Feed Additive

INTERNATIONAL MAGAZINE FOR ANIMAL FEED & ADDITIVES INDUSTRY

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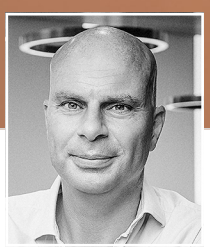

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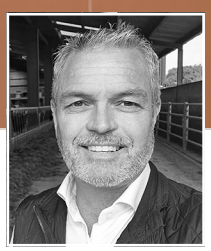

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A Brief Look at 2026: What's on the horizon?

As we approach 2026, we see the animal nutrition industry increasingly focusing on sustainability, biotechnology and raw material diversity. Current indicators point out that by 2026, feed formulation will be considered not only in terms of nutritional value but also within a broader framework, including carbon footprint, supply continuity, and adaptation to changing climate conditions.

Alternative protein sources, more effective utilisation of by-products, and the commercial-scale use of microbial proteins are among the areas being closely monitored by the industry. At the same time, R&D efforts in prebiotics, postbiotics, and microbial additives are gaining greater importance to support animal performance in markets where antibiotic use is being reduced. Heat stress and variable weather conditions, which have become significant issues due to climate change, are bringing mineral balancing and heat-tolerant additives to the forefront.

Looking at a global scale, rapid production capacity increases in Asia, large-scale investment projects in the Middle East, and Latin America's flexible export position could shape the regional direction of feed demand in 2026. Geopolitical uncertainties and periodic oilseed supply risks also make ration formulation flexibility more valuable.

In short, 2026 appears to be a year in which new raw materials and technologies will be trialled more extensively, but also one in which the sector will seek 'more efficient, more resilient and lower impact' solutions. It is likely that companies able to strike a balance between innovation and practical farming needs will emerge more prominently during this process.

As the Feed & Additive team, we will closely follow each of these topics throughout the year and continue to report on them.

We look forward to seeing you again in the 2026 issues...

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A FRESH NEW PATHWAY TO BRING ANIMAL FOOD INGREDIENTS TO MARKET IN THE U.S.

Austin Therrell
Executive Director
The Association of American Feed Control Officials

Beginning in October 2026, a new modernized regulatory pathway is available to bring fresh and innovative animal food ingredients to the market in the U.S.

Earlier this year, the Association of American Feed Control Officials (AAFCO) announced a partnership with Kansas State University's Olathe Innovation Campus (K-State Olathe) to develop the new Scientific Review of Ingredient Submissions (SRIS) process.

AAFCO and K-State Olathe laid out an aggressive plan to develop the novel process within one year; with both teams quickly getting to work setting up a collaborative steering committee that consisted of experienced state regulatory officials, retired U.S. Food and Drug Administration (FDA) personnel, and key representatives from trade associations that represent the U.S. animal food industry. The steering committee worked continuously throughout the year to develop the process flow, conflict of interest requirements, timelines, submission guidance, and training material for subject matter experts.

The result of that effort is a pathway that offers a fast and accurate scientific assessment of new animal food ingredients. Through SRIS, prospective ingredients undergo scientific evaluation by independent consultants and subject matter experts from universities across the country, while upholding rigorous scientific standards and transparency. The process is intended to complement the FDA's current Generally Recognized as Safe (GRAS) Notice program, providing the animal food industry with an additional option for introducing new and innovative products to the market.

The SRIS process is managed by Dr. Garret Ashabranner, who previously served as an animal scientist at the FDA, where he reviewed animal food ingredients and advised on monogastric nutrition and environmental claims. He brings nearly a decade of experience in poultry production, regulatory science and agricultural education to the SRIS process.

In addition to hiring Dr. Ashabranner, AAFCO and K-State Olathe put out a call for subject matter experts (SMEs) in June of this year, amassing a repertoire of diverse and uniquely qualified individuals who will conduct expert panel reviews within the SRIS framework. SMEs were selected based on their areas of expertise, screened for potential conflicts of interest, and trained to review new and innovative ingredients that would benefit the U.S. animal food industry in a manner that preserves scientific rigor.

Within the process flow that was developed, a steering committee also worked to establish the flexibility for submitters to "stop the clock" within the process to address any questions from reviewers or to gather additional data that may be needed to support a safety conclusion. Unlike the federal processes, the 60–90-day review clock will stop and start when dialogue or answers are needed without resetting the review time frame back to zero.

The unique flexibility of the SRIS process, along with the collection of the brightest minds in animal nutrition, allows for ingredient reviews to be done in half of the time that it currently takes FDA's Center for Veterinary Medicine, without compromising safety standards or scientific integrity because the leading experts are the individuals involved in the review.

The SRIS pathway is also the only regulatory process that provides a formal review of animal food ingredient definitions that neither FDA's Food Additive Petition (FAP) nor the GRAS pathways fulfill. Through SRIS, the safety and intended use of proposed new ingredient definitions are evaluated. These definitions form a key part of the AAFCO Official Publication, which standardizes ingredient terminology, providing consistency in interstate commerce. Without SRIS, the U.S. animal food industry faces barriers to innovation and standardization of feed ingredients.

With strong leadership on board, and an expansive network of some of the most qualified animal nutritionists in the world, the SRIS process is poised to be a successful regulatory pathway for U.S. animal food manufacturers.

Innovators in the ingredient space can expect responsiveness, transparency, a fair evaluation of ingredients, and open dialogue, while U.S. animal food manufacturers can expect to gain access to innovative ingredients that will allow them to remain competitive on the international stage.

Photo: Freepik

About Austin Therrell

Since 2022, Austin Therrell has been the the executive director of the Association of American Feed Control Officials (AAFCO). AAFCO has been guiding state, federal and international feed regulators with ingredient definitions, label standards and laboratory standards for more than 115 years.

Biochem signs agreement for BASF's glycinate business

Biochem, an innovative animal nutrition company specializing in feed additives and dietary supplements, and BASF, a pioneer in the animal nutrition and feed ingredients markets, entered into a binding agreement on Biochem's acquisition of BASF's global glycinate business.

Biochem states that this strategic acquisition reinforces its role as a pioneer in high-performance organic trace minerals (OTMs) since 1992 and broadens its global market presence. By acquiring this business, Biochem gains enhanced market access and a well-established network of distribution partners from BASF, guaranteeing a seamless transition for all customers worldwide.

Following BASF's recent announcement to explore strategic options for its feed enzyme business, for BASF, this divestiture represents another step in refining the portfolio toward core ingredients for human and animal nutrition. While the review of strategic options for the feed enzyme business is still underway, the company remains fully committed to supporting customers and advancing the business—driving growth and innovation throughout this transition.

The glycinate portfolios of both companies are highlighted as sharing a strong, science-backed value proposition, focused on delivering superior results for animal producers, namely:

Photo: Biochem

- Improved Animal Performance: The high bioavailability of glycinates ensures better mineral absorption, which directly supports animal health, immunity, and growth.
- Environmental Sustainability: Using highly efficient minerals reduces the excretion of key trace elements like zinc and copper into the environment, helping producers meet increasingly strict regulations.

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Rumen-protected fats boost cow performance in winter

Feeding rumen-protected fats through the winter provides a concentrated, rumen-safe energy source that supports milk production, body condition, fertility and milk composition when bulky silage rations can limit energy intake.

As dairy producers transition into winter feeding, Volac Wilmar Feed Ingredients highlights rumen-protected fats as being essential to maintaining energy balance in rations without risking acidosis issues from excessive amounts of cereals.

"With grass and maize silages forming the base of most diets, achieving the energy density required to sustain milk production and fertility can be difficult," explains Dr. Richard Kirkland, Global Technical Manager for Volac Wilmar Feed Ingredients.

Research shows that dairy cows require 15–20% of their total metabolisable energy (ME) from fat. For high-yielding cows, this is typically around 6% of the ration's dry matter (DM). While forages and concentrates provide some of this, supplementation with rumen-protected fats allows producers to reach optimal levels safely, without compromising rumen health.


Photo: Volac-Wilmar

According to Dr. Kirkland, rumen-protected fat supplements are the ideal vehicle to deliver this energy supply while avoiding disruption of rumen function. Carrying 2.5-times the energy density of cereals, the Megalac product delivers around 33 megajoules (MJ) of ME per kilogram of DM.

Read more>>

dsm-firmenich unveils Sustell Carbon Value Program

dsm-firmenich Animal Nutrition & Health unveiled the launch of its Sustell™ Carbon Value Program, a solution designed to help the agri-food value chain reduce carbon footprints at low cost – or even at a profit. This program is aimed at enabling companies to decarbonize their value chains, meet sustainability targets, comply with reporting requirements, and benefit financially from the achieved emissions reductions.

"Sustainability is about smarter production — getting more from less, cutting waste, and building stronger, more efficient farms and food systems," says Dr. Heinz Flatnitzer, Global Head of Emissions Value Management at dsm-firmenich Animal Nutrition & Health.

"With the Sustell™ Carbon Value Program we help our clients scale carbon reductions with transparency, credibility, and measurable returns. By fostering farm-to-fork collaboration, partners across the value chain can achieve verified emission footprints with full traceability and additional financial value. We invite more companies to join us on this profitable journey toward a more sustainable food system," adds Flatnitzer.

Image: dsm-firmenich

Agrifood, retailer, CPGs, and food service companies need to cut greenhouse gas emissions to meet sustainability targets that are driven by commitments, science-based targets, or customer demands, dsm-firmenich points out. To achieve lower emissions, full value chain collaboration is required.

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FAO warns transboundary animal diseases threaten food security

The Director-General of the Food and Agriculture Organization of the United Nations (FAO), QU Dongyu, on November 28, 2025, urged member countries to reinforce global partnerships to prevent and control transboundary animal diseases (TADs), warning they are one of the most urgent threats to global food security and economic stability.

Speaking at an Information Session on the new Global Partnership Programme for Transboundary Animal Diseases (GPP-TAD) at FAO headquarters in Rome, Qu cautioned that recent funding cuts risk undermining decades of progress in managing and responding to these diseases when global risks are intensifying.

For more than 20 years, the Emergency Centre for Transboundary Animal Diseases (ECTAD) has served as FAO's operational backbone on animal health, supporting more than 50 countries and consistently demonstrating that prevention costs far less than responding to crises.

©FAO/Giulio Napolitano

"We cannot afford to destroy what has taken decades to build," Qu said. "The cost of prevention is far lower than the cost of inaction."

TADs are highly contagious diseases that cross borders rapidly. As animals and humans live in closer proximity and global movements increase, these diseases are spreading faster - from animal to animal, farm to farm, and country to country.

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dsm-firmenich unveils Verax for layer producers

dsm-firmenich Animal Nutrition & Health unveiled the global launch of its Verax™ machine learning-based precision service for layers, designed to transform how egg producing farms can manage their animal health, welfare, and productivity.

By applying advanced data analytics, the service reportedly enables producers to predict performance drops, stress events, and health challenges. This first of its kind early-warning capability empowers farmers to intervene proactively, reducing losses, improving livability, and enhancing egg production.

"This launch marks a pivotal step in our journey to make poultry farming more predictive, more responsive, and more sustainable," said Scott Cavey, Head of Precision Nutrition & Health at dsm-firmenich Animal Nutrition & Health. "By combining machine learning with real-time blood biomarker insights, we're helping producers move from reactive to proactive management—improving both profitability and operational outcomes."

"Smart farming demands more than technology—it requires insight from inside of the bird," noted Cavey. "Our precision service portfolio leverages advanced software experience, artificial intelligence algorithms and expert consultants to help producers make better decisions for their animals and their business."


Photo: dsm-firmenich

The rollout of Verax™ for layers will initially be available to leading global layer producers, dsm-firmenich states. The service is part of the company's broader Precision Services portfolio, which combines digital diagnostics, consultancy, and tailored nutrition to support profitable, sustainable food production.

Read more>>

Researcher explores waste-based feed protein production

A research project within Resource Recovery at the University of Borås, Sweden, explored how valuable substances can be extracted from organic waste – such as animal manure – and how this loop can be closed by producing animal feed.

In her doctoral project, Clarisse Uwineza demonstrated how food waste and animal manure can be converted into valuable volatile fatty acids. These acids can then be used as a substrate to cultivate protein-rich fungal biomass, which in turn can be used to produce animal feed.

Early in her studies, she developed an interest in creating sustainable methods for managing waste and by-products. Her research allowed her to combine her interests in both biotechnology and resource recovery.

Organic waste, such as food waste and manure from agriculture, is a growing environmental issue. However, by using a method known as anaerobic digestion, where microorganisms break down waste in an oxygen-free environment, it is possible to extract these volatile fatty acids. These acids, along with nutrients such as nitrogen and minerals, can then be used to cultivate a specific fungus: Aspergillus oryzae. The fungus grows into a biomass rich in protein, minerals, and dietary fibre, and is also easily digestible for animals.


Photo: University of Borås

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Innovations in Nutrition and Farming

At dsm-firmenich, we support the growing demand for animal protein with sustainable solutions that reduce environmental impact and improve animal welfare.

By harnessing our cutting-edge science and innovative capabilities, and working in partnership with our customers, we're helping to ensure efficient production of safe, nutritious, and affordable high-quality protein for consumers and a more sustainable future.

Learn more at
dsm-firmenich.com/anh

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Nutrition 101 acquires dairy upcycling company

A provider of eco-friendly waste management services, Nutrition 101, LLC, announced the acquisition of Value Feeds, dairy upcycling company based in Dallas, Texas, US, with strategic supply contracts from the region's leading dairy producers.

The acquisition will enable 101 to continue its strategic growth into the Southwest US while building upon Value Feeds' customer relationships, efficient operations, and environmentally friendly solutions, which are reflected in its robust processing capabilities and established foothold in a growing market.

"Value Feeds has proven itself in its over 30-year history as the market-dominant player with fantastic operations," said Rick Shipley, CEO of Nutrition 101. "By bringing its capabilities, unmatched reputation, and customer relationships into the 101 family, we'll be able to continue helping food processors manage byproducts while providing farmers high-quality proteins and energy for livestock in a new and growing market."


Photo: Freepik

"We are very pleased to partner with Nutrition 101," commented Mark Quinn, Founder of Value Feeds. "101's industry expertise will allow us to continue to provide best-in-class services for our customers while expanding our processing capabilities. I look forward to continuing Value Feeds' mission with the support of the 101 team."

Read more>>

Study examines needle free PRRSV vaccination approach

Researchers at the Pirbright Institute from England showed that a needle-free solid dose vaccine can protect pigs against Porcine Reproductive and Respiratory Syndrome Virus (PRRSV). This milestone marks the first time the technology has been proven to work in any species, according to the institute's announcement.

PRRSV is one of the most economically damaging diseases in pig farming worldwide, with losses estimated to exceed $664 million annually in the US alone. Current vaccines are not always fully protective.

Writing in the journal Vaccine's 64th volume, the scientists demonstrate how they tested a novel "prime and pull" strategy combining a solid dose modified live (MLV) vaccine delivered without needles and a nasal boost with an inactivated vaccine.

While the nasal boost failed to enhance immunity, the solid dose vaccine was shown to provide neutralising antibody responses and strong protection against PRRSV infection – comparable to


Photo: The Pirbright Institute

conventional needle-and-syringe vaccination, according to the results. Protection was evidenced by reduced viremia, virus shedding and lung lesions in vaccinated pigs.

Needle-free vaccination could offer advantages: Reducing the risk of spreading diseases via reused needles, improving animal welfare, improving carcass quality by avoiding broken needles and eliminating the risk of needle stick injury for staff handling the animals.

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Terresis launched as unified identity

TIMAB Magnesium, Magnesitas Navarras (MAGNA) and Magnesium Do Brasil have always operated as one company, and one team. Since October 27 2025, the three structures have been united under a new name: Terresis. Regarding the initiative, the company stated, “With a fresh emblem and a powerful new strapline – “Protect what matters” – Terresis embodies the values that have always guided us.”

