxin binders during feed formulation. Proper drying of feed ingredients to moisture levels below 14%, combined with adequate storage conditions to prevent humidity buildup, can significantly reduce fungal growth and mycotoxin production (Matumba *et al*., 2021). Collectively, these measures can help mitigate mycotoxin risks and ensure safer feed for livestock.

Conclusion

In contemporary, highly intensive livestock production systems, mycotoxin contamination in animal feed poses a critical challenge with far-reaching implications for animal health, production efficiency, and food safety. Beyond mycotoxins, livestock face stressors such as extreme weather conditions, nutritional imbalances, and infectious diseases. These stressors often interact synergistically with mycotoxin exposure, compounding their adverse effects. Addressing this challenge requires a multifaceted approach that integrates practical interventions, emerging technologies, and collaborative efforts among stakeholders.

To mitigate mycotoxin risks effectively, concrete actions must be implemented at multiple stages of the agricultural and production process. At the farm level, practices such as crop rotation with nonhost species, optimised irrigation, and timely harvesting can limit fungal proliferation and mycotoxin production. Postharvest interventions, including proper drying, improved storage facilities with controlled humidity and temperature, and the application of antifungal agents, are critical to minimising contamination during storage and transport.

Emerging technologies hold significant promise in transforming mycotoxin management. For instance, the use of real-time mycotoxin sensors can provide on-site, accurate detection of contamination levels, enabling immediate corrective actions. Additionally, AI-driven predictive models, incorporating data on weather conditions, agronomic practices, and fungal ecology, can forecast contamination risks, allowing producers to implement proactive measures. These advancements, combined with farmer education and accessible tools, empower stakeholders to make data-informed decisions to safeguard feed quality.

However, policymakers and researchers play a pivotal role in addressing mycotoxin challenges. There is an urgent need for collaborative efforts to develop region-specific mitigation strategies that account for the impacts of climate change on fungal growth and toxin production. Furthermore, investment in research to improve understanding of fungal competition dynamics, such as between *Aspergillus* and *Fusarium*, will enable the development of integrated control strategies targeting multiple mycotoxins simultaneously. By implementing these targeted strategies, we can reduce mycotoxin risks, improve animal welfare, enhance production efficiency, and ensure safer food systems for consumers worldwide.

This article was condensed for publication in *AFMA Matrix*. For the full article and references, visit *doi.org/10.1016/j.jfp.2025.100464*
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AMINONIR®RED: Precision analytics to determine the nutritional value of soya bean products

EVONIK
Leading Beyond Chemistry

By Felicia Dube, technical service manager, Evonik Africa (Pty) Ltd

Raw materials, especially those contributing mostly energy and protein, account for the largest variation and cost in feed production. This makes their quality a critical factor in animal performance and profitability (Oviedo-Rondon *et al.*, 2024). Soya bean products, especially soya bean meal (SBM), are cornerstones of protein nutrition in monogastric diets. Yet, amid global markets, rising input costs, and increasing sustainability demands, crude protein alone is no longer a reliable indicator of feed value (FAO, 2025).

In South Africa, SBM remains the dominant soya source in animal feeds (USSEC, 2012). Over the past decade, soya bean planting in South Africa has doubled, with production rising by over 76%, reducing import dependency. Yet, inconsistent milling and fluctuating protein/oil content remain key concerns. Overprocessing can degrade proteins and destroy reactive lysine, while underprocessing leaves anti-nutritional factors such as trypsin inhibitors intact, reducing digestibility and feed efficiency (Graziosi *et al.*, 2024).

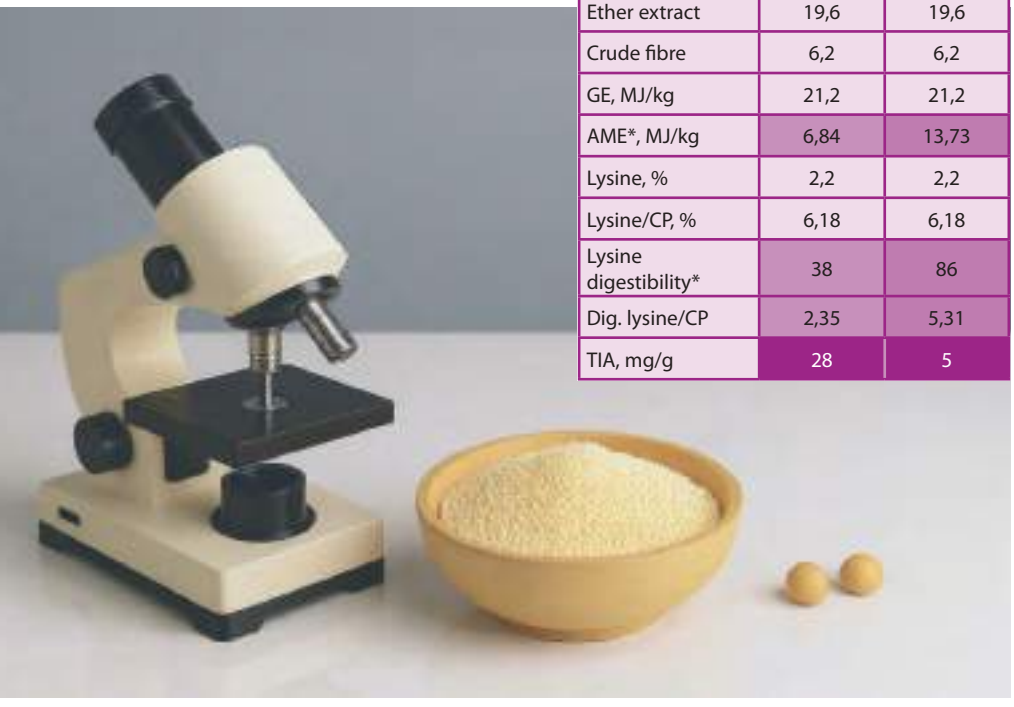
Despite stable crude protein levels, variability in processing methods such as urease activity, the protein dispersibility index (PDI), KOH solubility, and trypsin inhibitor activity (TIA) have led to inconsistent SBM, and because raw materials comprise 70 to 75% of feed costs, precision evaluation tools are now essential for optimising nutritional value and economic efficiency (BFAP, 2021).

A holistic lens on soya bean processing quality

Amino acid analytics, while essential, offer a partial view of feed ingredient quality. For example, as shown in *Table 1*, soya beans with identical crude protein levels (35,6%) can differ in digestibility, and processed full-fat soya shows nearly double the lysine digestibility and significantly lower TIA. This means that crude protein and amino acid content alone do not reflect changes in digestibility.

Table 1: Comparison of raw and full fat soya bean.

	Raw soya beans	Full-fat soya bean
Dry matter, %	88	88
Crude protein (CP)	35,6	35,6
Ether extract	19,6	19,6
Crude fibre	6,2	6,2
GE, MJ/kg	21,2	21,2
AME*, MJ/kg	6,84	13,73
Lysine, %	2,2	2,2
Lysine/CP, %	6,18	6,18
Lysine digestibility*	38	86
Dig. lysine/CP	2,35	5,31
TIA, mg/g	28	5



Evonik's *AMINONIR*®RED calibration, refined over 30 years, uses near infrared spectroscopy to assess processing conditions and antinutritional factors across soya bean products (full-fat, expeller, meal), canola meal, maize, and DDGS. By integrating indicators such as TIA, KOH solubility, reactive lysine, and the exclusive processing condition indicator (PCI), *AMINONIR*®RED provides a precise, holistic evaluation of ingredient quality. This empowers nutritionists and feed producers to optimise formulations, reduce inefficiencies, and unlock the true nutritional potential of their raw materials.