This fresh identity reflects the company's mission to be the "guardian of a magnesia essential to all," and brings together its sector expertise under a single banner. This change aims to simplify, with a clear international brand identity for the company’s customers and partners, and a united Terresis with a stronger global presence.

Terresis’ integrated industrial model allows it to control the entire value chain - from magnesium extraction to the final application. The company supports its customers in four strategic application areas, through each of its business units:

- Animal nutrition and crop production via Terresis Agriculture,
- Refractory solutions via Terresis MAGNA,
- Industrial minerals via Terresis Industrial Minerals,

- Environmental solutions via Terresis Environnement.

According to the announcement, this new identity represents a significant milestone in the company’s journey. It reflects a commitment to unified communication and highlights the complementarity between the brand’s various areas of expertise.

Read more>>

Hendrix Genetics expands shrimp portfolio

Hendrix Genetics announced a new addition to its shrimp genetics portfolio: the Kona Bay Balance Pro. Developed by the company's shrimp division, the Kona Bay Balance Pro is highlighted as a next-generation shrimp genetics solution engineered to enhance performance, resilience, and sustainability across the aquaculture value chain.

The product was officially introduced at the Hatch India Show 2025, held at the Radisson Blu in Visakhapatnam, India on October 30-31. The launch event featured remarks from Naomi Duijvesteijn, Global Sustainability Director at Hendrix Genetics, who emphasized the strategic relevance of Balance Pro in promoting responsible aquaculture practices.

As with all products in the Kona Bay product portfolio, Kona Bay Balance Pro is a non-ablation breeding solution, eliminating the need for eyestalk ablation and thereby promoting animal welfare without compromising performance or resilience across production cycles. According to the company's statement, this innovation aligns with global sustainability standards and reinforces Hendrix Genetics' commitment


Photo: Hendrix Genetics

to ethical breeding practices.

"The Balance Pro product is the answer to unpredictability in shrimp farming," stated Deepak Patnaik, Commercial Director at Kona Bay. "Designed to reduce variability and improve predictability, it delivers faster growth, higher productivity, and improved resilience."

Read more>>

New Study: Industrialized animal farming challenges climate targets

A new study published in Animals highlights that industrialized animal farming is one of the most powerful - yet persistently neglected - forces driving the climate and biodiversity crises. The analysis, "The Missing Target: Why Industrialized Animal Farming Must Be at the Core of the Climate Agenda", synthesizes evidence from 47 international studies and concludes that reducing livestock production and embracing plant-based food systems is essential for meeting global climate goals.

Across global research, livestock farming contributes an estimated 12-20% of all greenhouse gas emissions annually, with the most comprehensive studies yielding the highest figures.

The most modern accounting methods, which include the impacts of deforestation, bottom trawling and cooling effects from certain atmospheric pollutants, reveal that 52% of present-day global warming is attributable to animal agriculture.

According to the study, animal agriculture occupies over 80% of agricultural land, while providing only 18%


Photo: Sustainable Pet Food Foundation

of calories and 37% of protein consumed worldwide, making it difficult to meet the needs of a fast-growing future population. Among other food-originating environmental impacts, the sector also creates 50% of eutrophication and 32% of soil acidification.

Rapidly developing regions including emerging economies are projected to experience the sharpest growth in livestock emissions unless production trends shift. Biodiversity studies reveal that meat-heavy diets can create three to four times greater biodiversity losses compared to predominantly plant-based diets.

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Terragen launches first cattle probiotic study in Canada

Australian agricultural biotechnology company Terragen launched its first international research trial for Terragen's Probiotic™ for Ruminants (TPR) in collaboration with leading Canadian research organisations. The product is dry-form, shelf-stable and can be added to dry feed, milk, or water to support gastrointestinal health and productivity in beef and dairy cattle, calves, and sheep, the company highlights.

The two-phase feedlot study, conducted at the Agriculture and Agri-Food Canada (AAFC) Lethbridge Research and Development Centre in Alberta, brings together the University of Calgary, the Canada/Alberta Livestock Trust, and the Beef Cattle Research Council.

This marks the first use of TPR in a North American beef production setting, assessing its impact on cattle performance, carcass quality, and the gut-immune connection in feedlot systems.

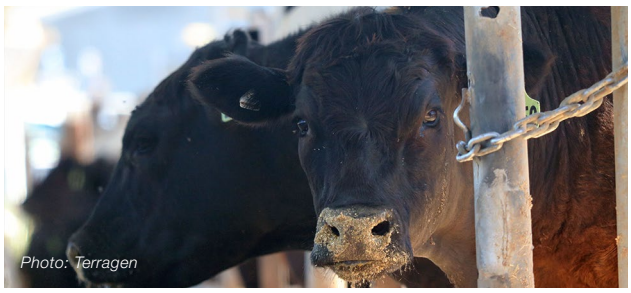
Photo: Terragen

AAFC research scientist Professor Trevor Alexander said the study aligns with their long-term focus on bovine respiratory disease (BRD) and animal health.

"While we know that performance can be affected by BRD, there is limited research exploring how natural or feed-derived gut microbes and gut immunity influence respiratory health in cattle," stated Professor Alexander. "This work will help us better understand the link between digestion, performance, microbiota, and immunity."

Read more>>

Review article details amino acids' impact on chick appetite

In the poultry industry, ensuring chicks receive optimal nutrition is paramount, as it influences their early development, health, and long-term productivity. For decades, scientists have tried to unravel the biological mechanisms that control appetite and satiety during the early developmental phases of chicks—a key step toward designing effective feeding strategies. Interestingly, neonatal chicks are an excellent animal model for studying such biomolecular processes in detail. They are a precocial species that begins searching for food immediately after hatching, and their relatively large brains make it easier to administer substances directly into their central nervous system during experiments.

However, despite decades of research, many aspects of appetite regulation in chicks remain poorly understood. Chicks exhibit very short and frequent eating bouts separated by brief resting periods. While appetite is known to be regulated by neuropeptides, these signaling molecules take time to synthesize and act, implying that some other fast-acting signal must be controlling satiety. Could free amino acids, which are rapidly influenced by nutrient uptake, be involved in this process?

Dr. Phuong V. Tran from the Graduate School of Bioresource and Bioenvironmental Science, Kyushu University, Japan, analyzes current knowledge on the regulation of food intake in neonatal chicks in a review article published in Volume 62 of the Journal of Poultry Science on March 15, 2025. The review, titled "Function of Amino Acids and Neuropeptides in Feeding Behavior in Chicks", focuses specifically on the role of amino acids and their metabolites and how they interact with the appetite-stimulating neuropeptide Y (NPY).


Photo: Freepik

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Cargill boosts micronutrition production capacity in Austria

Cargill Animal Nutrition & Health (ANH) announced the completion of a major expansion at its Engerwitzdorf, Austria facility, substantially increasing current production capacity by 50% to meet the growing customer demand for micronutrition solutions. This further demonstrates the company's commitment to innovation, growth and customer success in the rapidly evolving micronutrition space.

Cargill highlights that this investment allows it to continue expanding its micronutrition business, which moves beyond traditional feed additives to consider the impact of how each microelement interacts with others in the animal's microbiome and its effect on animal health and performance. This intimate understanding of each microelement allows for precise, effective nutrition solutions that maximize productivity and promote digestive health.

Cargill introduced its Micronutrition & Health Solutions business in 2024 that combines the capabilities and resources from Diamond V (acquired in 2017), Delacon (acquired in 2022), and Provimi (acquired in 2011) into one science-based portfolio. The company reports that, holistically, this portfolio has experienced double-digit growth each year for the past three years as more customers adopt science-based nutrition solutions to boost performance, protect animal health and preserve resources.

Photo: Cargill

"Our Micronutrition & Health Solutions business is a culmination of our industry-leading capabilities across phytogenics, postbiotics, anti-mycotoxin agents, enzymes and other performance-enhancing nutrition solutions," explained Gilles Houdart, Global Head of the Micronutrition & Health Solutions business.

Read more>>

New agreement to boost poultry genetics in Pakistan

Hubbard SAS, one of the global leaders in poultry breeding and part of the Aviagen Group under the EW Group, signed a strategic agreement with Noor Poultry, appointing the company as the official distributor of Hubbard Efficiency Plus Grand Parent stock in Pakistan. According to Noor Poultry's statement, this partnership marks a significant milestone in strengthening the nation's poultry genetics and advancing sustainable production standards.

Noor Poultry's joint executive statement said, "Speaking with one voice, the Executive Leadership of Noor Poultry affirms that our landmark collaboration with the EW Group to deploy the Hubbard Efficiency Plus genetics platform fundamentally redefines the production landscape of Pakistani poultry. By introducing this globally validated, top-tier efficiency stock, Noor Poultry is doing more than elevating our own portfolio; we are establishing a new national standard for food security, producer profitability, and operational excellence, securing the sustainable future of our entire sector."

Photo: Noor Poultry

The Pakistani poultry sector is a vital, multi-billion-rupee industry that serves massive national demand. However, to thrive amid volatility and rising costs, the industry requires more than incremental changes; it demands world-class efficiency.

Read more>>

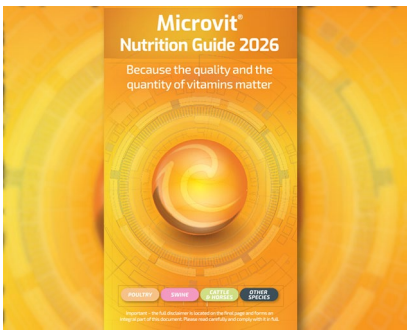
Rumen-protected fats boost cow performance in winter

Producing vitamins for over 70 years and focused on supporting the feed industry for improved animal performance, Adisseo is now publishing the new updated version of its guide for vitamin recommendations, the Microvit® Nutrition Guide (MNG).

The company highlights this new version of the Microvit® Nutrition Guide as presenting minimum and maximum recommended levels for fat soluble vitamins A, D3, E and K3, plus the hydro soluble vitamins B1, B2, B3, B5, B6, B7, B9, B12 and vitamin C in feed. These recommendations cover 18 different species, including poultry, swine, horses, ruminants, pets, and aquatic species, represented in 35 different developmental stages.

Everything is based on technical and scientific publications from the last 30 years, supplemented by Adisseo's research in this area, and the practical experience of consultants and the feed industry, the company points out.

Even though no new vitamins have been developed in the last 50 years, the need for supplementation can change over the years due to various factors, such as the animal's growth rate, the special needs of the immune system in antibiotic-free feeding situations, or even due to heat stress – a problem that strongly affects animal protein producers. Meat quality can also be improved by



specific levels of certain vitamins.

Other factors also affect the levels of vitamins to be added to the feed, such as the diversity of raw materials, and especially the heat treatments performed on the feed, which currently use higher temperatures and longer times, requiring compensatory doses of some vitamins.

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New study may clarify how seaweed cuts cow methane

Each year, a single cow can belch about 200 pounds of methane. The powerful greenhouse gas is 27 times more potent at trapping heat in the atmosphere than carbon dioxide. For decades, scientists and farmers have tried to find ways to reduce methane without stunting the animal's growth or productivity.

Recent research at University of California, Davis, US, showed that feeding cows red seaweed can dramatically cut the amount of methane that is produced and released into the environment. Until now, however, scientists did not fully understand how red seaweed changes the interactions among the thousands of microbes in the cow's gut, or rumen.

A new collaborative study by researchers at UC Davis, the University of California, Berkeley, and the Innovative Genomics Institute (IGI) sheds light on that process and reveals which microbes in the cow's gut might help reduce methane. The new insights bring the multidisciplinary team, composed of microbiologists, animal and computer scientists, closer to engineering the gut microbes of cows to produce less methane, offering a long-term solution that would not depend on seaweed feed additives. The study was published in Microbiome.


Photo: Gregory Urquiaga / UC Davis

Scientists have previously shown that red seaweed of the genus Asparagopsis blocked a key enzyme found in methane-producing microbes in the cow's gut.

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LDC opens specialty feed protein facility in China

Louis Dreyfus Company (LDC) inaugurated its new specialty feed protein production line in Tianjin, China. The line is a part of the group's strategic plans to expand its activities further downstream in the value chain and diversify its offering with value-added products, including specialty feed ingredients, as part of its Food & Feed Solutions business.

Covering an area of 11,000m2 near LDC's existing Tianjin oilseeds crushing plant, the new specialty feed protein production line will initially focus on producing fermented soybean meal, with an annual production capacity of 60,000 metric tons.

"This development represents LDC's first investment in a facility to produce specialty feed proteins on a commercial scale, and reflects our commitment to continued growth with China," said James Zhou, LDC's Head of Food & Feed Solutions and Chief Commercial Officer. "In addition to supporting the growth of our Food & Feed Solutions Platform, the facility enables us to supply China's livestock and poultry industry with high-quality specialty feed proteins that can contribute to enhanced animal health and productivity across species."

Photo: Louis Dreyfus Company

The facility employs synergistic fermentation technology developed by LDC's R&D Center in Shanghai, that utilizes multiple probiotic strains to break down anti-nutritional factors in soybean meal, enhancing its feed protein content, palatability and digestibility. Rich in small-molecule organic acids, LDC highlights that its fermented soybean meal supports animal gut health and helps strengthen immunity during stress or illness.

Read more>>

Biochem expands RumiPro product line

Biochem announced the newest addition to its RumiPro® product line: RumiPro® Wean, a solution designed to make the weaning process smoother, safer, and more successful. With its unique blend of proven ingredients, the company highlights RumiPro® Wean as promoting better rumen development, supporting a resilient immune system, and helping to mitigate growth slumps related to weaning.

"Many farms lose the hard-earned progress they achieved during the milk-feeding phase when weaning," said Miriam Deppe, Product Manager at Biochem. "RumiPro® Wean is specifically designed to prevent those setbacks and ensure a smooth transition to solid feed for calves without compromising their growth or health."

Weaning is one of the most critical phases of calf rearing. It is characterized by many stressors, including nutritional, environmental, and social factors. Despite its importance, this phase is often overlooked. Growth slumps occur on almost every farm during this time due to suboptimal nutrition, decreased nutrient intake, increased energy consumption, and higher rates of disease. In fact, many farms experience a four- to eight-week standstill during this phase, during which any gains made during the milk-feeding phase are lost.


Photo: Biochem

In addition to the stress of weaning, calves are more susceptible to mycotoxin contamination, which can result in reduced feed intake and growth and suboptimal rumen development.

Read more>>

Study warns feed shortage may limit aquaculture growth

According to a new study published in Nature Food, aquaculture's rapid expansion could be limited by its continued reliance on a fragile feed supply. The findings underscore how closely the sector's future growth remains linked to the very ocean it seeks to relieve.

The analysis was conducted by researchers from Xiamen University, University of Massachusetts, Boston, University of Arizona, and University of Tasmania. It found that despite major progress in using fishmeal and fish oil more efficiently, the aquaculture industry would need to secure an additional 1.8 million metric tons of alternative feed ingredients each year to keep pace with rising global demand for high-value farmed seafood such as salmon and shrimp.

"This is a practical moment to secure feed supply and unlock new value streams," said the study's lead author Ling Cao, a professor at Xiamen University and judge of the F3 Challenge. "Treating fishmeal and fish oil as strategic, finite resources, while accelerating alternative innovations, can help sustain aquaculture growth and reduce exposure to supply variability."


Photo: Freepik

Aquaculture has emerged as the fastest-growing food production sector worldwide, supplying more than half of the world's seafood and nearly one-fifth of all animal-sourced protein. As the global population approaches 10 billion by mid-century, aquaculture's continued growth is essential to meet our global food security needs.

Read more>>

Research explores leptin's role in bird reproduction

Leptin is an anorexigenic hormone that plays a key role in regulating food intake, ovarian development, and reproduction in mammals. However, its physiological role in birds remains less understood, compared to mammals. A significant knowledge gap exists between leptin levels and reproductive processes in layer and broiler parent stock chickens. A deeper understanding of these mechanisms could aid in optimizing sustainable global meat and egg production, particularly in challenging conditions like nutrient-deficient environments, where the reproductive efficiency may be compromised.