Anti-nutritional factors affecting protein digestibility

TIA is a key factor for identifying under-processed soya bean products. These inhibitors interfere with trypsin, an enzyme responsible for protein digestion (Chen *et al.*, 2013).

When soya bean meal is insufficiently heat-treated, these anti-nutritional factors remain active, reducing amino acid absorption, and compromising animal growth and feed efficiency (Mateos *et al.*, 2020). High TIA levels have also been linked to physiological stress, including pancreatic hypertrophy, as animals attempt to compensate for impaired digestion (Dozier and Hess, 2011). For optimal poultry performance, TIA levels should remain below 4mg/g in both soya bean meal and full-fat soya.

Indicator of heat damage

KOH protein solubility measures the proportion of SBM protein that dissolves in a 0,2% potassium hydroxide solution, offering a direct indication of heat-induced protein denaturation (Dozier and Hess, 2011).

This index is inversely relative to the degree of heat treatment applied during processing. While raw soya beans' protein approaches 100% solubility, heat can reduce this considerably (Araba and Dale, 1990).

Optimal processing typically yields solubility values from 73% upwards, balancing the removal of anti-nutritional factors with amino acid preservation. Values below suggest overprocessing, while readings above 90% do not necessarily indicate underprocessing, as KOH is not sensitive enough to dictate under processing. Hence, complementary assays such as TIA are recommended for a fuller picture.

Evonik's processing conditions indicator

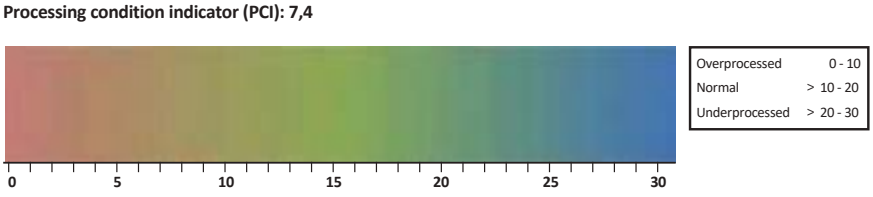
Evonik developed a synthetic parameter, the processing conditioning indicator or PCI, to seamlessly show the impact of processing on amino acid digestibility. This is a patented algorithm that combines multiple heat-sensitive indicators into a single, easy-to-interpret score ranging from 0 to 20. The ranges used for PCI at Evonik are 0-10 overprocessing, 11-15 optimal, and >20 underprocessing (*Figure 1*).

Table 2 contains an example of broiler grower diets that show the impact of SBM on feed formulation using correction of digestible amino acids based on the PCI index (broiler grower, AMEn = 3 000, digestible lysine = 1,1). At a PCI of 12, soya bean meal is highly digestible, resulting in total feed cost of about R10 096. But at a PCI of 7 that has low digestibility, more synthetic amino acids need to be included, such as lysine, threonine, and methionine to meet the same specifications which then increases the total feed cost by over R372/tonne. This is why testing for heat damage is especially important. Without it, formulation is based on assumptions and not facts.

Table 2: PCI impact on feed formulation costs.

Broiler starter composition	SBM PCI 12	SBM PCI 10	SBM PCI 8	SBM PCI 7
Maize	61,464	60,206	54,671	49,219
SBM (46 % CP)	33,314	34,373	39,072	43,702
Soya oil	1,598	1,782	2,605	3,469
DCP	1,388	1,380	1,347	1,315
$CaCO_3$	0,718	0,714	0,696	0,679
NaCl	0,193	0,189	0,181	0,174
$NaHCO_3$	0,230	0,235	0,243	0,253
Choline chloride	0,053	0,049	0,050	0,011
Vitamin + mineral mix	0,500	0,500	0,500	0,500
Phytase	0,005	0,005	0,005	0,005
DL-Met	0,271	0,263	0,233	0,197
L-Lys HCl	0,166	0,163	0,226	0,267
L-Threonine	0,061	0,058	0,039	0,034
L-Valine	0,039	0,039	0,039	0,040
CP %	**20,549**	**20,970 (+2%)**	**22,803 (+11,5%)**	**24,607 (+20%)**
Feed price R/MT	**R10 096,06**	**R10 182,72 (+86,70 R/MT)**	**R10 537,56 (+354,80 R/MT)**	**R10 910,10 (+372,54 R/MT)**
Shadow price R/MT	**R10 785,92**	**R10 537,56**	**R9 650,56**	**R8 976,44**

Figure 1: Overall evaluation of processing.



Results for single processing-related parameters

Parameter	Content (as is)	Content*
KOH protein solubility (KOH PS)n [%]	60,1	60,1
Trypsin inhibitor activity (TIA-A) [mg/g]	1,2	1,2
Reactive lysine [%]	1,992	1,953
Reactive lysine/lysine [%]**	80,356	80,356

* DMS: Figures standardised to a dry matter content of 88%

** Estimated with separate calibration equation

Conclusion

As the feed industry moves towards more data-driven, transparent, and sustainable production, heat processing measures such as *AMINONIR*®RED are no longer optional. Using Evonik's *AMINONIR*®RED offers unique insights into each parameter, and PCI stands out as it directly influences amino acid digestibility and feed cost.

AMINONIR®RED enables mills to monitor supplier consistency through monthly or annual PCI tracking. It also helps adjust digestible amino acid values in formulation software, and screen soya bean loads when unloading as a quality assurance measure. Following a reliable multi-parameter approach ensures feed quality, protects digestibility, and ultimately supports better productivity.

For more information, send an email to the author at felicia.dube@evonik.com or visit w*ww.evonik.com* or *animal-nutrition.evonik.com*

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The importance of liver health in modern, fast-growing, and intensive production animals

By Nell Wiid (Pri.Sci.Nat.), Super Agri Science

The genetic potential for muscle growth in modern production animals such as broiler chickens are optimal and continue to improve over time. To remain economically viable both locally and with regard to imported animal products, producers must achieve genetic potential that is as close as possible to that of imported animal products.

Feed conversion remains the most important economic parameter in livestock production due to the cost contribution of feed in the total cost chain. In terms of muscle growth, feed conversion can also be referred to as the protein conversion factor (PCF). The economic portion of any carcass is muscle (meat protein) given the market focus on broiler breast muscle and red meat grading systems.

Growth optimisation strategies in livestock production focus strongly on gut health to create an optimal environment for digestion and absorption. Although gut health is important and needs to be optimised, there is a lack of focus on optimising further metabolic processes and organs such as the liver.

Protein synthesis

Intensive production animals maintain a fast metabolic rate for growth and secondary product output such as eggs, day-old chicks, milk, and wool. To sustain this fast rate of growth and output the nutrient intake density increases. The main output of modern production animals remains protein from muscle. The speed and efficiency of protein synthesis and related processes are thus critical for the sustained growth and output within the required economic parameters.

Protein synthesis takes place primarily in the liver and then in the muscle with the liver receiving amino acids from the blood stream, building albumin and plasma proteins. The liver is responsible for amino acid metabolism through the synthesis of non-essential amino acids through transamination. Deamination also takes place in the liver as well as muscle and requires efficient detoxification routes and processes. Protein synthesis in the liver represents 11% of all protein synthesis in the bird (Denbow *et al*., 2000).

Optimal protein synthesis in the liver and muscle further requires stable and available energy sources. Even short periods of energy restriction will limit and impair protein synthesis and thus muscle growth (Swennen *et al*., 2006). The liver is the most important organ in the body for energy metabolism by regulating the production, storage, and release of lipids, carbohydrates, and proteins.

Figure 1: Protein conversion factor (PCF).

The storage of glycogen in the liver is important for the maintenance of a stable and regular supply of energy for optimal protein synthesis (Richards *et al*., 2003). The ratio of protein anabolism to catabolism is critical to support fast growth and muscle growth in the body. Liver health and optimal functionality are key for optimal protein anabolism.

Function and role of the liver

Modern, fast-growing and high-yielding livestock require healthy, well-functioning livers to support the rapid rate of nutrient processing and metabolic function within a stable energy balance and detoxified body. The liver is a critical organ in the body, and all blood is continuously filtered by the liver and remains the pivot in the gut-liver-muscle axis.

The liver receives blood from the intestine and general circulation. All blood from the gut passes through the liver first. The liver receives oxygenated blood from the hepatic artery and deoxygenated blood from the hepatic portal vein, eliminating toxins and drugs and processing the nutrients it collects from the digestive tract (Akers *et al*., 2013).

The main functions of the liver can be summarised as follows:

Metabolic function

- Lipid metabolism.
- Carbohydrate metabolism (energy management).
- Protein metabolism.
- Iron homeostasis.

Detoxification

- Removes toxins and waste products from the body.
- Removes harmful substances such as mycotoxins, drugs, metabolic byproducts.

Synthesis

- Produces bile (cholesterol precursor) (emulsifier and waste removal).

- Produces blood proteins.
- Growth factors/hormones/enzymes.
- Produces hepcidin which controls iron uptake and recycling.
- Convert vitamin D to 25(OH)D, primarily through the enzyme CYP2R1. This conversion is a crucial first step in the activation of vitamin D.

Storage
- Glycogen.
- Fat soluble vitamins.
- Iron and related.

Immune support
- Produces immune precursors.
- Removes pathogens from the bloodstream.

"The liver is involved in an array of metabolic and homeostatic functions and considered as a biochemical factory responsible for most of the synthesis, metabolism, excretion, and detoxification process. To maintain a healthy bird, this organ should be kept in an excellent condition" (Zaefarian *et al*., 2019).

Gut-liver-muscle axis

The liver is at the centre of the gut to muscle growth axis as it receives all the nutrients from the gut, maintains energy balance, stores nutrients such as triglycerides and glycogen, detoxifies breakdown products from surplus amino acids and proteins and fats – and deposits digestion optimisation products such as bile acids into the gut for fat digestibility.

In young growing animals such as broiler chickens that are bred for fast growth, muscle growth is a complex process involving both an increased number and size of muscle fibres (myofibers) as well as muscle bundles. Muscle growth and expansion is directly dependent on the health and function of the liver due to its various roles.

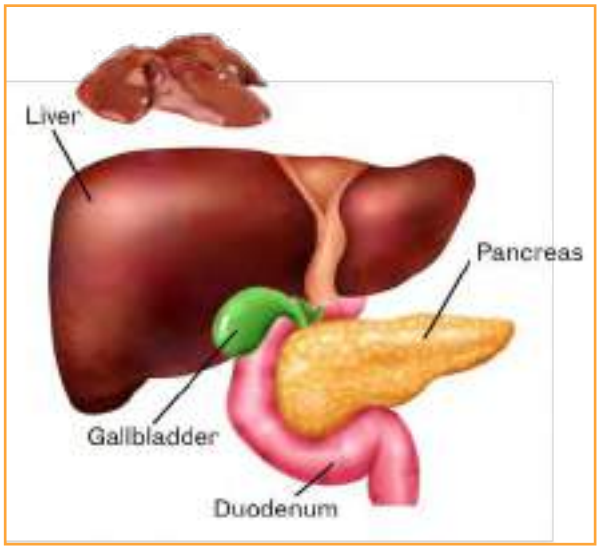
Hormones in protein synthesis

The hormones insulin and glucagon are well known for their regulating role of energy availability and glucose and glycogen levels (Brockman *et al*., 1981). However, what is less known is the impact of those hormones on protein synthesis.

High levels of insulin stimulate protein anabolism, particularly in muscle tissue. Insulin promotes protein synthesis and inhibits protein breakdown, leading to net muscle protein gain. This anabolic effect is especially prominent when insulin is combined with amino acid availability, as it can increase the availability of building blocks for protein synthesis (Fujita *et al*., 2006).

Glucagon, on the other hand, stimulates protein catabolism, primarily by increasing hepatic amino acid uptake and promoting gluconeogenesis. This effect is more pronounced during conditions of insulin deficiency (Ropelle *et al*., 2006). The negative effect of fasting even for short periods in high growth production animals is clear and very important in maintaining a constant and positive energy balance in these animals.

Figure 2: Anatomy of the liver.



Importance of detoxification

Liver detoxification is the process of the breakdown, destruction, and removal of harmful substances plus the removal of pathogenic microbes through the phagocytic action of the Kupffer cells. Potential toxic substances include fat soluble toxins and metabolic end products such as ammonia; cell breakdown products and bile pigments; contaminants such as pesticides and carcinogens; anti-nutrients such as hydrocyanic acid, glucosinolates, tannins, and phytate; chemicals such as heavy metals; and additives such as antibiotics, drugs, and medications.

Optimal growth and protein conversion can only take place if the liver detoxifies optimally and consistently.

Optimal liver function and health

The most important aspect of liver health is the absence of toxins and damaging substances supplied to animals through water and feed – supplying good-quality feed and water is therefore crucial. Formulations must maintain the correct energy protein ratio considering the age, growth curve, type of protein and energy in the diet and the levels of fat-soluble vitamins, heavy metals, chemicals, and amino acid ratio as close to ideal as possible. Ensure proper cell and body homeostasis and cell membrane health and functionality by adding osmolytes, conjugators, antioxidants, and emulsifiers.

Cholesterol is important for cell membrane integrity, steroid production, and is a precursor of bile acid production. The liver is responsible for synthesising cholesterol and removing it from the body by converting it into bile salts (Hundt *et al*., 2022). Prevent the formation of fatty liver in especially adult birds by using good-quality fats and oils and supplying feed aimed at maintaining optimum energy levels.