Against this backdrop, Dr. Sadequllah Ahmadi and Dr. Takeshi Ohkubo from the College of Agriculture, Ibaraki University, Japan, conducted a comprehensive review of leptin's influence on female reproduction in birds, focusing on early folliculogenesis and ovarian development, and compared these mechanisms with those observed in mammals. This review was published in Volume 62 of The Journal of Poultry Science on February 6, 2025.

"In mammals, leptin is secreted by the adipocytes and its role has been clearly elucidated. However, in birds, leptin is primarily expressed in the brain and gonads with its mechanisms being unclear. A deeper understanding of leptin's role in reproduction could help improve reproductive efficiency and sustainability in poultry production," says Dr. Ahmadi, as the motivation behind the study.


Photo: Freepik

In mammals, leptin is secreted primarily by adipose tissue, which then circulates in the blood stream, signaling energy sufficiency to the brain and regulating the secretion of reproductive hormones like luteinizing hormone and follicle-stimulating hormone. On the other hand, in birds, leptin is expressed locally in the brain, especially in the pituitary glands and gonads, and not secreted by adipocytes.

Read more>>

Skretting unveils next-gen Lorica and Optiline shrimp feeds

Skretting unveiled the launch of the next generation of its flagship shrimp feeds: Lorica and Optiline. These products are the first in the Skretting shrimp portfolio to feature EDGEOS PhytoComplexes developed by Nutreco Exploration, the company's team of experts specialising in plant and bacteria research, and the development of proprietary ingredients that have never been used in animal feed. The company highlights these EDGEOS PhytoComplexes as a synergistic blend of bioactive compounds derived from whole plants, specific plant parts—such as leaves, flowers, or stems—or combinations thereof, designed to address animal health and performance.

The shrimp industry is evolving rapidly, against a backdrop of technological change, trade disruptions, increased sustainability focus, and various health challenges. In this dynamic environment, achieving consistent growth and survival is critical for producers worldwide. The new versions of Lorica and Optiline, Skretting points out, are designed to support farm productivity, and thanks to the inclusion of PhytoComplexes, will offer increased efficacy compared to their predecessors.


Photo: Skretting

Read more>>

New study links nutrient consistency to broiler health

In poultry houses where broiler chickens — birds bred and raised specifically for meat production — are grown, feed is delivered through long feed lines, which are mechanized systems that automatically deliver feed from storage silos to feeding pans. They run from the front of the houses to the back, and sometimes nutrients become unevenly distributed. This can lead to inconsistent feed quality, which can affect bird growth and health. To help the poultry industry determine the extent of this problem, researchers at the Pennsylvania State University, US, conducted a study of how nutrient distribution affects broiler chicken performance, processing yields and bone mineralization.

"Walking through commercial poultry houses, and looking in the feed pans, seeing what the birds are consuming, we saw a difference in the quality of feed from the front of the house where feed was coming in to the back end of the house," said John Boney, Vernon E. Norris Faculty Fellow of Poultry Nutrition in the College of Agricultural Sciences, senior author on the paper. "That led us to the question: If we can see a difference in physical quality of the feed — meaning many of the pellets have

broken down into fine particles or dust — how does that variability affect nutrition the birds get?"

In findings available online that will publish in the December 2025 issue of Journal of Applied Poultry Research, the researchers reported that variability in two key nutrients along the feed line affect broiler chickens' growth performance, including body weight, feed-conversion ratio, processing yields — like breast meat yield — and bone strength/mineralization. The two key nutrient areas are amino acid density — the amount of essential amino acids, which are the building blocks for proteins, in the feed — and Phytase Activity, which is a type of protein called an enzyme responsible for initiating and accelerating necessary biological reactions - that helps chickens absorb phosphorus from plant material.

Read more>>

Orffa introduces new science-driven brand promise

A global producer of specialty feed additives, Orffa announced its renewed purpose, vision and mission, distilled into a new brand promise: "Orffa. The science in your feed."

With this announcement, Orffa states that it reaffirms its commitment to placing validated science at the core of its solutions, supporting customers and partners with expertise and data that deliver measurable value across animal farming.

The global feed industry is undergoing rapid transformation, with rising demand for transparent, evidence-based and reliable insights. Orffa's renewed direction aims to respond to these needs by strengthening its scientific foundation and providing customers with clearer guidelines for formulation efficiency, performance predictability and sustainability. The new brand promise is highlighted as reflecting Orffa's broader ambition to enable better-informed decision-making across the industry, grounded in peer-reviewed science and independently verified results.

Over the past year, Orffa has taken significant steps to further embed scientific excellence into its operations, including:

• Advancing gut health analytics through its partnership with Florates, enabling more precise microbiome-driven decision-making,

• Initiating scientific collaboration on methane abatement with SeaForest to explore new pathways for sustainability.

Read more>>

ASIA'S ANIMAL FEED INDUSTRY ENTERS NEW ERA


Photo: Freepik

Asia's animal feed industry is undergoing rapid transformation. Companies we spoke to at Taiwan Smart Agriweek 2025 confirm a powerful wave of innovation, ranging from technology to microbial additives, digitalisation to sustainability. The region is setting the direction for the global market with both increasing feed demand and rising technology investments.

By Derya Gülsoy Yildiz & Muhammed Akatay, *Feed & Additive Magazine*

Held in Taiwan in September, Taiwan Smart Agriweek 2025 was not only an event showcasing the region's agricultural technologies; it was also a noteworthy gathering that highlighted Asia's decisive role in the global animal feed market. Today, a large portion of global feed production and consumption occurs in Asia. Population growth, improving income levels, and rising demand for animal protein have positioned the region as both the largest producer and consumer of feed.

Representatives from five Taiwan and India-based companies we met during the event shared their observations on the trends shaping the industry. The emerging picture was quite clear: Asia's animal nutrition sector is undergoing rapid transformation. This transformation is defined by three main pillars: Technology, efficiency, and health-focused feeding approaches.

EXPANDING LIVESTOCK INDUSTRY, INCREASING FEED DEMAND

The growth in feed demand in Asia is not only a result of population increase but also of production models becoming more professional and scaled. Industrial poultry farming, modern dairy production, and expanding pig operations are driving countries towards tech-intensive feed production. The aquaculture sector is also one of the region's growing areas of interest.

Tommy Chou, Marketing Planner of AgriAsia DC, a Taiwan-based integrated feed processing solutions provider, summarises the region's needs and demands: “There is a strong focus on storage, material handling and high-quality pellet production systems in Southeast Asia. Storage and material handling stem from the need for efficient bulk handling in humid climates and the reduc-

tion of post-harvest losses. Pelleting and extrusion systems are essential for livestock industries that require high-quality feed with durable physical stability. Demand for these technologies is fuelled by population growth, rising protein consumption and the transition towards more modern, large-scale feed mills."

Similarly, for India-based animal nutrition solutions developer **DSAND Animal Nutrition**, the main factor driving demand is the necessity of economy of scale. The company's **Poultry Business Unit Head, Dr. Ashwani Jadaun**, notes that poultry and dairy farming are widespread in India, while aquaculture and pig farming are still developing. Dr. Jadaun also draws attention to price volatility, explaining that feed costs put pressure on producers, particularly in large markets such as India: "In India's poultry sector, production costs are the biggest challenge due to uncertainty in raw material prices and fluctuations in chicken/egg prices. Additionally, gut health is one of the biggest challenges due to disease outbreaks, mycotoxins, etc. The Indian dairy sector also faces similar challenges related to milk yield and reproductive performance. Therefore, solutions that focus on these challenges are attracting interest in the market."

NEW GENERATION TECHNOLOGIES: PRECISION PROCESSING AND ENERGY EFFICIENCY

Growth in the region is also increasing interest in animal feeding technologies. Automation, process control and microbial additives are particularly prominent among the preferred options. Field observations indicate a significant leap in technology investments in the feed industry in Asia. The common view among companies is that 'the transition to precision processing has begun.'

Tommy Chou from AgriAsia DC explains why advanced process equipment is crucial: "The industry is rapidly transitioning to precision feed technologies. For example, advanced expanders and conditioners precisely adjust processing parameters such as temperature, humidity, holding time, and mechanical energy input to enhance feed digestibility and nutritional value. These parameters are visualised on PC monitors, enabling operators to make real-time adjustments. Automation also plays a critical role in feed mills, enabling continuous monitoring of temperature, humidity and hygiene indicators. This improves compliance with feed safety standards while reducing operator exposure to hazardous environments, ultimately enhancing workplace safety and plant reliability. In addition, integrated safety detection systems mounted on equipment further strengthen process safety."

Taiwan-based feed processing machinery manufacturer **Yeong Ming Machine Industrial** is also observing similar trends. **Company Manager Ryan Huang** notes that demand for pellet machines is particularly high in South and Southeast Asia, but adds that the economic slowdown is putting pressure on some markets: "Due to the economic situation, the market is currently declining. Since the pandemic, our production has decreased, partly due to the economic climate and also competition from China."

MICROBIAL ADDITIVES AND IMMUNITY-FOCUSED SOLUTIONS

Beyond technological equipment, biotechnological feed additives aimed at strengthening animal health and immunity are also rapidly rising in the

Feed & Additive Magazine's publisher, Muhammed Akatay with Yeong Ming Machine Industrial's Manager Ryan Huang

Asian market. Chunghwa Protein, the first company in Taiwan to apply the theory of immunity stimulation, which "strengthens the innate immune system of animals and plants," to animal and plant nutrition, is one of the region's notable companies. The company utilises metabolites obtained from multi-layered fermentation and enzymatic hydrolysis processes in cattle, pig, poultry farming, and plant cultivation. Chairman of the Board Dr I-Chang Yang defines the basic function of their products as follows: "We reduce the chronic inflammation caused by excessive fat accumulation in organs and promote the conversion of fat into muscle. This improves both animal health and the flavour and aroma quality of the meat."

According to **Dr. Yang**, the following trends will become apparent in Southeast Asia over the next decade:

1. Development and use of local alternative pro tein sources,
2. Alternative proteins and sustainability pressures,
3. Animal health/increased use of micronutrients and additives,
4. Precision nutrition, digital technologies, and monitoring,
5. Antibiotic alternatives and health risk manage ment in animal husbandry,
6. Aquaculture-specific nutritional needs,
7. Environmental and carbon footprint transparency, sustainability certification,
8. Rapid growth in the pet nutrition market,
9. Strengthening policies and regulations.

DSAND Animal Nutrition from India focuses on gut health, feed efficiency and performance parameters, developing enzyme, probiotic, protein hydrolysate and phytobiotic solutions in line with this. **Dr. Jadaun** describes their products as 'solutions that bring scientific innovation together with real-world challenges' and highlights the following regarding the market: "The animal nutrition sector is shifting towards science-backed biotechnological innovations. Gut health remains the biggest concern across the entire sector. Therefore, safe and innovative solutions that address these challenges could be one of the major focal points in the coming period. In addition to nutrition, developments in anti-viral solutions and vaccines could be the next big lookout for poultry and livestock producers."

SMART FARMS ARE ON THE RISE IN ASIA

Digitalisation and the use of artificial intelligence in the sector are not limited to feed formulation or process control. Smart farming and automation solutions are rapidly gaining traction, particularly in markets such as Taiwan, which are experiencing labour shortages. **Joe Huang, Vice President of Engineering at ICHASE**, which utilises AI technology and offers biosecurity and productivity-focused solutions to help farmers increase their profits, summarises the future of technology in the region: "There is a significant labour shortage in Taiwan, and many young people do not want to become farmers. I believe that technology will be used in all areas of animal farming in the future."

We got the chance to speak with Chunghwa Protein's Chairman of the Board, Dr. I-Chang Yang

Joe Huang, Vice President of Engineering at ICHASE, with our publisher at the event


Image: Freepik

The company's two products (an AI-powered live weight measurement system and an AI-powered device that recognises bird behaviour and repels them with a green laser) are rapidly gaining acceptance on modern farms. Exporting from Taiwan to Southeast Asia and 14 other countries, the company has come to the forefront at a time of increased biosecurity risks.

ASIA: GREAT OPPORTUNITIES, BUT ALSO UNCERTAINTIES

All companies agree that Asia is one of the world's fastest-growing feed markets in the medium to long term. However, short-term economic uncertainties and competition from China are challenging some producers. **Huang from Yeong Ming** cautiously describes the region's current situation: "Due to economic conditions, the market is currently declining. We do not expect this situation to improve in the short term." In contrast, the sector's innovation drive remains strong. According to **Dr. Jadaun**, biotechnology and antiviral solutions will be the two main areas of focus for producers. AgriAsia DC believes that the transformation in the market is shifting towards sustainability. **Tommy Chou** predicts that the Southeast Asian feed sector will continue to grow, driven by three main factors:

1. Rising livestock production to meet growing food demand,
2. Stricter food safety regulations, requiring higher feed quality and full traceability,
3. Sustainability pressures, with greater emphasis on energy-efficient and environmentally friendly feed production.

CONCLUSION: ASIA IS SHAPING THE FUTURE OF FEED

When the interviews are combined, it is clear that a major transformation is taking place in the animal nutrition and feed technology sector in Asia. The key dynamics of this transformation can be summarised as such:

- The scaling up of the livestock industry is driving up feed demand,
- Precision control in process technologies is becoming the new standard for efficiency,
- Microbial additives, enzymes and immunity focused solutions are rapidly becoming widespread,
- Digitalisation and automation are accelerating due to labour issues and biosecurity pressures,
- Sustainability is becoming central to nutrition strategies.

The region, stretching from Taiwan to India, Vietnam to Indonesia, is defining not only the volume of production but also the technological direction of the global feed industry. Asia is now not only the world's largest feed producer but also one of the most innovative markets.

MICROBIOME-FOCUSED PET NUTRITION IS GROWING, BUT BARRIERS REMAIN

NBF LANES Offers Science-backed Solutions

By NBF Lanes

INNOVATION AND RESEARCH TO SUPPORT GUT HEALTH IN DOGS AND CATS

The growing focus on companion animal gut health is reshaping the pet nutrition landscape. More and more manufacturers are seeking effective ways to include probiotics and postbiotics in pet foods, yet production and regulatory challenges remain significant. Within this context, NBF LANES with its business unit BIOME stands out with scientifically validated probiotics and postbiotics, developed specifically for the supplements and pet food market.

THE POWER OF L. REUTERI IN EXCLUSIVE FORMULATION

Among the latest innovations are strains of Limosilactobacillus reuteri, one of the most studied microorganisms both for human and veterinary use. NBF LANES BIOME offers:

- NBF1, a species-specific probiotic strain for dogs (***L. reuteri*** *DSM 32203*);
- NBF2, a species-specific probiotic strain for cats (***L. reuteri*** *DSM 32264*).

These are the only *L. reuteri* strains authorized by EFSA and patented to ensure their stability even in dry pet foods, overcoming key barriers related to probiotic survival during processing. Key advantages include:

- High resistance to gastric acidity and bile salts,
- Ability to adhere to the intestinal wall through biofilm formation,
- Production of reuterin for microbial balance,
- Stimulation of short-chain fatty acids (SCFA/butyrate) for gut health,
- Proven safety: absence of antibiotic resistance factors.

Photo: NBF Lanes

A POSTBIOTIC FOR EVERY NEED

The NBF LANES BIOME portfolio also includes the postbiotic NBF DC PRO, derived from *L. reuteri*, offering a stable and bioactive solution perfect for wet products, where high temperatures may compromise live probiotics. Through fermentation and heat inactivation, this postbiotic delivers functional metabolites that:

- Stimulate SCFA production,
- Support immune modulation,
- Enhance probiotic stability.

It can be used alone or in combination with probiotics in various product forms, providing flexibility and new development opportunities for the pet industry.

FULL SUPPORT FOR MANUFACTURERS

With nearly 40 years of experience in veterinary nutrition, NBF LANES acts as a partner for feed and supplement manufacturers. Support includes:

- Analysis of requirements and tailored solutions,
- Formulation development and specialized microbiome research,
- Regulatory assistance including support with EFSA dossier,
- Dedicated co-branding programs.