Hepatoprotective agents

Many phytonutrients and biologic active plant compounds have shown promise as hepatoprotective agents that can protect the liver against damage, support liver function, and improve liver efficiency. Research has shown that actively and purposefully feeding or administering these types of compounds might support liver function and improve growth and carcass quality. The main hepatoprotective activity of the phytonutrients will be antioxidant, anti-inflammatory and detoxifier agents preventing damage to the liver. ❖

For more information and references, send an email to the author at nwiid@mweb.co.za or visit *www.superagriscience.co.za*

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Focus on fibre and fibre testing

By Dr RE Taljaard, Labworld

From a nutritional perspective, fibre is defined as the hydrolytically indigestible, partially fermentable components of feed. Nutritionists need practical and routine means of measuring fibre fractions representing various soluble and insoluble components.

Chemically, these components are a variable mixture of cellulose, hemicelluloses, lignin, and soluble dietary fibres (e.g., pectins). Because there is no guarantee of direct correspondence between chemical solubility and nutritional availability, in reality, fibre is defined by the method used to isolate it. The actual definition of fibre becomes method dependent, which explains why there are so many different fibre analyses.

Crude fibre (CF)

This method was developed to separate carbohydrates into digestible and indigestible fractions. High crude fibre (CF) content indicates low feed energy, as CF is largely indigestible. Originally, CF measurement formed part of analysing the 'digestible' fraction of feedstuffs.

The method uses sequential acid and alkali extraction and was once the standard for determining fibrous components in feed. However, some of these components are partly fermentable by microorganisms in the rumen, cecum, or large bowel. CF measures most cellulose but only part of hemicellulose and lignin, excluding ash, thus underestimating total fibre. CF values are lower than acid detergent fibre (ADF) values, making CF an unreliable indicator of digestibility in ruminants. Consequently, detergent fibre analysis has replaced CF for ruminant feed evaluation.

Nonetheless, CF remains the legal measure of fibre in grains and finished feeds, despite its limitations in accurately reflecting true fibre content or digestibility.

Detergent fibres

The concept behind detergent fibre analysis is that plant cell substances can be divided into less digestible cell walls (made up of hemicelluloses, cellulose, and lignin) and highly digestible cell contents (containing starch and sugars). These cell contents are successfully separated from the cell walls by using two different detergent systems.

Acid detergent fibre (ADF): This fibrous component represents the least digestible fibre portion of forage or other roughage. This highly indigestible part of forage includes lignin, cellulose, silica, and insoluble forms of nitrogen, but not hemicelluloses. Forages with higher ADF values are lower in digestible energy than forages with lower ADF values. This means as the ADF concentration increases, digestible energy concentration decreases. During laboratory analysis, ADF is the residue remaining after boiling a test material in acid detergent solution.

Acid detergent lignin (ADL): ADL is most insoluble fibre analyses in the laboratory. After ADF analyses the residue is dissolved in 72% sulphuric acid. Lignin is determined as the residue remaining thereafter. Lignin is indigestible.

Neutral detergent fibre (NDF): NDF is the residue or insoluble fraction left after boiling a feed material in neutral detergent solution. The NDF contains insoluble plant cell wall components that include cellulose, hemicelluloses, lignin, silica, and cutins. The hemicelluloses, cellulose, and lignin represent the fibrous content of the forage. Because they give the plant rigidity and enable it to support itself as it grows, these three components are classified as structural carbohydrates.

NDF and ADF often are used in nutritional equations to calculate digestibility, total digestible nutrients (TDN) and/or net energy for lactation (NEL). Ashing of the residue after digestion for detergent fibres removes the ash component and only focusses on the contribution of the organic material.

Total dietary fibre (TDF)

Dietary fibre is defined as those compositions that are resistant to digestion and absorption in the small intestine but can be fermented in the large intestine. It includes polysaccharides, oligosaccharides, etc., like cellulose, hemicellulose, gum, beta-glucans, pectin, lignin, polydextrose, fructo-oligosaccardides, resistant starch and dextrin.

There are a number of analytical methods which can be used to estimate dietary fibre content. The method chosen is determined by the type of material and the specific dietary fibre fractions required. The most common method used is AOAC 991.43 where the fibrous components are broken down enzymatically, resulting in soluble and insoluble dietary fibre fractions.

Variation in analyses

While principal definitions remain unchanged, fibre analysis methods and equipment have improved for faster throughput and fewer tedious steps. Originally, fibre was determined by boiling a test sample in a beaker and filtering it through a Gooch crucible – a method still used in many labs. Automated extraction systems now enable simultaneous digestion and sequential filtration in porous crucibles, eliminating the need to transfer solutions for filtering. Alternatively, pressurised kettle systems use filter bags containing test portions, allowing all bags to be digested and analysed simultaneously. These innovations have streamlined the process, increased efficiency, and enabled laboratories to process more samples at once.

While there are different extraction systems and methods, they are all required to follow these critical conditions: subsampling and segregation, drying of high moisture materials before analysis, particle size reduction, and validation of methods. ❖

For more information, send an email to Dr Taljaard at email elrisa.taljaard@labworldsa.co.za

The science behind phosphate source selection

By Zané Orffer, Nu3enta

Phosphorus (P) is one of the most vital – and expensive – minerals in animal nutrition, playing a key role in skeletal development, energy metabolism, and overall productivity (NRC, 2016). While organic sources of phosphorus typically contain low levels and are poorly digestible, inorganic feed phosphates – such as monocalcium phosphate (MCP), dicalcium phosphate (DCP), and monodicalcium phosphate (MDCP) – are widely favoured for their higher phosphorus content and greater bioavailability. However, not all feed phosphates are created equal.

Differences in raw material quality and variations in manufacturing processes can significantly influence solubility, phosphorus availability, and overall product efficacy. For feed formulators, producers, and nutritionists, understanding how feed phosphates are produced – and how these production differences impact nutritional performance – is essential to ensure consistent results, maximise bioavailability, and optimise return on investment.

How feed phosphates are made

The production of high-quality feed phosphates relies heavily on the purity and characteristics of the raw materials used. For P, high-quality defluorinated phosphoric acid that is low in heavy metals and impurities must be used to ensure safety and bioavailability (Lee *et al*., 2023).

On the calcium side, suitable sources include calcium hydroxide, calcium oxide, or calcium carbonate, depending on the specific production method. The purity, reactivity, and fineness of the calcium source are critical for an effective and consistent chemical reaction to produce a high-quality, low-variability phosphate source (Fernandes *et al*., 2012).

Rather than a single, precise chemical reaction, phosphate production involves a series of reactions that yield a mixture of calcium phosphate types. MCP, DCP, and MDCP are the most commonly used inorganic feed phosphates; all commercial products are blends, not pure compounds (Lee *et al*., 2023).

As a result, feed-grade phosphates typically contain a combination of MCP, DCP (both the hydrated and unhydrated forms), and TCP (tricalcium phosphate). The final composition is influenced by variables such as ingredient purity, production temperature, water content, reaction time, pressure, and specific process design (Ruan *et al*., 2019). The variation in concentrations of minerals can significantly impact the effectiveness of these phosphates in animal nutrition (Lee *et al*., 2023).

All modern feed phosphate plants use the reaction of phosphoric acid with a lime source or a blend of lime sources to produce feed phosphates (Duc, 2021). The final product is highly dependent on the ability to control the reaction time and temperature given the set of ingredients and their quality (Lee *et al*., 2023). The control of these parameters is crucial, as they directly affect the efficiency of phosphorus utilisation and the overall nutritional quality of the feed (Ruan *et al*., 2019).

Therefore, understanding the dynamics within the production process, as well as maintaining high standards of ingredient purity is essential for producing phosphate sources that reliably meet animal dietary needs (Fernandes *et al*., 2012).

MCP is the most concentrated inorganic phosphate. The key distinction between MCP and other calcium phosphates lies in the high P content and calcium-to-phosphorus ratio. MCP requires a lower calcium input (Kim *et al*., 2018) resulting in higher phosphorus content and greater water solubility. There are, however, chemical limits as to the final level of P that can be achieved.

Depending on processing conditions, the final **DCP** product can be either the hydrated or anhydrous form (Dobenecker *et al*., 2021). While chemically similar, the hydrated form offers significantly better bioavailability and the quality of DCP is therefore directly correlated with the ratio of these two variants to each other (Cotti *et al*., 2020).

MDCP is typically a combination of MCP and DCP in varying ratios. These blends are not single compounds but functional formulations, with the MCP:DCP ratio directly influencing product solubility and effectiveness (Dobenecker *et al*., 2021). The ratio of DCP dihydrate and DCP anhydrate in the final product could further complicate the availability of P in such products (Adekoya *et al*., 2021).

Why it matters in the ration

The phosphate quality in a feed ration impacts much more than lab values. Low-solubility DCP may appear cost-effective on a price-per-tonne basis, but its poor P availability can compromise animal performance. In contrast, more soluble sources such as MCP and MDCP support precise and efficient formulation, minimising the need for safety margins and maximising biological effectiveness. Total P is often the starting point in comparing P sources – MCP needs to contain at least 22,7% P, MDCP around 21%, and DCP approximately 18 to 20%.

What to look for in a phosphate

Formulators can evaluate phosphate options based on P content, solubility, calcium levels, moisture, and impurities.

Typical minimum P levels

- P ≥ 22,7% – MCP.
- P ≥ 21% – MDCP.
- P ≥ 18% – DCP.

P quality is assessed via variation and solubility. Labels should report solubility in citric acid, ammonium citrate, and water.

- Citric acid and ammonium citrate solubility should exceed 95%, with lower values indicating the presence of polyphosphates and TCP, respectively.

- Water solubility reflects the MCP fraction and is a great screen indicator of bioavailable phosphorus.

Calcium content reveals formulation accuracy, ability to control the production process and often stability and variation:

- A Ca:P ratio < 0,70 suggests insufficient calcium input and potential larger amounts of free acid.
- 0,70 to 0,74 is typical for MCP.
- 0,76 to 0,83 for MDCP.
- 0,85 to 1,20 for DCP.
- A ratio > 1,2 indicates excess lime or high pH, often found in DCP anhydrate with lower availability.

Moisture content offers insight into handling characteristics and product transitions, such as from DCP dihydrate to DCP anhydrate.

Impurities should fall below legal limits under *Act 36 of 1974*. Phosphates often contain arsenic, cadmium, aluminium, sulphur, and fluorine, which must be monitored. Labels must list these specifications, and each batch should be accompanied by a certificate of analysis.

However, not all the P is equally usable. What truly matters is available P – specifically the portion that is water-soluble and digestible. Studies show MCP has the highest availability, followed by MDCP, while DCP varies greatly depending on its form – hydrated or anhydrous (Van der Klis and Versteegh, 1996). Overcompensation for poor bioavailability often leads to P oversupply, increasing excretion and contributing to environmental contamination – an escalating concern in sustainable livestock production.

The real price of P

When recalculated to price per unit of total P, MCP may be more cost-effective than MDCP or DCP despite a higher price per tonne, due to its higher P concentration. More importantly, cost should be evaluated per unit of available P – not just total P.

MCP offers the highest water solubility and digestibility, which means lower inclusion levels are needed to meet P requirements. This results in improved formulation precision and reduced safety margins.

MDCP offers a cost-effective middle ground but its variable MCP:DCP ratio can affect solubility and digestibility. DCP, especially in anhydrous form, may have the lowest cost-per-tonne but also the lowest P availability. Comparing phosphate sources using available P cost rather than total P alone is essential for maximising performance and ensuring economic efficiency.

Quality P is precision in practice

Feed phosphates are more than just numbers on a label. Their true value lies in how they are made. When precise production meets informed formulation, P becomes not only present but potent. Investing in high-quality phosphate sources is an investment in animal performance, efficiency, and sustainable profitability.

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Relationships between individual animal variation in dry matter intake and animal performance and feed efficiency of finishing beef cattle

By MR Beck, VN Gouvêa, JK Smith, JA Proctor, PA Beck and AP Foote

It has been suggested that dry matter intake (DMI) of ruminants is largely controlled by gastrointestinal fill (i.e., physical gut distention; Forbes, 2007) in high-roughage diets and through chemotaxis signalling, such as osmotic or volatile fatty acid receptors (Forbes, 2007), or hepatic oxidation (Allen, 2014) in low-roughage diets.

In contrast, the minimum total discomfort theory attempts to unify the different theories of DMI regulation and posits that animals consume feeds in a manner that minimises their discomfort (Forbes, 2007). Accordingly, day-to-day variation in DMI from individuals may reflect an animal adjusting their intake in response to short-term aversions to feed intake resulting from some stimuli that induce discomfort (malaise, metabolic disorders, etc.).

Variation in day-to-day intake has been demonstrated to reduce DMI and average daily weight gain (ADG) in several production systems. For example, cattle with greater naturally occurring variation in supplement intake have lower performance and supplement conversion efficiencies (Horn *et al*., 2005; Williams *et al*., 2018). Sheep with naturally occurring greater variation in DMI of forages had less average DMI and ADG (Garrett *et al*., 2021 a, b).

In finishing beef cattle, some studies have demonstrated that imposed variable day-to-day DMI reduces growth performance (Soto-Navarro *et al*., 2000; Pereira *et al*., 2021), although others have not (Cooper *et al*., 1999; Schwartzkopf-Genswein *et al*., 2004), and still others determined that cattle with greater naturally occurring day-to-day variation in DMI had greater ADG (Schwartzkopf-Genswein *et al*., 2011). Several of the studies compared an *ad libitum* intake treatment group with imposed DMI variation treatment groups and did not report the day-to-day variability of DMI of the *ad libitum* group (Cooper *et al*., 1999; Soto-Navarro *et al*., 2000; Schwartzkopf-Genswein *et al*., 2004).

It has been suggested that perhaps the inconsistent relationship between day-to-day variation in DMI and production traits may be because control treatment groups were already undergoing discomfort due to day-to-day variation in DMI (Pritchard and Bruns, 2003). Accordingly, studies that assess direct associations between day-to-day variation in DMI with production traits of individuals may be a better approach than comparing treatment groups with imposed day-to-day variation to elucidate the consequences of day-to-day variation in DMI.