With its patented L. reuteri-based and stable postbiotic solutions, NBF LANES BIOME is the ideal partner for developing innovative products dedicated to supporting the gut health of dogs and cats.

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Add *Reuteri* to your feeds

Boost your dog and cat feeds with our new EFSA – authorized Probiotics and Postbiotics

100 billion
live probiotics
per gram

NBF1 probiotic for dogs
L. reuteri DSM 32203

NBF2 probiotic for cats
L. reuteri DSM 32264

NBF postbiotic for dogs and cats
L. reuteri NBF DC PRO

NBF LANES

Want to know more?
Visit **www.nbfreuteri.com**

PET FOOD AND NEW TRENDS

- Liquid Antioxidant Application: Challenges related to temperature fluctuation
  Frank Clement, Kemin Nutrisurance Europe
- Balancing Taste and Acceptance: Enhancing pet food palatability
  Dr. Anne Winkler, Phytobiotics
- Intestinal Microbiota: Key to dog and cat wellbeing
  Alessandro Gramenzi, University of Teramo
- Nucleotides gain increased attention in functional pet nutrition
  Tonje Elisabeth Dominguez, Aker Qrill Company
- The power of faba bean ingredients to drive pet food purchasing
  Dr. Maygane Ronsmans, BENEO
- Postbiotics: The next generation of pet gut health support
  Dr. Francesca Susca, Lallemand Animal Nutrition

Liquid Antioxidant Application: **CHALLENGES RELATED TO TEMPERATURE FLUCTUATION**

Frank Clement
Principal Technical Service Manager
Kemin Nutrisurance Europe

"Liquid antioxidant application ensures that pet food products remain safe for animals throughout their intended shelf life. Effective management of fat oxidation is increasingly important as sustainability initiatives prompt manufacturers to reduce packaging layers. These modifications may result in greater oxygen migration, potentially accelerating fat oxidation processes. Antioxidants must be incorporated with precision at optimal dosages to ensure product shelf life and comply with the European Union's regulations on maximum permitted levels of antioxidant molecules."

Fat oxidation in pet food raw materials and finished products is a critical concern, as it can negatively impact both nutritional quality and palatability, ultimately affecting pet health. To control these issues, antioxidant molecules are systematically incorporated throughout the pet food production chain, as illustrated in Figure 1.

Oxidation can begin as early as the raw material management stages and continue throughout all pet food processing and storage steps, up to the moment the product is fed to the animal. To address this, antioxidants—available in both liquid and dry forms—are applied at nine key points throughout the production process, from raw material handling

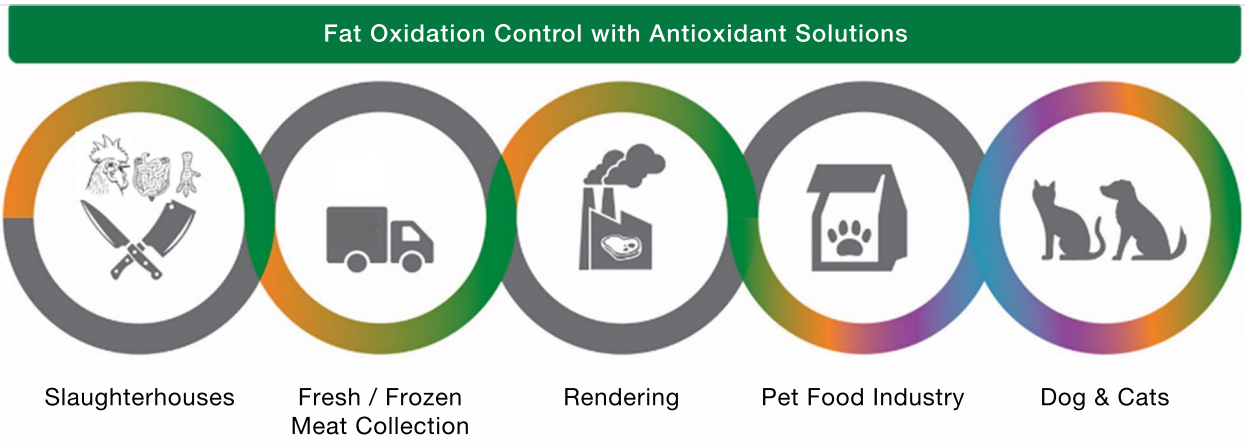

Figure 1. Fat oxidation must be controlled at every step of the pet food process[1]

to finished product processing. While both types play essential roles in maintaining product quality, liquid antioxidants are selected for approximately 80% of applications due to their versatility and strong performance across diverse production scenarios.

ADVANTAGES OF LIQUID ANTIOXIDANT FORMULATIONS

Liquid antioxidants offer significant benefits in terms of homogenization and distribution:

- **Fresh meat and animal by-products (ABP):** Liquid antioxidants form stable emulsions, ensuring uniform penetration.
- **Processed Animal Proteins (PAP):** Effective dispersion across dry matrices via advanced spray technologies.
- **Liquid/liquid systems:** When applied to animal fats, static mixing technologies enable optimal blending and antioxidant molecular interaction.

Spray application remains the predominant method for dry matrices, where air-assisted spray systems achieve fine particle coverage.

Liquid Antioxidant Formulation Complexity

Liquid antioxidant solutions are engineered for:

- **Synergistic molecular activity** to enhance oxidative stability.
- **Metal-binding properties** to neutralize pro-oxidant catalysts.
- **Enhancing molecule efficacy** through tailored carrier systems.
- **Viscosity optimization** to ensure compatibility with diverse application technologies.

These formulations represent a balance of antioxidant functional performance, chemical stability, and process adaptability, making them indispensable for modern pet food manufacturing. These liquid solutions have specific and different viscosity values, based on their formulation.

CHALLENGES: UNDERSTANDING VISCOSITY AND ITS ROLE

Viscosity, as defined by Newton's law, is the resistance of a fluid to flow—caused by molecular interactions and friction. It is measured in units such as Pascal-second (Pa·s), or Centipoise (cP).

Here's the key principle:

- Higher viscosity = slower flow
- Lower viscosity = faster flow

And temperature plays a major role: as temperature increases, viscosity decreases. This means that the same antioxidant solution behaves very differently at 10°C compared to 25°C as described in Figure 2.

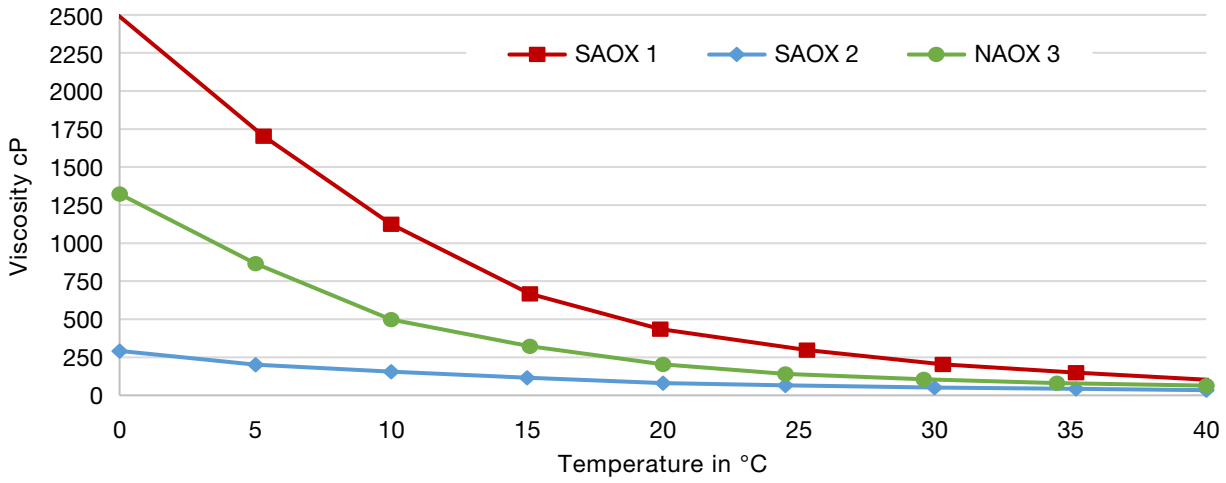

Figure 2. Viscosity in Centipoise follows up at different temperatures in ° Celsius of three different antioxidant solutions. Synthetic antioxidant (SAOX) 1 is BHA/BHT solution on vegetable carrier, SAOX 2 is BHA/ Propyl Galate/ citric acid solution on specific carrier and Natural antioxidant (NAOX) 3 is Mix Tocopherols / Rosemary extract on vegetable carrier.[4]

Our studies show that viscosity varies significantly among antioxidant solutions, depending on active molecule concentration and carrier systems. For example:

- **SAOX 1** (BHA/BHT on vegetable carrier)
- **SAOX 2** (BHA/Propyl Gallate/Citric Acid on specific carrier)
- **NAOX 3** (Mixed Tocopherols/Rosemary extract on vegetable carrier)

Each formulation has its own viscosity profile and therefore requires a dedicated application line tailored to that specific antioxidant (including suction line, pump, piping and nozzle). It's crucial to maintain always the same temperature as the liquid antioxidant and keep the pump calibrated with the temperature of use. If not, we can observe significant variations in the amount of antioxidants applied, as shown in Figure 3.

Critical temperature ranges from 5 to 20°C impacting the dosage, which corresponds to the exponential decrease of SAOX 3 mentioned in Figure 2. If we apply SAOX 3 at 10°C instead of 20°C, pumps will deliver less than 10L per hour which is half of the quantity expected in this example. Conversely, highest temperature will deliver more antioxidants than targeted.

These temperature variations reflect EU seasonality and also the lack of temperature control. Especially during winter. Rendering companies and pet food manufacturers are often highlighting some fat oxidation increases trend with higher Peroxides Values and Hexanal recoveries increase. But in parallel, antioxidant molecules recoveries are decreasing a lot related to liquid antioxidant application challenges.

Key challenges include insufficient or decreased use of antioxidant solutions. A direct result is reduced product shelf life, potentially leading to end product recalls.

During the summer period we notice occasionally higher antioxidant recoveries levels. In this context, the primary concerns may involve surpassing the rate of antioxidant molecule recovery in final pet food production, as well as potential increases in the associated costs of antioxidant usage.

TAKE AWAY

Between 10°C and 25°C, viscosity changes dramatically, impacting pump performance.

- **Cold conditions (winter):** Higher viscosity → pumps deliver less antioxidant → underdosing

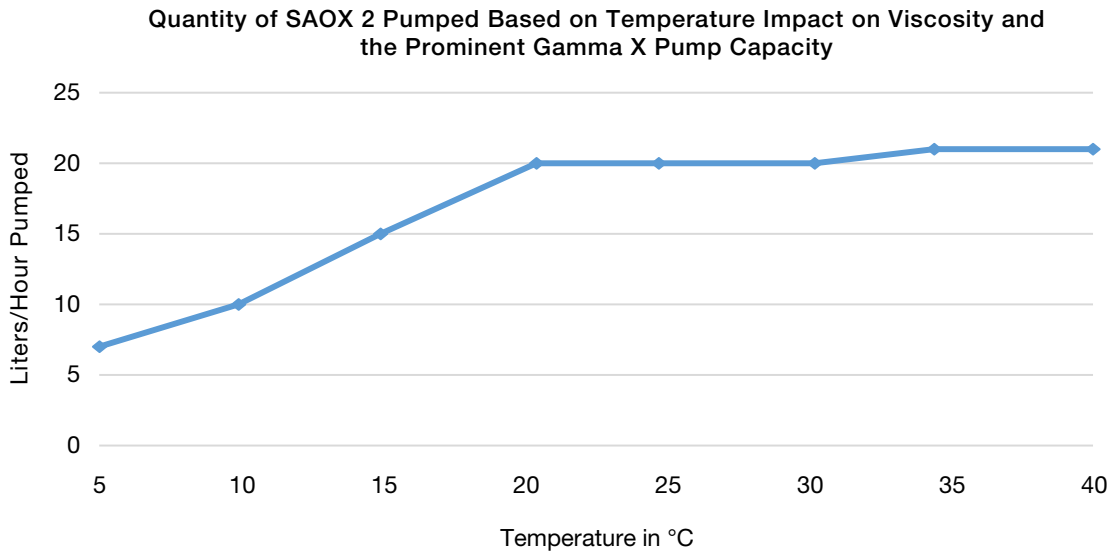

Figure 3. Impact of temperature /Viscosity on the Prominent™ Gamma/X® pump liquid Synthetic antioxidant SAOX 2 application capacity[2]


Photo: Freepik

• **Hot conditions (summer)**: Lower viscosity → pumps deliver more antioxidant → overdosing

Consequences include:

• **Winter:** Increased fat oxidation, higher peroxide values, reduced shelf life, potential product recalls

• **Summer:** Excess antioxidant levels, regulatory compliance risks, and higher treatment costs.

HOW TO SECURE THE RIGHT ANTIOXIDANT APPLICATION

Main rules to respect are good practices in term of:

1. Application and pump calibration

2. Weather anticipation

3. Liquid antioxidant temperature control

Liquid application practices

Before initial use, pump calibration should be performed at the same temperature as that of the intended liquid application. It is essential to record the liquid temperature and document it in the calibration report. Whenever there is a change in temperature, recalibrate the pump accordingly. Regularly monitor antioxidant consumption as per established guidelines.

Always apply liquid antioxidants at the originally specified temperature, typically within the range of 20°C to 30°C.

Weather condition changes

It is essential to maintain consistent control and monitoring of the liquid antioxidant temperature both prior to and during application. Temperature sensors are typically used in the antioxidant Intermediate Bulk Container (IBC), drum, or bidon, while certain flowmeters can also relay temperature data. All collected information can be managed via a Programmable Logic Controller (PLC) or directly through connected technologies such as Kemin sciORIAN™.[3] This system enables real-time collection of data including temperature, flow rate, quantity administered, bulk and stock levels, and pump status. Operators actively oversee temperature and application in real time. Should any issues arise, such as temperature reduction or pump failure, alert notifications are sent by email. All data is recorded to ensure full traceability.

Prior to installing a new IBC, drum, or Jerrycan, it is important to verify the temperature. As a standard procedure, allow the container to acclimate for several days near the existing antioxidant liquid. If required, gently warm the container to reach the desired temperature.

Temperature control

As mentioned above, it's crucial to maintain the right liquid antioxidant temperature in the IBC/


Photo: Freepik

Drum/Jerrycan, in the suction line and in the pump, but also up to the nozzles.

For antioxidants' temperature management, specific heated containers with temperature control or heating jackets with thermostat are used. For the last one, some internal temperature sensors are recommended to avoid overheating, especially when temperatures are increasing in spring.

Sometimes nozzles application points are located at more than 15m of the pumps. In this case, pipes can go outside the plants or in cold areas. We suggest equipping along pipes with some heating tracer for maintaining a constant temperature. Higher temperature improves the antioxidant dispersion, mixing and efficacy.

CONCLUSIONS

The application of liquid antioxidants ensures that pet food products remain safe for animals throughout their intended shelf life. Effective management of fat oxidation is increasingly important as sustainability initiatives prompt manufacturers to reduce packaging layers. These modifications may result in greater oxygen migration, potentially accelerating fat oxidation processes.

Antioxidants must be incorporated with precision at optimal dosages to ensure product shelf life and comply with the European Union's regulations on maximum permitted levels of antioxidant molecules.

As the climate continues to evolve and overall temperatures rise, we are experiencing increasingly erratic and unpredictable temperature fluctuations throughout the year. These variations can affect the dosing of liquid antioxidants. The implementation of new connected technology, equipped with comprehensive sensors and alarm systems, will assist us by anticipating changes in liquid temperature and maintaining consistent temperatures over time. While it is important to select efficient antioxidant solutions, their precise and proper application remains critical to achieving optimal results.