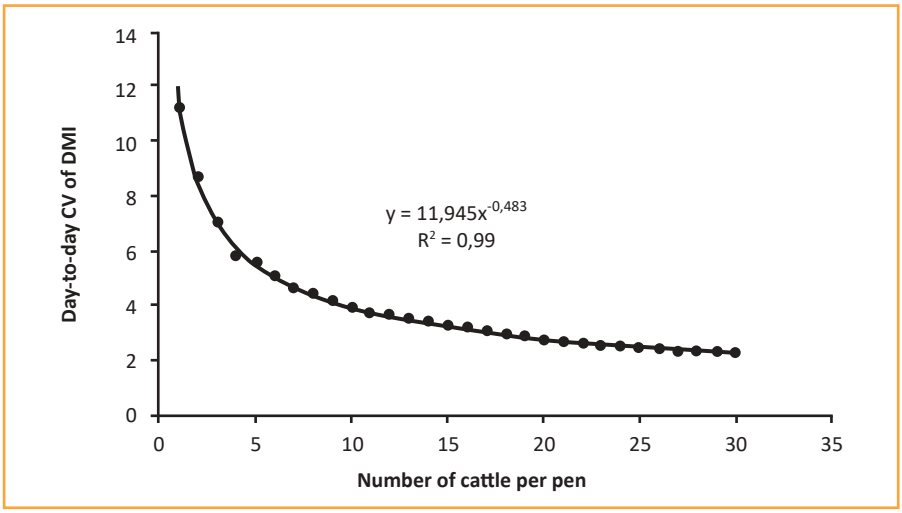
Feed efficiency and DMI variation

Variation in DMI of individual cattle is apparent when cattle are fed individually; however, it tends to disappear or become greatly diminished when cattle are group fed. It has been proposed that individual variation in DMI does not disappear when cattle are group fed, but rather is masked by their pen mates (Schwartzkopf-Genswein *et al*., 2011).

Accordingly, understanding how individual variation in DMI influences average DMI, growth, feed efficiency, and carcass traits could provide evidence that management practices which minimise individual variation could improve economic outcomes for producers. Furthermore, statistically significant relationships between DMI variation and indexes of feed efficiency, such as residual feed intake (RFI), residual ADG (RADG), and residual feed intake and gain (RIG; Berry and Crowley, 2012), may provide an explanation for variation in feed efficiency between animals.

Galyean and Hales (2023) proposed novel means of assessing day-to-day variation of DMI of cattle, as opposed to merely using the day-to-day coefficient

Figure 1: Simulated data illustrating the relationship between number of animals per pen and day-to-day coefficient of variation (CV) in DMI.



The simulated data used a mean (11,3kg/DMI/d) and SD (1,11kg/d) from the average of the three studies used in this experiment (Table 1). Simulations were performed for 30 animals across 200 days on feed. The day-to-day CV across the 200 simulated days on feed decreased exponentially with increasing animals per pen.

of variation (CV). One of these proposed methods was the Euclidean distance (ED), which is essentially the distance between two data points. To our knowledge, the relationships between ED and DMI, growth performance, feed efficiency, and carcass traits have not been explored. Accordingly, the objective of this experiment was to assess the relationship between CV and ED with DMI, ADG, carcass characteristics, and measures of feed efficiency, including pound of gain per pounds of feed (G:F), RFI, RADG, and RIG.

It was hypothesised that animals with greater variation in DMI would have less-desirable production outcomes and feed efficiency. An additional objective of this experiment was to use simulated data to demonstrate how the day-to-day CV of DMI would be expected to decrease with increasing numbers of animals per pen.

Results and discussion

Figure 1 presents the day-to-day CV of DMI across a simulated 200-day feeding period with increasing number of animals per pen (from 0 to 30, increasing in increments of 1). The day-to-day CV of pen DMI ranged from 11% with one animal per pen to 2,2% with 30 animals per pen. An animal's feeding behaviour will likely be influenced by its cohorts (e.g., through bunk competition) and by feed availability in the bunk (Pritchard and Bruns, 2003), so that in a day where one animal consumes less feed, another animal in that same pen may compensate by consuming more.

This exercise demonstrates that day-to-day CV of DMI will decrease with increasing animals per pen just by random chance, albeit at a diminishing rate. This should be intuitive and expected, as the SD or CV of the experimental unit will decrease with increasing observational units within an experimental unit (e.g., animals per pen; Reuter and Moffet, 2016). So, in the context of the current analysis, the pen-level variability (day-to-day CV of DMI) will decrease as the number of animals per pen increases.

Table 1 presents the mean and standard deviation (SD) of pertinent production variables for each of the three experiments used in this analysis. Interestingly, all three experiments had similar CV for average DMI across animals (7,6 to 11,5%). However, there were apparent differences in day-to-day DMI variation within individual animals across the three experiments.

Table 1: Mean (SD) of DMI, growth performance, measures of feed efficiency, and measures of individual animal DMI variation.

	Experiment		
Item[1]	**Beck *et al.* (2023)**	**Proctor *et al.* (2024)**	**Foote *et al.* (2024)**
n	42	53	55
Days on feed	92	80	63
Initial BW[2] kg	521 (31,4)	525 (30,1)	518 (26,7)
Final BW[2] kg	661 (39,8)	680 (39,7)	613 (35)
DMI, kg/d	11 (1,26)	10,8 (0,83)	12,2 (1,23)
ADG, kg/d	1,52 (0,212)	1,94 (0,304)	1,51 (0,254)
G:F	0,138 (0,01387)	0,18 (0,02635)	0,123 (0,01793)
RFI, kg DMI/d	0 (0,86)	0 (0,68)	0 (0,98)
RADG, kg/d	0 (0,15)	0 (0,27)	0 (0,21)
RIG	0 (0,96)	0 (0,79)	0 (1,07)
HCW, kg	406,2 (27,2)	407,9 (27,20)	386,7 (22,84)
DP[3] %	64,1 (1,73)	63,8 (2,27)	65 (2,05)
REA, cm²	92,2 (9,11)	99,9 (8,19)	90,7 (6,49)
BFT, cm	1,65 (0,353)	1,42 (0,425)	1,76 (0,397)
YG	3,33 (0,614)	2,77 (0,644)	3,39 (0,54)
Marbling score[4]	520,2 (74,72)	443,2 (67,33)	597,7 (99,24)
EBF, %	32,6 (2,18)	30,3 (2,55)	33,1 (2,06)
CV, %	9,3 (4,71)	9,5 (3,26)	16,7 (4,13)
ED	1,22 (0,179)	1,21 (0,107)	2,51 (0,42)

[1]G:F calculated as kg ADG per kg DMI; RFI = residual feed intake; RADG = residual ADG ; RIG = residual feed intake and gain; HCW = hot carcass weight; DP = dressing percentage; REA = ribeye area; BFT = back fat thickness; YG = yield grade; EBF = empty body fat; CV = individual animal DMI day-to-day coefficient of variation; ED = average Euclidean distance of DMI. [2]Initial and final BW are unshrunk. [3]Dressing percentage is calculated using a shrunk final BW. [4]Marbling scale: 100-199 = practically devoid (standard–); 200-299 = traces (standard+); 300-349 slight (select–); 350-399 = slight (select+); 400-499 = small (choice–); 500-599 = modest (choice0); 600-699 = moderate (choice+); 700-799 = slightly abundant (prime–); 800-899 = moderately abundant (prime0); 900-999 = abundant (prime+).

Beck *et al.* (2023) and Proctor *et al.* (2024) had numerically similar CV (9,3 and 9,5%, respectively) and ED (1,22 and 1,21, respectively). However, Foote *et al.* (2024) had 78% greater CV (16,7%) and 107% greater ED (2,51) than the average of Beck *et al.* (2023) and Proctor *et al.* (2024). This increased variability in day-to-day DMI may be associated with the feeding system used.

Both Beck *et al.* (2023) and Proctor *et al.* (2024) used Calan gate systems, where each animal was assigned their own bunk, whereas Foote *et al.* (2024) used the Insentec roughage intake control (RIC) system, which assigns multiple animals to a feed bunk (4,5 animals per bunk in this instance). In the Insentec RIC system, only one animal can consume feed at each bunk at a given time. Therefore, the increased day-to-day variability in DMI in the study of Foote *et al.* (2024) may have been related to bunk competition.

As such, an increased day-to-day variation in DMI and any subsequent effects on production traits should be considered when comparing experiments that employ Insentec RIC systems or similar systems (e.g., SmartFeed, C-Lock Inc, Rapid City, SD; GrowSafe Systems Ltd, Alberta, Canada) against systems within which animals are fed in their own bunk (such as Calan gates and individual pens). However, these findings should be further confirmed.

Carcass characteristics and RFI

Residual feed intake was positively correlated with DMI (rp = 0,79; rs = 0,77; P < 0,01), indicating that steers that

Table 2: Pearson's and Spearman's correlation coefficients between DMI, growth performance, indexes of efficiency, and measures of individual animal DMI variation.

Item[1]	RFI	RADG	RIG	CV	ED
Pearson's					
DMI, kg/d	0,79***	0,04	–0,70***	–0,65***	–0,12
ADG, kg/d	0,01	0,86***	0,19**	–0,52***	–0,55***
G:F	0,51***	0,96***	0,68***	–0,11	–0,49***
RFI, kg DMI/d	–	–0,34***	–0,98***	–0,41***	0,01
RADG, kg ADG/d	–0,34***	–	0,54***	–0,15*	–0,57***
RIG	–0,98***	0,54***	–	0,29***	0,09
CV, %	–0,41***	–0,15*	0,29**	–	0,77***
Spearman's					
DMI, kg/d	0,77***	0,03	–0,67***	–0,59***	–0,27***
ADG, kg/d	0,03	0,84***	0,16**	–0,48***	–0,61***
G:F	–0,51***	0,95***	0,69***	–0,10	–0,50***
RFI, kg DMI/d	–	–0,32	–0,97***	–0,35***	–0,08
RADG, kg ADG/d	–0,32***	–	0,53***	–0,10	–0,56***
RIG	RIG –0,97***	0,53***	–	0,25***	0,04
CV, %	–0,35***	–0,10	CV, 0,25***	–	0,83***

*[1]G:F calculated as kg ADG/kg DMI; RFI = residual feed intake; RADG = residual average daily gain; RIG = residual feed intake and gain; CV = individual animal DMI day-to-day coefficient of variation; ED = average Euclidean distance of DMI. *0,05 < P ≤ 0,10; **0,01 < P ≤ 0,05; ***P ≤ 0.01. Statistical significance was considered at P ≤ 0,05, and tendencies were considered at 0,05 < P ≤ 0,10.*

consumed more feed were less efficient (*Table 2*). Furthermore, RFI was negatively correlated with G:F (rp = –0,51; rs = –0,51; P < 0,01; *Table 2*), indicating agreement between these two measures of feed efficiency. These associations are expected and are similar to those reported in other experiments (Tedeschi *et al*., 2006; Cruz *et al*., 2010; Pereira *et al*., 2016).

Efficient cattle according to the RFI index also had decreased YG (rp = 0,18, P = 0,03; rs = 0,21, P = 0,01) and tended to have less back fat thickness (BFT) (rp = 0,14, P = 0,10) and empty body fat (EBF) (rp = 0,14, P = 0,09) according to Pearson correlation. Efficient cattle according to RFI were associated with decreased BFT (rs = 0,16, P = 0,05) and EBF (rs = 0,18, P = 0,02) with Spearman's correlation.

Other research has also reported relationships between carcass characteristics and RFI. For example, some researchers have reported negative correlations between RFI and EBF (Basarab *et al*., 2003; Tedeschi *et al*., 2006), and others have reported that low-RFI cattle had lower BFT (Nkrumah *et al*., 2007; Pereira *et al*., 2016), which supports the tendency for a positive correlation between BFT and RFI determined in the current study. In contrast, other experiments have not demonstrated a relationship between RFI and carcass traits (Jensen *et al*., 1992; Cruz *et al*., 2010; Bonilha *et al*., 2013).

The discrepancy in the literature for the relationship between RFI and carcass traits may be due to the non-uniform way that RFI is calculated, which typically occurs within a group of cattle, making direct comparison of RFI across studies difficult.

However, the trend for RFI to be associated with poorer carcass traits related to body fat (that is BFT and EBF) has led some to suggest applying an adjustment to RFI for carcass composition (Basarab *et al*., 2003). The current findings have interesting implications for feedlot profitability. On the one hand, efficient cattle according to RFI also had the highest G:F, and G:F is the greatest contributor to cost of gain in a feedlot (Retallick *et al*., 2013). On the other hand, efficient cattle according to the RFI index had lower beef carcass yield grades (YG) and leaner carcasses, indicating a potential lower carcass value if sold on a grid-based marketing system.

More efficient cattle

Residual ADG was positively correlated with ADG (rp = 0,86; rs = 0,84; P < 0,01) and G:F (rp = 0,96; rs = 0,95; P < 0,01; *Table 2*), indicating that more efficient animals had greater ADG and G:F. These relationships are expected and have been reported elsewhere (Berry and Crowley, 2012; Kelly *et al*., 2019; Lancaster *et al*., 2021). Residual ADG was also positively correlated with hot carcass weight (HCW) (rp = 0,17, P = 0,04) when using Pearson's correlation, but not for Spearman's correlation (rs = 0,12, P = 0,17), and negatively correlated with marbling score (rp = –0,20, P = 0,02; rs = –0,25, P < 0,01).

Kelly *et al*. (2019) likewise reported a small but significant positive correlation between RADG and HCW (rp = 0,15) and a negative correlation between RADG and intramuscular fat (rp = –0,11). It appears that more efficient cattle according to the RADG index will have greater HCW, with a potential sacrifice of marbling score. The regression equation used to calculate RADG includes average metabolic bodyweight (BW), and so the index is independent of BW; however, cattle with greater RADG may have larger frame size and mature BW, thereby possibly explaining the positive association with HCW and the negative association with marbling score.

The CV and ED methods to assess day-to-day variability were highly correlated (rp = 0, 77; rs = 0 ,83; P < 0,01; *Table 2*). This agrees with the results of the study by Galyean and Hales (2023), in which they simulated DMI with the same average DMI but different day-to-day standard deviation (SD) of either 0,125, 0,250, 0,375, or 0,500kg/d, which resulted in day-to-day DMI CV of 1,4, 2,9, 3,8, and 5,6%, respectively. The sum of the Euclidean distance increased with the increasing day-to-day CV of simulated DMI. Based on these findings, Galyean and Hales (2023) concluded that Euclidean distance was an acceptable means to assess day-to-day variability of DMI.