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[1]Kemin Nutrisurance COMM-24-26907

[2]Estimation done based on Prominent Gamma X DS and internal Viscosity data

[3]SciORIAN™ Kemin connected Technology for monitoring pump, stock and many sensors

[4]Internal Kemin viscosity data

About Frank Clement

Based in France, Frank Clement is a Principal Technical Service Manager (TSM) and the Kemin Application Solutions (KAS) Manager of Kemin Nutrisurance Europe. He coordinates EU antioxidant, preservatives, and palatability TSM team projects. During the past 11 years, he's spent a lot of time in slaughterhouses and rendering plants to evaluate the best strategy to preserve the freshness of raw materials and guarantee safe end pet food products. He has been at Kemin for 16 years, mainly focusing on antioxidation subject and especially on EU Natural Antioxidant transition. As a biochemist, he's spent more than 34 years at the pet food industry and especially on the analytical part at the beginning of his career.

NEW

VERAFYT™

VERAFYT™ Liquid

SUPPORTING OXIDATION CONTROL AND MICROBIAL STABILITY IN PET FOOD

VERAFYT™ Liquid is a high-efficiency antioxidant blend specifically developed for animal fats used in pet food. Its formula, enirched with ingredients of natural origin such as olive pulp juice, rosemary extract, and tocopherols, offers oxidation control while supporting clean-label and sustainability goals.

Thanks to its high concentration, **VERAFYT™ Liquid** helps manufacturers preserve product freshness and oxidation stability—without compromising on label expectations or processing performance.

- **Tailored for pet food**
  Liquid form, ideal for animal fats
- **Sustainable & clean-label solution**
  Enhances freshness while addressing supply chain challenges
- **A commitment to circular economy principles**
  Unlocks the potential of olive pulp juice for shelf-life stabilization, driving by-product valorization
- **Enhance microbial stability**
  Antioxidant blend enriched with ingredients of natural origin to improve kibble safety

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Balancing Taste and Acceptance: ENHANCING PET FOOD PALATABILITY

Dr. Anne Winkler
Global Product Manager Flavours & Sweeteners
Phytobiotics Futterzusatzstoffe GmbH

"The science of pet food palatability lies in balancing functionality with sensory performance. Dogs and cats rely predominantly on olfactory perception to evaluate feed, whereas humans associate quality with freshness, clean aroma, and an overall pleasant feeding environment. This creates a dual requirement: strong palatability cues for pets, paired with controlled, refined aroma for human handlers."

THE DUAL CHALLENGE OF PET FOOD DESIGN

Modern pet food development blends advanced nutrition with behavioural and sensory science. While balanced formulations based on proteins, grains and essential nutrients support health and performance, they do not automatically guarantee one decisive factor - voluntary intake driven by palatability.

To stimulate appetite and encourage consistent feeding behaviour, producers have long relied on palatability enhancers such as digests - hydrolyzed animal proteins delivering intense meaty cues that are naturally appealing to dogs and cats. Yet while these compounds strongly attract pets, their characteristic odour can be perceived as unpleasant in production environments and home feeding situations.

Today's pet owners expect food that delivers high acceptance for pets while remaining pleasant and manageable for humans. This shift is accelerating demand for a new generation of palatability solutions - technologies designed not only to drive feed intake, but also to refine and balance aroma perception.

PetArom systems operate both as palatant modulators and aroma harmonizers, optimizing sensory cues for pets while reducing human-perceived off-notes from digest-based formulations.

Designed to support high palatability with a refined aroma profile, the PetArom portfolio - including PetArom Beef P - represents the next generation of palatability enhancement: scientifically grounded, species-adapted, and developed to deliver flavour enjoyment for pets and sensory comfort for their owners.

FROM NUTRITIONAL BALANCE TO SENSORY ENJOYMENT

The science of palatability lies in balancing functionality with sensory performance. Dogs and cats rely predominantly on olfactory perception to evaluate feed, whereas humans associate quality with freshness, clean aroma, and an overall pleasant feeding environment. This creates a dual requirement:

strong palatability cues for pets, paired with controlled, refined aroma for human handlers.

PetArom Beef P was developed as a next-generation palatability enhancer to bridge this sensory gap. With a characteristic beef-and-liver profile, it boosts feed attractiveness for dogs while selectively masking off-notes commonly associated with digests or animal-based raw materials.

The result is targeted palatability optimization: enhanced voluntary intake for pets, coupled with a cleaner, more agreeable aroma profile in production and home feeding environments.

SCIENCE BEHIND THE PALATABILITY ENHANCER

At the heart of PetArom performance lies flavour chemistry and sensory physiology. Its selected amino acids and small peptides act as natural precursors that can enhance Maillard-type reactions during heat processing - pathways associated with roasted, meaty notes typically perceived in freshly cooked foods. This mechanism supports the development of aroma intensity, depth, and persistence over time.

PetArom Beef P demonstrates high thermal stability and can be incorporated at multiple stages of the production process:

- **Co-extrusion:** blended with digest or meat base and processed at 125–160 °C to support controlled browning reactions.

- **Post-extrusion coating:** dissolved in water and applied with digest to fine-tune aroma expression and masking performance.

- **Short thermal treatments:** suitable for sterilized or semi-moist formats without compromising sensory performance.

This processing flexibility allows seamless integration into both dry and wet pet food systems, ensuring consistent palatability and a refined aroma profile.

TRIAL DESIGN: PUTTING PALATABILITY TO THE TEST

To evaluate the impact of PetArom Beef P on feed acceptance, a controlled palatability study was conducted at Rancho de Pedra, a recognized companion-animal research facility in Brazil. Twenty adult dogs participated in a paired-comparison two-bowl test, where each dog had simultaneous access to two diets for 30 minutes per session.

Two key behavioural indicators were recorded:

- **Spontaneous acceptance:** relative intake of each diet.

Photo: Freepik

Table 1. Diet Overview and Experimental Definitions

Diet	Composition	Digest level	PetArom level	Purpose
Diet A	Premium dog food	0%	0 g/100 kg	Negative control
Diet B	Premium dog food + liquid digest	3%	0 g/100 kg	Positive control / benchmark
Diet C	Premium dog food + PetArom	0%	20 g/100 kg	Stand-alone PetArom effect
Diet D	Premium dog food + liquid digest + PetArom	3%	20 g/100 kg	Synergy evaluation
Diet E	Premium dog food + liquid digest + PetArom	3%	40 g/100 kg	Dose-response evaluation

Digest = hydrolyzed animal protein palatant
PetArom Beef P = targeted flavour enhancer for dogs (powder)

• **First choice:** which food the dog approached and consumed first.

This dual-criteria assessment provides a robust measure of true preference and feeding motivation.

USED DIETS FOR TRIALS

To support transparency and provide a clear overview of the test design, the diets used across all trials are summarized on Table 1.

Results: Mealtime decisions made easy

All trials were conducted using a standard two-bowl preference test in 20 adult dogs, fed once daily. Palatability was evaluated by spontaneous acceptance (intake share) and first-choice behaviour.

Baseline validation - Confirming digest as the acceptance driver

To establish the reference point, dogs received:

• **Diet A:** Premium dog food without digest
• **Diet B:** same diet with 3 % digest

As expected, digest significantly increased spontaneous intake and first-choice selection, confirming its essential role in palatability and validating the study model. Preference shifted from ~50/50 for the control diet to approximately 84/16 in favour of the digest-containing diet, clearly demonstrating digest as the primary intake driver.

Diet B served as the validated commercial benchmark for all following tests (Figure 1).

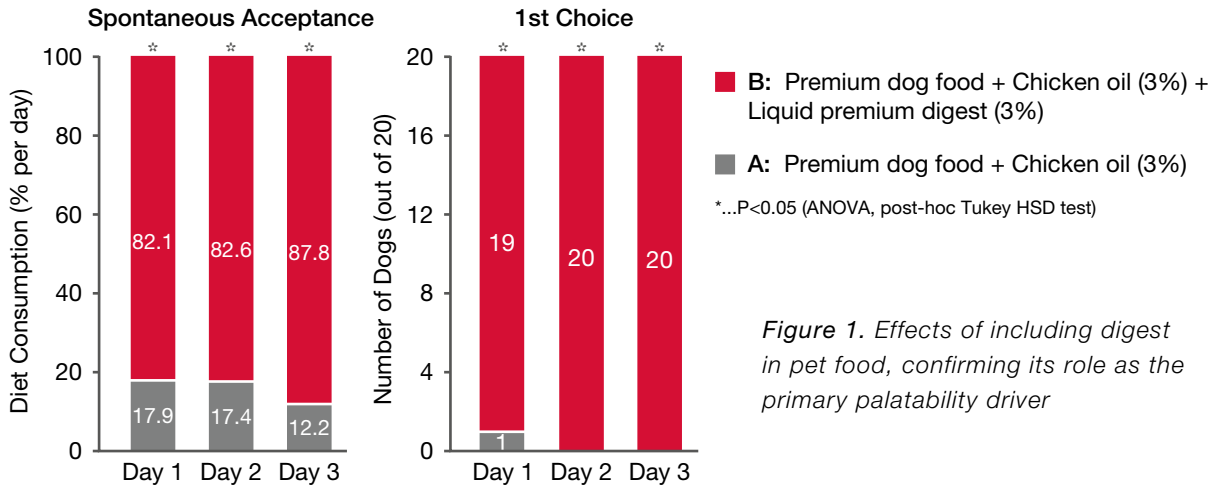


Figure 1. Effects of including digest in pet food, confirming its role as the primary palatability driver

TRIAL 1- PetArom Beef P Without Digest

To evaluate the intrinsic effect of PetArom independent of digest, dogs were offered:

- **Diet A:** Premium dog food without digest
- **Diet C:** same diet + 20 g PetArom Beef P per 100 kg feed

(both diets digest-free)

PetArom alone significantly improved palatability. Preference shifted from approximately 50/50 for the control to ~70/30 in favour of the PetArom diet, demonstrating a clear increase in spontaneous acceptance and voluntary intake.

For comparison, the positive control containing 3 % digest achieved ~84/16 versus Diet A. This indicates that, although PetArom delivers a clear palatability benefit on its own, digest, however, continues to be the major intake-driving component.

Conclusion

PetArom enhances voluntary intake on its own, but is positioned as a complement, not a replacement, to digest (Figure 2).

TRIAL 2 - Synergy: PetArom Combined With Digest

To assess the additional palatability benefit of PetArom when combined with digest, in a digest-free comparison, a standard two-bowl preference test was conducted in 20 adult dogs fed once daily. Diets offered:

- **Diet A:** Premium dog food without digest
- **Diet D:** Premium dog food with 3% digest + 20 g PetArom Beef P / 100 kg feed

Results showed that preference increased to approximately 94/6 in favour of Diet D.

For context, in the baseline validation, Diet B (base diet with 3% digest) had previously shifted preference from roughly 50/50 to ~84/16 versus the same digest-free control (Diet A).

This demonstrates that supplementing digest with PetArom provides an additional ~10-percentage-point improvement, further increasing spontaneous intake and first-choice selection beyond the effect of digest alone. By strengthening the savoury, meaty aroma profile, PetArom enhances the initial

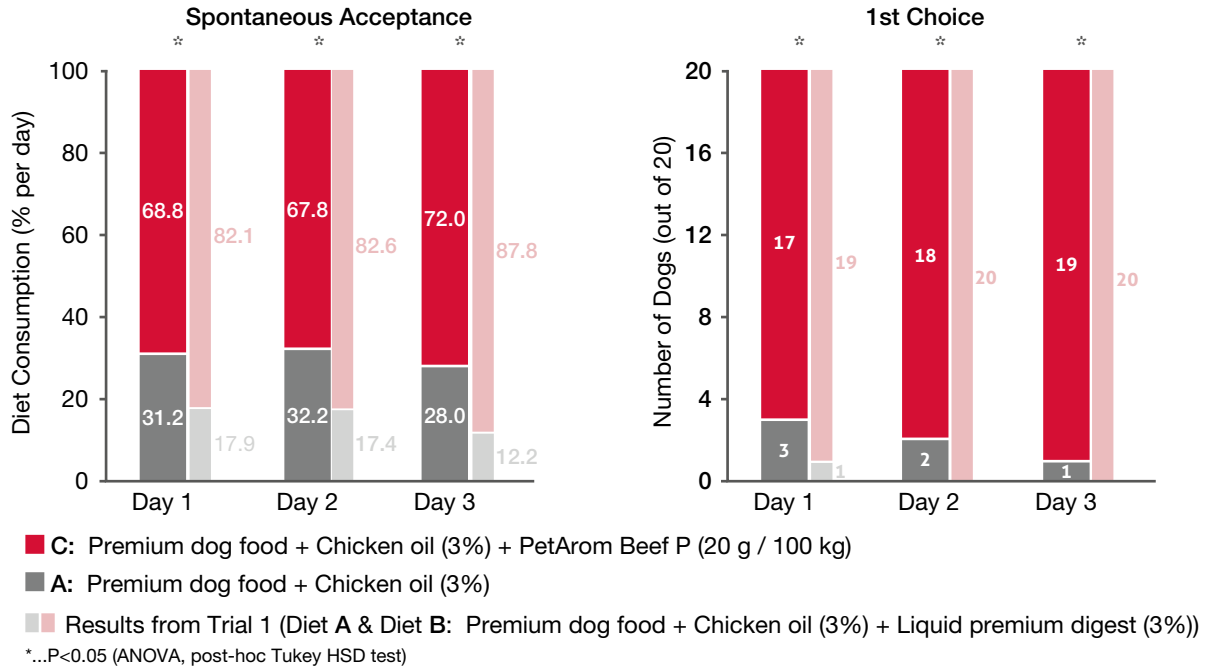


Figure 2. Effects of PetArom Beef P without digest, confirming that it enhances palatability but does not replace digest as the primary driver of food intake

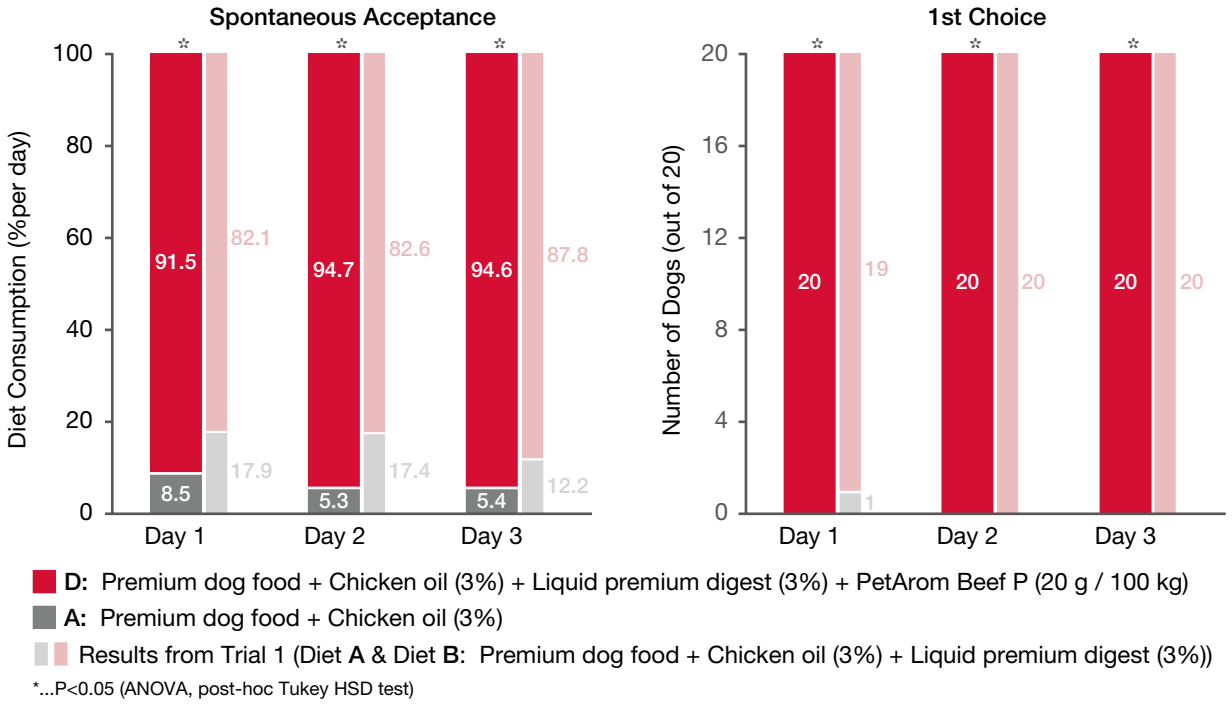


Figure 3. Effects of combining PetArom Beef P with digest, demonstrating a synergistic palatability boost beyond the effect of digest alone

sensory appeal of the diet and reinforces the intake-driving effect of digest.

Conclusion

PetArom amplifies digest performance, delivering ~10 percentage points of additional synergy (Figure 3).

TRIAL 3 - PetArom Enhances Digest-Based Diets

After confirming that digest serves as a key driver of palatability, PetArom was evaluated on top of a standard digest-based diet (Diet B), reflecting a typical commercial formulation. Diets offered:

- **Diet B:** Premium dog food with 3% digest
- **Diet D:** same diet + 20 g PetArom Beef P per 100 kg feed

When PetArom was incorporated into the digest-containing diet, dogs showed a clear preference for the enhanced formulation, shifting selection to approximately 66/34 in favour of Diet D.

This demonstrates a meaningful sensory uplift even in a premium digest-based matrix, confirming true synergy rather than redundancy.

Conclusion

PetArom significantly enhances the palatability of digest-based diets, elevating sensory appeal without requiring formulation changes.

This provides a valuable differentiation opportunity for pet food manufacturers — enabling premium positioning and a more engaging eating experience through a simple, low-dose enhancement (Figure 4).

TRIAL 4 – Dose Response: Confirming The Optimal Inclusion Level

To evaluate whether a higher inclusion level of PetArom Beef P could further enhance palatability, an additional comparison was conducted within the same trial:

- **Diet B:** Premium dog food with 3% digest
- **Diet E:** same diet + 40 g PetArom Beef P per 100 kg feed

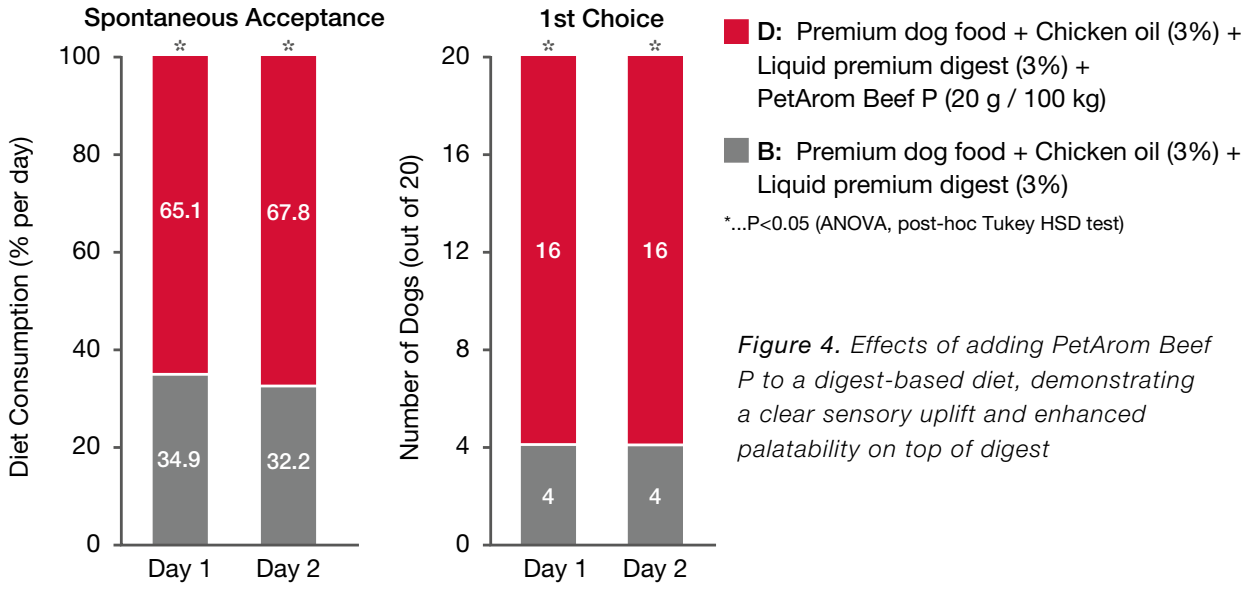


Figure 4. Effects of adding PetArom Beef P to a digest-based diet, demonstrating a clear sensory uplift and enhanced palatability on top of digest

Dogs showed a preference improvement with the higher dose, but the increase was modest — approximately 5 percentage points above the standard inclusion level.

This indicates that the regular dose already provides strong and meaningful palatability benefits, and that doubling the inclusion rate leads only to marginal additional gains under the conditions of this specific study. Effects may vary in different trials or feeding environments.

Conclusion

20 g/100 kg remains the optimal, cost-effective inclusion rate, as higher doses provide only marginal additional benefits (Figure 5).

CONCLUSION AND OUTLOOK

The study clearly demonstrates that PetArom Beef P delivers consistent and meaningful improvements in palatability — both as a standalone solution and through pronounced synergy with digest. By enhancing aroma depth for dogs while refining

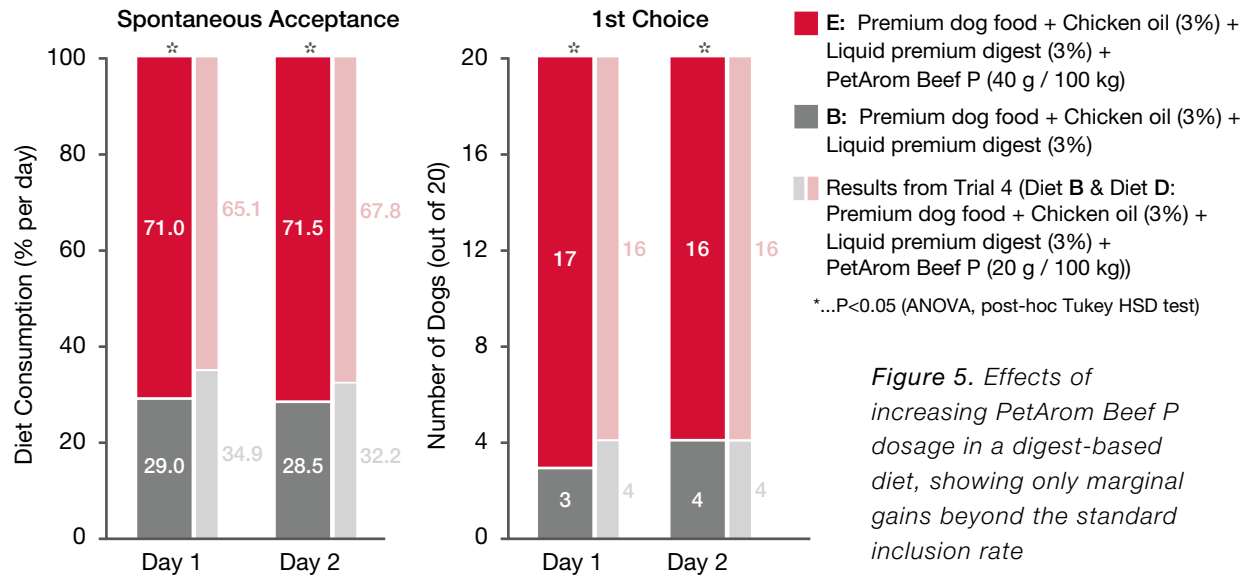


Figure 5. Effects of increasing PetArom Beef P dosage in a digest-based diet, showing only marginal gains beyond the standard inclusion rate

the sensory profile perceived by humans, PetArom meets the dual expectations shaping today's premium pet food market.

For dogs, PetArom Beef P enriches the feeding experience, stimulating enthusiasm, appetite, and overall enjoyment. For pet owners, its cleaner, more balanced aroma profile contributes to a noticeably more pleasant and hygienic mealtime environment.

For manufacturers, these benefits translate into real strategic value: improved product acceptance, strengthened premium positioning, and the ability to differentiate through sensory experience without formulation complexity. In addition, the technology supports more efficient, flexible use of digest - helping deliver both cost and sustainability advantages in a competitive industry landscape.

Palatability remains the decisive factor not only for voluntary intake, but also for long-term consumer loyalty and brand preference. PetArom Beef P illustrates how targeted flavour science can elevate pet food from nutritionally complete to genuinely irresistible - bridging nutrition, behaviour, and sensory design.

In essence, PetArom transforms balanced diets into rewarding eating experiences — a tangible benefit for pets, pet owners, and manufacturers alike.

About Dr. Anne Winkler

After obtaining a Diploma in Agricultural Science, Dr. Anne Winkler pursued a Master's degree in Agricultural Science and Environmental Protection at the University of Applied Sciences in Bingen. In 2018, she earned a PhD in Agricultural Science from Martin-Luther-University Halle-Wittenberg. With her strong scientific background, Dr. Winkler now brings her expertise to her role as the Global Product Manager for Flavours & Sweeteners at Phytobiotics.

INTESTINAL MICROBIOTA: **KEY TO DOG AND CAT WELLBEING**

Alessandro Gramenzi
Associate Professor of Animal Nutrition
Department of Veterinary Medicine, University of Teramo

The intestinal microbiota plays a crucial role in the overall health of dogs and cats. Learn how managing dysbiosis and targeted nutritional strategies, including multi-strain probiotics, can support digestive and immune wellbeing in pets of all ages.

THE ROLE OF INTESTINAL MICROBIOTA IN PETS

The intestinal microbiota is a complex ecosystem within the digestive tract of dogs and cats. It consists of billions of beneficial bacteria that work together to maintain health. These microbes do much more than aid digestion. They play a vital role in developing and modulating local and systemic immune responses. The gut microbiota acts as a protective barrier against pathogens. It produces essential nutrients and metabolites that support intestinal cells. It also communicates with the immune system to maintain balance and tolerance. An imbalance in this delicate ecosystem, known as dysbiosis, can have serious consequences. It can lead to digestive disorders such as diarrhea, constipation, and inflammatory bowel conditions. Beyond the gut, dysbiosis is linked to systemic issues including allergies, dermatitis, and even behavioural changes in pets.

UNDERSTANDING DYSBIOSIS: CAUSES AND CONSEQUENCES

Dysbiosis is increasingly common in companion animals. Several factors can trigger this microbial imbalance:

- **Unbalanced diets:** Low-quality commercial feeds or nutritionally incomplete home-prepared diets,
- **Prolonged antibiotic treatments:** While necessary for treating infections, antibiotics can disrupt beneficial bacteria,
- **Prebiotic fibre deficiencies:** Lack of fermentable fibres reduces beneficial bacterial growth,
- **Stress and environmental changes:** Moving homes, travel, or changes in routine,
- **Age-related changes:** Young puppies and kittens, as well as senior pets, are more vulnerable.

Clinically, dysbiosis often manifests subtly. Symptoms may include intermittent digestive upset, dull coat, skin problems, or reduced vitality. This makes early detection and intervention challenging. Left unaddressed, chronic dysbiosis can compromise immune function and overall quality of life.

RESTORING BALANCE: NUTRITIONAL APPROACHES TO EUBIOSIS

Combating dysbiosis requires comprehensive strategies that restore eubiosis—an optimal microbial balance. Nutritional interventions are fundamental to this approach. Probiotics play a key role in re-establishing healthy gut flora. Probiotics are

live microorganisms that, when administered in adequate amounts, confer health benefits to the host. They work through multiple mechanisms:

- Competitive exclusion of pathogenic bacteria,
- Production of antimicrobial substances,
- Strengthening the intestinal barrier,
- Modulating immune responses,
- Producing beneficial metabolites like short-chain fatty acids.

THE POWER OF MULTI-STRAIN PROBIOTICS

Multi-strain probiotic formulations offer significant advantages over single-strain products. By including selected bacterial species with complementary functions, these formulations broaden the therapeutic spectrum. Different strains target different aspects of gut health. Some excel at inhibiting pathogens. Others promote protective metabolite synthesis. Still others specialize in boosting immune defences or reducing inflammation. This synergistic approach provides more comprehensive support. It addresses multiple aspects of dysbiosis simultaneously. It also increases the likelihood that beneficial strains will successfully colonize the gut environment.

Photo: Freepik

WHEN TO RECOMMEND PROBIOTICS FOR PETS

Probiotics are particularly beneficial in several clinical and nutritional contexts:

- **After antibiotic therapies:** Antibiotics disrupt the microbiota balance. Probiotic supplementation helps restore beneficial bacteria more quickly.

- **During recurrent digestive issues:** Chronic diarrhea, soft stools, or intermittent vomiting often signal dysbiosis requiring microbial support.

- **For dietary transitions:** Changing from one food to another, or introducing home-prepared diets, stresses the gut microbiota. Probiotics ease this transition.

- **As immune support:** In allergies, dermatitis, or inflammatory conditions, probiotics help modulate immune responses through the gut-immune axis.
- **For behavioural disturbances:** The gut-brain axis means intestinal health influences behaviour. Probiotics may support animals with anxiety or stress-related behaviours.

- **During stressful periods:** Travel, boarding, veterinary visits, or environmental changes can trigger dysbiosis. Preventive probiotic use helps maintain balance.

SPOTLIGHT ON *LIMOSILACTOBACILLUS REUTERI*

Among probiotic species, *Limosilactobacillus reuteri* has demonstrated particular promise for companion animals. This bacterium contributes to maintaining and restoring balanced intestinal microbiota.

L. reuteri is part of the complex gut ecosystem responsible for fermenting undigested food residues. It produces beneficial short-chain fatty acids that nourish intestinal epithelial cells. It also actively inhibits pathogenic bacteria through multiple mechanisms. From early life, *L. reuteri* supports gut immune response by influencing intestinal lymphoid tissue functions. This early colonization helps establish proper immune tolerance and reduces susceptibility to inflammatory conditions.


Photo: Freepik

When dysbiosis occurs and harmful bacteria dominate, *L. reuteri* helps counteract the imbalance through:

- **Pathogen inhibition:** Preventing growth of inflammation-promoting bacteria
- **Anti-inflammatory support:** Promoting production of anti-inflammatory cytokines and metabolites
- **Barrier enhancement:** Strengthening the intestinal lining function
- **Immune modulation:** Restoring local immune tolerance and appropriate responses

In practical applications, *L. reuteri* contributes to improved gut health, reduced digestive functional disorders, and prevention of dysbiosis-related complications. These can include systemic effects like allergies, dermatitis, or behavioural problems. Its role is considered crucial in nutritional strategies aimed at rebalancing gut flora and supporting overall wellbeing.

CONCLUSION: A FOUNDATION FOR LONG-TERM HEALTH

Intestinal wellbeing is fundamental to the overall health of dogs and cats. The microbiota influences not just digestion, but immune function, skin health, behaviour, and overall vitality. Evidence-based nutraceutical strategies that support gut health provide lasting benefits. Modern multi-strain probiotic formulations offer targeted support backed by scientific research. Innovations in strain selection, ease of administration, and formulation adaptability make these products valuable tools. For professionals in animal nutrition and pet owners alike, prioritizing gut health through strategic probiotic use represents a proactive approach to companion animal care. Products like Reuteral Pet demonstrate how scientific advancement translates into practical daily support for pet wellbeing.

About Alessandro Gramenzi

As an Associate Professor of Animal Nutrition at the Department of Veterinary Medicine, University of Teramo, Italy, Alessandro Gramenzi's research focuses on pet nutrition and nutraceutical innovation for dog and cat wellbeing. He specializes in dietary management of companion animals, with particular emphasis on how feed additives and probiotics affect intestinal microbiota and overall health.