Fat vs lean tissue deposition

The negative association between CV and RFI in the current experiment implies that animals with greater day-to-day DMI

variability were more efficient. However, this increased efficiency was likely driven by a disproportionately larger reduction in DMI than in ADG. Cattle with decreased DMI are often more efficient. This may be due to slower ruminal passage rates that result in greater nutrient digestibility (Okine and Mathison, 1991).

Furthermore, as metabolisable energy intake increases, recovered energy in fat tissues increases at a much faster rate than in lean tissues (Geay, 1984). This holds true over a wide range of BW. An increase in G:F is expected with an increasing proportion of energy intake going toward lean tissues, because fat tissues are more energy dense. In other words, 1Mcal contained in lean tissue will weigh more than 1Mcal contained in fat tissues. So, even though fat accretion has a greater efficiency of metabolisable energy utilisation than lean-tissue accretion (Geay, 1984), as a larger proportion of recovered energy is used for protein accretion, a subsequent increase in G:F would be expected.

Accordingly, cattle with decreased DMI, but greater G:F often have leaner carcasses. In fact, some studies have indicated that low-RFI cattle have leaner carcasses (Basarab *et al*., 2003; Tedeschi *et al*., 2006; Nkrumah *et al*., 2007; Pereira *et al*., 2016), whereas others did not find this (Jensen *et al*., 1992; Cruz *et al*., 2010; Bonilha *et al*., 2013).

As RFI is negatively correlated with DMI, low-RFI cattle having leaner carcasses supports the assumption that the negative correlation between day-to-day DMI CV and RFI may be due to cattle partitioning a greater proportion of their feed energy toward lean tissues. It may be possible that the relationships between RFI and carcass composition are related to later maturing carcasses and larger frame sizes; however, this requires more investigation. This was directly observed in the current study, where day-to-day DMI CV was negatively correlated with BFT ($rp = -0,25$; $rs = -0,31$; $P < 0,01$) and EBF ($rp = -0,30$; $rs = -0,32$; $P < 0,01$).

The ED measure of day-to-day DMI variability was negatively correlated with ADG ($rp = -0,55$; $rs = -0,61$; $P < 0,01$), G:F ($rp = -0,49$; $rs = -0,50$; $P < 0,01$), and RADG ($rp = -0,57$; $rs = -0,56$; $P < 0,01$; *Table 2*). Additionally, ED was negatively correlated with DMI when using Spearman's ($rs = -0,27$; $P < 0,01$) but not when using Pearson's ($rp = -0,12$; $P = 0,15$) correlation coefficients (*Table 2*).

The negative associations between ED and G:F and RADG suggest that cattle with greater day-to-day DMI variability were less efficient. Furthermore, the ED was negatively correlated with HCW ($rp = -0,33$; $rs = -0,39$; $P < 0,01$) and positively correlated with dressing percentage ($rp = 0,24$; $rs = 0,32$; $P < 0,01$). The recency of using ED as a measure of day-to-day DMI variability (Galyean and Hales, 2023) makes it impossible to compare these findings with other studies. Accordingly, these findings should be confirmed by future investigations.

This article was condensed for publication in *AFMA Matrix*. For the full article and references, visit *doi.org/10.15232/aas.2024-02583* or send an email to Matthew.R.Beck@usda.gov

Labour inspections: Is the official official?

By Hannes Latsky, training and compliance manager, LWO Employers Organisation

Workplace inspections by the Department of Employment and Labour (DoEL) have become more routine to ensure compliance with labour legislation. It is crucial for producers, in their role as employers, to understand how to identify labour inspectors and recognise their authority – not only to ensure compliance, but also to guard against fraudulent individuals posing as officials.

Earlier this year, the DoEL announced plans to recruit 20 000 new graduate interns nationally into its Inspection and Enforcement Service (IES) division over a two-year period. The recruitment process began in February this year with the first 10 000 interns. These interns are expected to support labour inspectors by assisting with the checking of wage payments, monitoring employment conditions, evaluating workplace safety, and performing other key inspection duties.

Labour inspectors are appointed in accordance with Section 63(1) of the *Basic Conditions of Employment Act, 1997 (Act 75 of 1997)* or *BCEA*, as amended. They are empowered to monitor and enforce compliance with the *BCEA* as well as other key labour-related legislation:

- *Compensation for Occupational Injuries and Diseases Act, 1993 (Act 130 of 1993)*, as amended.
- *Employment Equity Act, 1998 (Act 55 of 1998)*, as amended.
- *National Minimum Wage Act, 2018 (Act 9 of 2018)*, as amended.
- *Occupational Health and Safety Act, 1993 (Act 85 of 1993)*, as amended.
- *Unemployment Insurance Act, 2001 (Act 63 of 2001)*, as amended.

Identification of inspectors

Employers must verify the identity of any individual claiming to be a labour inspector. According to Section 66(3)(a) of the *BCEA*, labour inspectors are legally required to produce their official appointment certificate upon request.

The *BCEA* provides for two types of official identification issued to inspectors:

- An appointment certificate (*BCEA* Annexure 14A), typically issued in document format, confirms that the bearer is duly appointed and authorised by the DoEL to carry out specific functions. It includes the inspector's full name, identification number, signature, serial number, the DoEL logo, and the legislation they are authorised to enforce.
- An inspector card (*BCEA* Annexure 14B), typically similar in size to a bank card and made from plastic, which contains the inspector's photograph, signature, serial number, and the signature of the provincial executive manager of the inspector's office.

If an individual is unable to present valid statutory identification upon request, he/she must be denied access to the premises. Notably, official inspectors from the DoEL are prohibited from charging any fees for inspections, investigations, guidance, or assistance. Furthermore, the DoEL does not authorise any third party to carry out inspections on its behalf, and inspectors are not permitted to sell posters, documents, or any products.

The legal rights of inspectors

Labour inspectors have extensive powers under Section 65(1) of the *BCEA*. They may access any workplace or business premises – excluding private residences – without a warrant or prior notice, provided the visit occurs during reasonable hours. During inspections, they are empowered to question individuals, examine documents, and verify adherence to applicable labour legislation.

Planned inspections are typically communicated ahead of time, giving employers the opportunity to prepare by gathering essential documents such as employment contracts, payslips, time records, and health and safety policies.

In contrast, unannounced inspections or blitz operations have become more prevalent. These surprise visits are conducted without prior warning to ensure that employers consistently uphold compliance, rather than merely preparing for scheduled inspections.

In terms of the *BCEA*, both employers and employees are legally obligated to co-operate fully with labour inspectors. This includes responding to questions honestly and to the best of their ability, as well as granting access to records and facilities necessary for the inspection process.

Employers must always request and verify the credentials of anyone claiming to be a labour inspector. Once the individual's official status is confirmed, cooperation is not optional – it is a legal requirement. Failure to comply, whether intentional or inadvertent, may lead to substantial penalties and pose operational risks. ❖

The LWO Employers Organisation assists employers to comply with labour law, and to use it to their advantage to protect their business. As a registered employers' organisation with the Department of Employment and Labour, the LWO has the right to represent members at the Commission for Conciliation, Mediation and Arbitration (CCMA). Take note that this article is not legal advice – consult one of our legal advisors about any specific legal problem or matter. For more information, email Hannes Latsky at hannes@lwo.co.za, info@lwo.co.za, or visit *www.lwo.co.za*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