NUCLEOTIDES GAIN INCREASED ATTENTION IN FUNCTIONAL PET NUTRITION

Tonje Elisabeth Dominguez
Director Specialty Animal Nutrition Products
Aker Qrill Company

Once considered non-essential, nucleotides are increasingly recognized for their impact on growth, vitality, and stress adaptation. Growing research highlights their role in supporting immune health, recovery, and cellular resilience in cats and dogs.

As the pet food industry continues to embrace functional ingredients and evidence-based nutrition, nucleotides have entered the spotlight. Once thought of as minor cellular components, these small yet powerful molecules are gaining recognition for the role they play in immune resilience, growth, and recovery in cats and dogs.

WHY NUCLEOTIDES MATTER FOR PET DIETS

Nucleotides are the structural units of DNA and RNA – the very molecules that carry genetic information and enable every process of life. They also serve as energy carriers through adenosine triphosphate (ATP) and contribute to cell signaling and enzyme function. Essentially, they are vital for cell division, protein synthesis, and tissue repair.

While cats and dogs produce nucleotides naturally, their ability to do so is limited under certain physiological conditions. Periods of growth, reproduction, illness, stress, or intense activity increase the body's demand for rapid cell renewal and immune function – situations where the body's own production may fall short. This is why researchers are increasingly referring to nucleotides as 'conditionally essential nutrients' for pets, especially during times of metabolic or immune stress.

MEETING HIGHER DEMANDS

Building on this understanding, growing evidence from studies in cats and broader animal nutrition suggests that dietary nucleotides can support immune response, intestinal integrity, and overall vitality in pets. Supplementation with nucleotides has been linked to improved antibody production and better resilience following stress or infection. As pets live longer and lead more active lives, these benefits are becoming increasingly relevant for maintaining immune balance, energy metabolism, and recovery.

A 2013 study published in *Veterinary Immunology and Immunopathology* showed that dietary nucleotide supplementation enhances the immune response in cats, suggesting a direct link between nucleotide intake and disease resistance. Similar effects have been observed in other animals, which also reinforces the importance of dietary sources at times of intense growth, activity, or recovery.

HOW NUCLEOTIDES WORK IN THE BODY

Nucleotides support some of the body's most energy-intensive and renewal-driven processes. Their role in immune function is among the most critical, as the rapid production of immune cells depends on a steady supply of nucleotides. During infection, inflammation, or stress, these cells divide and differentiate at a higher rate, and external sources of nucleotides may help sustain immune responsiveness and recovery.

They are also vital for tissue repair and maintenance. Cells of the intestinal lining, the immune system, and red blood cells have short lifespans and require constant renewal. A sufficient supply of nucleotides supports this regeneration, helping maintain gut integrity, immune readiness, and efficient oxygen transport throughout the body.

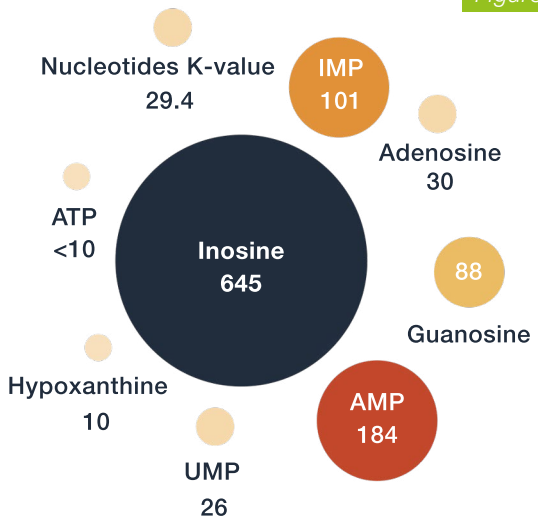
When it comes to metabolism, nucleotides fuel the conversion of nutrients into usable energy. This energy supports muscle contraction, organ performance, and the body's day-to-day performance. During periods of stress, like illness, travel, reproduction, or environmental changes, pets tend to experience elevated cellular turnover and energy demand. Supplementation may help the body stay balanced and support better recovery during times of stress.

DIETARY SOURCES AND FORMULATION OPPORTUNITIES

While commercial pet foods contain some naturally occurring nucleotides, mainly from meat and organ ingredients, the levels may not be sufficient to meet increased physiological demands. Due to this, formulators are exploring dietary nucleotide supplementation as part of functional and therapeutic diets.

High-quality nucleotide sources can be derived from yeast extracts, certain fish meals, and marine ingredients such as krill meal (Figure 1). There is growing interest in marine-derived nucleotide sources, resulting in studies that explore bioavailability and potential synergy with other nutrients, such as omega-3 fatty acids, choline, and astaxanthin, which are key components associated with cellular health and anti-inflammatory effects.

Figure 1



Nucleotides present in QRILL Pet meal

Numbers given in mg/kg

Dietary nucleotides have particular relevance in formulations designed for life stages or conditions in which cellular turnover and immune activity are heightened. Growing puppies and kittens, for example, benefit from an additional supply to support rapid tissue development and immune maturation. Working and athletic dogs may also require higher nucleotide levels to sustain energy metabolism and muscle recovery during periods of intense physical activity.

In older pets, reduced metabolic efficiency and slower regenerative capacity can make supplemental nucleotides useful for maintaining immune balance and well-being. Animals recovering from surgery, illness, or stress may also respond well to diets enriched with nucleotide sources to help restore cell function and overall resilience. For stress-prone or immune-compromised pets, these formulations offer a way to help stabilize the body's natural defense systems and promote long-term health.

THE ROAD AHEAD

As the pet food industry becomes increasingly shaped by science and sustainability, interest in functional ingredients like nucleotides will continue to grow. Across the sector, there is a growing focus on balancing efficacy, palatability, and natural sourcing with consumers' expectations for ev-

idence-based nutrition. At the same time, advances in precision nutrition are allowing formulators to tailor nucleotide inclusion to specific life stages, breeds, or health conditions, opening the door to more targeted and responsive feeds.

Sustainability remains a central driver of innovation in pet food. Researchers are exploring renewable marine ecosystems as potential sources of naturally occurring nucleotides, helping to build supply chains that are both traceable and responsibly managed. Together, these developments point to a future in which nucleotides play a key role in holistic, science-based formulations designed to support long-term health and resilience in pets.

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About Tonje Elisabeth Dominguez

As Aker Qrill Company's Director of Speciality Animal Nutrition Products, Tonje Elisabeth Dominguez works with companion animal nutrition. Earlier in her career, she worked at Nordic supplements company Orkla Health for six years, first as a scientific advisor and later as R&D Manager. Furthermore, she has held various technical and nutritional roles in Hill`s Pet Nutrition EMEA for 13 years.

She holds a master's degree from the Norwegian University of Life Sciences and has frequently been an invited lecturer at the Norwegian School of Veterinary Science

THE POWER OF FABA BEAN INGREDIENTS TO DRIVE PET FOOD PURCHASING

Dr. Maygane Ronsmans
Product Manager Animal Nutrition
BENEO

Pet owners are increasingly concerned about the environmental impact of pet foods but are not willing to compromise on nutritional quality. With ingredient choice being an important purchasing driver, opportunities for faba bean ingredients in pet formulations are being explored to enhance nutritional, technical, and sustainability credentials.

In recent years there has been a groundswell of consumers driving change in pet food recipe formulation. When it comes to their purchasing choices, many are going 'back to basics' regarding the ingredients in their pets' meals. The majority consider the quality of ingredients (71%) and the nutritional value (72%) a very important factor in their purchasing choices.[i] Also, more than 1 in 3 cat and dog owners buy natural pet food products when looking for pet food for specific needs.[ii]

Because of this, focusing on recipe composition and ingredient choice has never been more important for pet food producers and is essential to drive sales. Consumers are also continuing to demand more when it comes to the sustainability of the pet foods they purchase. Around 7 in 10 pet owners expect pet food brands to actively reduce their environmental impact.[iii]

PLANT-BASED PROTEIN POPULARITY

To tick the sustainability and ingredient integrity boxes, whilst also meeting pet owner demands for nutritious and balanced recipes, more pet food manufacturers are turning to plant-based sources for their cat and dog food formulations. With two in three pet owners now considering plant-based proteins to be better for the environment[iv], natural and high-quality vegetal proteins with sustainable credentials are a valuable resource for manufacturers.

Producers can use either plant-based protein isolates or concentrates to deliver added protein and other benefits in their finished products. Most isolates are produced through wet processing which enables a protein content of over 80%. However, they undergo extensive processing which requires more energy, water, and processing chemicals compared to concentrates, which also increases their cost and limits the opportunity for use in pet food recipes. Protein concentrates typically contain 60-80% protein but they also retain more of the original plant's fibre, starches and micronutrients, offering interesting technical advantages.

As demand for plant-based, sustainable and clean label pet food gathers pace, faba beans are an interesting alternative for pet food producers looking to expand their vegetal ingredient portfolio and also for those wanting to make 'no grain'

claims in their pet foods. This crop is popular with cat and dog owners too, reaching similar appeal as more widely used crops like wheat, barley and soy. In fact, 49% of pet owners strongly associate faba beans with being natural and 45% with being sustainable.[v] In addition, faba beans provide a range of technical and nutritional benefits in cat and dog foods that make them an attractive alternative to animal-derived or other plant-based ingredients such as those made from pea.

SUSTAINABLE SUCCESS WITH FABA BEANS

When it comes to sustainability, faba beans help to reduce greenhouse gas emissions at farm level. The faba beans can capture nitrogen from the air, to provide it for themselves and subsequent plants, which reduces the need for fertilizer input and improves soil quality. They are a resilient crop that has significantly lower carbon emissions than animal protein and can be grown easily in the northern hemisphere. BENEO's faba beans are grown in Germany, in proximity to the production plant, and are REDCert^2 certified, which is equivalent to the Farm Sustainability Assessment (FSA) from SAI at the highest "Gold" level.

Localised transportation costs, the fact that no water is used during production, the low energy input needed compared to wet processes and no requirement for chemicals or processing aids add up to a more sustainable process that also delivers lower production costs. The result is a better and more stable cost to protein ratio for producers than some animal-based ingredients or vegetal isolates, for instance. Also, the long-term contracts with local farmers ensure production and supply chain resilience for both BENEO and pet food producers using the company's faba bean protein, starch and fibre ingredients.

Together with an external partner, BENEO also conducted a Life Cycle Assessment (LCA) for its faba bean ingredients. The comparison of BENEO's LCA results with animal protein like fishmeal and competitive vegetal protein ingredients like soy or pea concentrate showed that faba bean protein concentrate gains a competitive edge through low climate change impact.

THE NUTRITIONAL AND TECHNICAL POWER OF FABA BEANS

Faba beans are a concentrated source of vegetal protein and starch which offer producers a good alternative to animal and soy proteins when creating plant-based or hybrid pet foods. BENEO's faba bean protein concentrate provides pet owners with a non-GMO, clean label source of high-quality vegetal protein. It contains a minimum of 60% protein on dry matter and offers (ileal) digestibility scores close to 90%.

Containing quite high levels of glutamine, which supports the growth of intestinal cells, as well as arginine, which is considered to be important for cognitive health, faba bean protein concentrate


Photo: Dennis Möbus/Südzucker

presents a good essential amino acid profile. As it is also relatively rich in lysine, it can be combined with cereal proteins to achieve a complete essential amino acid profile. Alongside the concentrate, BENEO's faba bean range includes a starch-rich flour with a typical 57% starch and minimum 21% protein content on dry matter. In addition, the faba bean hulls are a dietary fibre source for pet food recipe formulations.

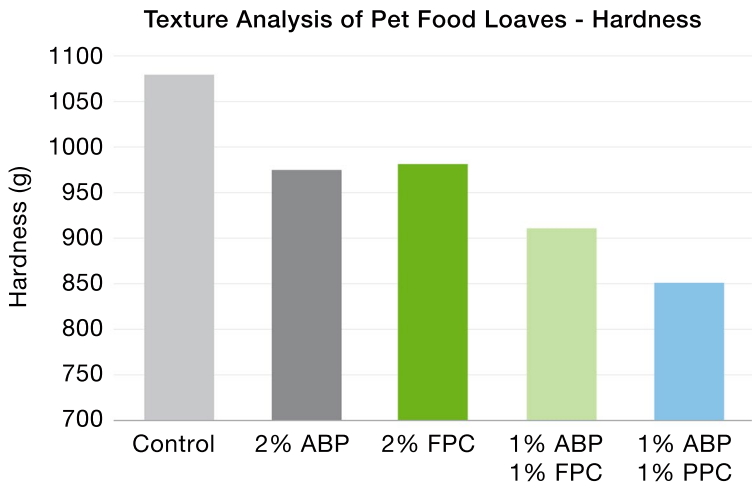
DELIVERING COST SAVINGS IN WET PET FOOD WITH FABA BEANS

Wet pet food benefits from strong consumer appeal as it is often marketed as a more gourmet or healthy option. This positive perception is driving demand amongst pet owners, with a compound annual growth rate (CAGR) of 15.6% between 2024 and 2029 predicted in terms of value.[vi] Plant-based proteins such as those made from faba beans have a key role to play in wet pet food recipe formulation – especially with almost half of cat and dog owners being interested in seeing more plant-based proteins used in wet food like cans or pouches.[vii] A case in point is the use of BENEO's faba bean protein concentrate as an alternative to spray-dried animal blood plasma (ABP).

ABP is commonly used in super-premium and premium wet pet foods to deliver emulsifying and texturising benefits, however these advantages come at a relatively high cost. BENEO's faba bean protein concentrate can either fully or partially replace ABP as a binder and emulsifier in pet food loaves (pâtés) and chunks-in-gravy, with cost saving potential of up to 47%.[viii]

Passion4Food, a specialist service provider for the pet food industry, conducted technical trials in pet food loaves using a high protein test recipe and then a commercially scalable one, in which 50% and 100% of the ABP content were replaced with BENEO's faba bean protein concentrate. The tests showed that partial or total replacement of ABP did not result in any significant changes in the loaves height or weight and led to a comparable texture to the control loaves containing 100% ABP. In the trial, BENEO's faba bean protein concentrate (FPC) was also benchmarked against pea protein concentrate (PPC), and a test recipe involving the partial (50%) replacement of ABP with PPC was also included. The results showed that the faba bean protein had higher binding capacities in the pet food loaf than the pea protein (Figure 1).

Figure 1



ABP = Animal Blood Plasma
FPC = BENEO's Faba Bean Protein Concentrate
PPC = Pea Protein Concentrate
Control: Reference recipe without ABP/FPC/PPC

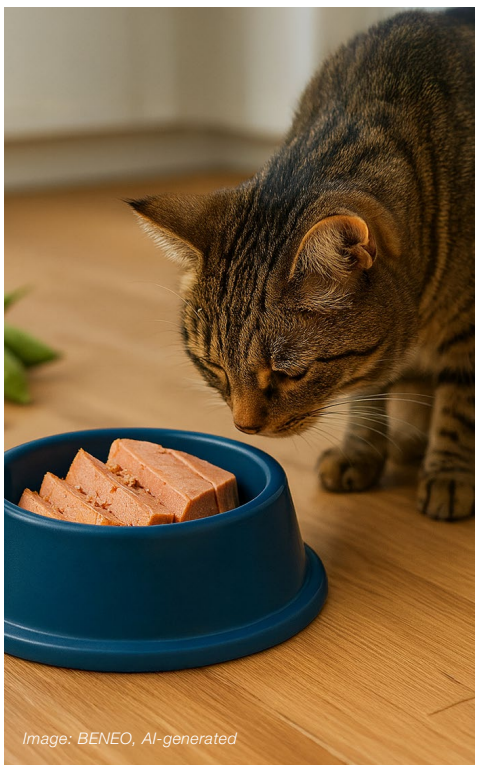


Image: BENEO, AI-generated

Testing on chunks-in-gravy products showed that chunks made with faba bean protein concentrate had a spongier structure and better holding capacity than those made with ABP thanks to the higher starch content of the vegetal protein. It was concluded that replacing at least 25% of the ABP in chunks-in-gravy recipes was possible with no significant impact on the appearance or quality of the chunks. Based on these successful trials, BENEO filed an international patent application for its faba bean protein concentrate as an alternative to spray dried animal blood plasma (ABP) in wet pet food, which was published in August 2025.

To assess the environmental impact of replacing ABP with BENEO's faba bean protein concentrate, LCA calculations[1] for the loaves test recipes were done, in particular for the climate change category, comparing their CO_2 emission equivalents.[2] The results demonstrate that when fully replacing ABP, BENEO's ingredient leads to a 6.3% reduction in emissions. Enabling to combine cost and sustainability benefits, this plant-based protein ingredient delivers interesting potential for wet pet food producers.

NEW SOLUTION FOR DRY PET FOODS WITH FABA BEAN STARCH

As well as supporting the latest trends in wet pet food, the faba bean is a great ingredient for pet food producers looking to capitalise on the continued popularity of dry pet food. In fact, 89% of pet owners say to have purchased dry pet food in the past three months and more than half would be interested in seeing more plant-based proteins being used in this type of pet food.[ix] Thanks to its convenience and cost, the global market for it is predicted to reach a sizeable USD 34.63 billion by the end of 2030.[x]

This is good news for pet food producers of dry products, who benefit significantly from the high production capacity of extruded food, which can be achieved at relatively low costs. Traditionally, dry pet food for cats and dogs comprises specific amounts of nutrients such as protein, fat, minerals, and vitamins, with these accounting for 40-50% of the total formula. To complete the formula, neutral fillers are used. While these fillers are not nutritionally essential, they can enhance the nutritional profile of the product and can provide technological properties.

Carbohydrates, particularly starch-rich raw materials, are commonly used as fillers because cooked starch provides digestible energy. The choice of starch will affect both the technical properties of the dry pet food and its production process. Traditional starches include grains like wheat, corn and barley, however grain-free pet foods are on the increase as pet owners perceive them as healthier. The most common starch sources in these products are potatoes, sweet potatoes, peas, and tapioca. BENEO's faba bean starch-rich flour is a legume starch alternative that can be used in non-grain dry extruded products.

Until recently its performance in dry pet food wasn't measured. However, thanks to technical trials conducted by Passion4Food with air-classified faba bean starch, it has been shown that it is suitable as an alternative to pea starch in dry pet food kibbles. BENEO's faba bean starch-rich flour was used as a partial and full pea starch replacement in non-grain recipes, leading to no significant differences in energy consumption during processing. The trials showed that full replacement of pea starch, with up to 20% inclusion of faba bean starch-rich flour, is possible without significant changes in kibble quality. Higher inclusion of 35% faba bean starch-rich flour led to considerably increased expansion, improved pore structure and enhanced oil absorption capacity.

As cats have been shown to like more expanded and crunchy kibbles, the results of higher inclusion are particularly interesting for cat food producers. Therefore, though technically more challenging, inclusion of faba bean starch-rich flour up to 35% is possible in cat food or in high fat diets where the pore structure and oil absorption capacity can benefit the final product. The trials give pet food manufacturers another vegetal starch option for their dry pet food ingredient toolbox. At the same time, LCA calculations revealed that a 20% inclusion of faba bean starch-rich flour as replacement of pea starch in the trial recipe leads to a decrease in CO_2 emission equivalent of approximately 30%.[3]


Photo: Dennis Möbus/Südzucker

A further technical trial in cereal diets has also shown that BENEO's faba bean starch-rich flour can be effectively used in cereal-based kibbles to enhance expansion and significantly increase elasticity. Addition of 5% faba bean starch slightly influenced the textural properties of the kibbles, reducing hardness and increasing elasticity, which could be beneficial in certain applications such as dental snacks, as it may prolong chew time.

Faba bean ingredients offer pet food producers a winning scenario in terms of their sustainability, supply chain stability, technical and nutritional credentials. Thanks to the work done by animal nutrition experts at BENEO and the collaboration with Passion4Food, pet food producers now have even more ways to meet end customer demands for healthy, nutritious and more sustainable recipes.

Footnotes

[1]Carbon footprint values are indicative and based on BENEO ingredient assessments and secondary databases (Agribalyse, Ecoinvent). Data are provided in good faith but without warranty. Users should verify suitability for their purposes and ensure compliance with applicable legislation before communication

[2]CO_2 equivalent is a metric measure used to compare the emissions from various greenhouse gases based on their global warming potential

[3]Carbon footprint values are indicative and based on BENEO ingredient assessments and secondary databases (Agribalyse, Ecoinvent). Data are provided in good faith but without warranty. Users should verify suitability for their purposes and ensure compliance with applicable legislation before communication.

References

[i]BENEO Consumer Research on Pet Care 2025. FMCG Gurus conducted a quantitative online survey with 2.500 pet owners in the US, Brazil, UK, Germany, and China (250 cat and 250 dog owners per country)

[ii]BENEO Consumer Research on Pet Care 2025, N = 2.500

[iii]BENEO Consumer Research on Pet Care 2025, N = 2.500

[iv]BENEO Consumer Research on Pet Care 2025, N = 2.500

[v]BENEO Consumer Research on Pet Care 2025, N = 2.500

[vi]Global Data; CAGR was calculated based on value in million euro

[vii]BENEO Consumer Research on Pet Care 2025, N = 2.500

[viii]This is based on an indicative annual consumption of 50 metric tonnes of ABP

[ix]BENEO Consumer Research on Pet Care 2025, N = 2.500

[x]Dry Pet Food Market Size (2025 – 2030) Virtuemarketresearch.com

About Dr. Maygane Ronsmans

With a degree in Veterinary Medicine Dr. Maygane Ronsmans also has a PhD in Veterinary Sciences. After working for a few years at an international biotech company, she joined the BENEO Animal Nutrition Department in 2019 as Product Manager. In this role she is responsible for offering technical support regarding BENEO's products and co-products for customers and colleagues in animal nutrition markets worldwide. BENEO is active in Petfood, Aquafeed and Livestock Nutrition markets.

POSTBIOTICS: THE NEXT GENERATION OF PET GUT HEALTH SUPPORT

Dr. Francesca Susca
Global Category Manager
Lallemand Animal Nutrition

Your pet's gut is home to trillions of microorganisms working behind the scenes to support digestion, immunity, and overall well-being. Scientists have discovered that postbiotic bacteria —non-viable bacterial cells that retain their structure and functional properties— can help maintain this internal ecosystem, especially during stressful events like antibiotic treatment or dietary changes. Here's what the latest research reveals about these shelf-stable, science-backed ingredients for pet gut health.

The next time you look at your dog, your cat, or even yourself in a mirror, think of this: each of us is currently hosting trillions of microorganisms. This inner world, called the microbiome, is a complex collection made up mostly of bacteria, but also includes viruses, fungi and other microbes. For the most part, we coexist harmoniously with this second internal world. Most of our microbiome lives in our gut, where it performs a variety of functions like helping us digest food, producing vitamins and neurotransmitters, supporting our immune systems, and even influencing our moods. As science continues to explore the gut microbiome, we learn more about its significant impact on our physical and mental health.

If a balanced gut microbiome helps keep us healthy, it is important to remember that what we (and our pets) eat impacts the ability of our microbiome to do its job.

FEEDING THE "GOOD GUYS": PREBIOTICS AND PROBIOTICS

Nutritionists recommend a high-fiber diet for many reasons, but for the microbiome the crucial one is the introduction of prebiotics. Prebiotics fuel the beneficial bacteria in our gut, helping them thrive. When they do, they support our overall health from the inside out.

Another aspect of our gut microbiome is the balance of "good" and "bad" bacteria. This balance can be disrupted by many factors, including dietary changes, stress, infections, and antibiotics. When disrupted, the imbalance can cause acute or chronic diarrhea, vomiting, or loss of appetite, ultimately impairing digestion and nutrient absorption.

Probiotics are live bacteria and yeasts that can help restore the healthy balance of bacteria and digestion. Probiotics have additional complex benefits. Current understanding of their properties includes providing immune support by helping stimulate the immune system, outcompeting "bad" bacteria, and initiating host-microbiome crosstalk that can have a positive impact on the intestinal barrier.

POSTBIOTICS: PRESERVING THE BENEFITS, ENHANCING THE PRACTICALITY

The introduction of live probiotic organisms has been shown to be beneficial for some medical conditions. However, working with live organisms presents practical challenges, including stringent regulatory requirements and maintaining viability throughout the production, storage, and distribution process.

Recent research set out to investigate if the benefits of probiotics could be obtained without those risks, by using heat treatment to inactivate bacteria and yeast, and then evaluating if the remaining components could be beneficial without harm to the host. These inactivated microbial fractions are called postbiotics. The researchers theorized that selected bacteria strains, made non-viable before administration, could be valuable functional ingredients to enhance pet food and pet supplement products.

Lallemand's researchers selected three strains of bacteria based on their known immunomodulatory properties: *Lactobacillus helveticus* HA-122, *L. paracasei* HA-108 and *L. plantarum* HA-119. They then used a strain-specific, gentle, heat-treatment process that:

- enabled preservation of the cell membrane and cell structure of the bacteria strains while inhibiting their capacity to replicate, and
- ensured the production of microbiologically non-viable, shelf-stable, yet functionally active microbial cells.

While all three strains underwent this careful preparation, the following studies zoom in on *L. helveticus* HA-122 and *L. plantarum* HA-119 to demonstrate the postbiotic approach in depth.

After the bacteria were heat treated, they were examined in depth. The researchers observed that the cell membrane and cellular structure were preserved, retaining their structural integrity and bioactive components.

The research then progressed to the next critical step: an *in vivo* proof-of-concept study. This marked the second phase of a rigorous three-step research program designed to validate the postbiotics' efficacy—first, strain characterization to preserve bacterial structure and function; second, effect characterization using a phenotyping model; and third, validation in the target species.

THE REMARKABLE MAMMALIAN MODEL: THE ZEBRAFISH

To validate the functional activity of the heat-treated strains, researchers first turned to the zebrafish—a well-recognized model for studying mammalian gut and immune biology. Although obviously not a mammal, the zebrafish offers key advantages: a fully sequenced genome, rapid reproduction, cost-effective maintenance, and strong physiological parallels with mammals, particularly in gut structure, nutrient metabolism, and immune pathways.


Photo: Freepik


Photo: Freepik

For the first part of the study, adult zebrafish were divided into four groups. All were fed a standard diet, and some received a diet enriched with either live *L. helveticus* HA-122, heat-treated *L. helveticus* HA-122, or heat-treated *L. plantarum* HA-119. After five weeks, fish receiving heat-treated bacteria showed clear improvements in gut barrier integrity and immune responsiveness—evidence that the postbiotics retained beneficial activity even without live cells.[1]

The second part of the study focused on whether these postbiotics helped to strengthen the animals' natural defenses against a viral challenge. After three weeks on the dietary treatments, *L. plantarum* HA-119 showed the strongest effect, and fish receiving the heat-treated form exhibited significantly elevated immune gene expression.[2]

Combined, these studies showed strong evidence that postbiotics could help strengthen gut barrier integrity and natural defenses in the zebrafish model, paving the way for validation in dogs.

FROM FISHBOWL TO PET BOWL: TESTING DIGESTIVE RESILIENCE IN DOGS

While model organisms help us uncover mechanisms, the real evidence emerges when we test these ingredients in the animals we care for. Building on the encouraging zebrafish data, researchers from Lallemand zoomed in exclusively on *L. helveticus* HA-122 for validation in dogs—the studies that really count. After all, findings in a model become even more meaningful when they are confirmed in the target species we are aiming to support.

The research team designed two studies addressing scenarios familiar to veterinarians and pet owners alike.

The first *in-vitro study* focused on antibiotic-induced dysbiosis—a common complication when dogs require antibiotic treatment. Using an advanced bioreactor system that replicates the canine gut environment, researchers administered a five-day course of broad-spectrum antibiotics known to disrupt gut microbial balance.[3] One bioreactor was infused with heat-treated *L. helveticus* HA-122 concurrently with the antibiotic treatment. The critical phase came next: monitoring gut microbiota recovery over the following weeks. The results showed that the heat-treated *L. helveticus* HA-122 accelerated the re-establishment of microbial balance compared with controls.

The second *in-vivo* study involved 40 healthy adult dogs and examined another common digestive stressor: dietary transitions. Whether upgrading nutrition or managing sensitivities, food changes can challenge gut stability. Dogs received either their standard diet or the same food supplemented with the postbiotic. All dogs then transitioned to a high-protein formula to assess digestive adaptation.

The results demonstrated consistent benefits compared to control animals:

- **Improved digestive function:** Stool quality

normalized more rapidly in supplemented dogs, indicating quicker resolution of dietary stress.

• **Enhanced gut barrier support:** Measurements of fecal calprotectin and secretory IgA revealed beneficial trends, suggesting the postbiotic helped reinforce intestinal defenses during periods of stress.

• **Better tolerance of dietary changes:** During food transitions, dogs receiving supplementation demonstrated smoother adaptation and more stable fecal consistency.

• **Improved skin and coat health:** Dogs showed measurable enhancements in skin condition and in microbiota composition and diversity, supporting the gut–skin axis hypothesis.

WHY THESE FINDINGS MATTER

These weren't artificial scenarios with abstract endpoints. The studies tested real challenges—antibiotic treatment and diet changes—that companion animals routinely face. Heat-treated *L. helveticus* HA-122 consistently supported digestive stability during these predictable stressors.

For veterinarians and pet owners seeking evidence-based approaches to immune support and gut health, these findings offer practical validation: a scientifically substantiated way to support overall health and well-being when dogs encounter unavoidable challenges.

THE NEXT GENERATION OF GUT HEALTH SUPPORT

As more people look for ways to support their pets' health naturally, nutraceuticals—foods with functional health benefits—are gaining momentum. Among them, postbiotics emerge as a practical and effective addition to premium pet food and supplements.

Postbiotics offer distinct advantages: they don't require refrigeration, remain stable throughout the pet food manufacturing process, and their shelf stability makes them easy to incorporate into daily feeding. Equally important, robust research demonstrates their ability to promote gut integrity, support immune balance, and help restore microbial equilibrium after antibiotic use or dietary changes.

When we feed our pets, we're nourishing more than just our companions—we're also supporting a complex microscopic ecosystem that plays a vital role in their overall well-being. Thanks to science-backed innovations like postbiotics, we're better equipped than ever to care for that hidden world inside them.

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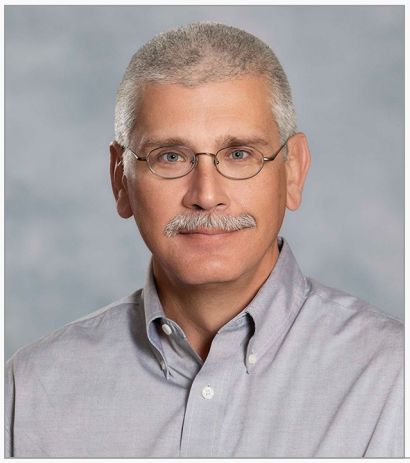
About Dr. Francesca Susca

As the Global Category Manager for Pet at Lallemand Animal Nutrition, Dr. Francesca Susca is dedicated to advancing the company's mission of optimizing animal health and well-being through carefully selected natural microbial solutions. Prior to this, Susca spent 10 years at Nestlé Purina, where she held various roles in Product Development, Regulatory Affairs and Compliance within the PetCare and Pet Food sectors.

She earned a Doctorate in Veterinary Medicine from the University of Milan, followed by a PhD in Animal Feed and Food Safety. Her doctoral research focused on the effects of dietary nutrient supplementation on the metabolism and performance of dairy ruminants, though her professional career has been dedicated to pets.



INNOVATION IN EVERY BOWL: **CARGILL'S TAKE ON GLOBAL PET TRENDS**

Dr. Mark Franklin
Technology Advisor, Global Pet
Cargill Micronutrition & Health Solutions

"Today's pet parents expect more than basic nutrition. They're looking for holistic solutions that deliver measurable health benefits and integrate seamlessly into their daily routines. For example, postbiotics, once a niche concept, are now central to Cargill's strategy, offering scientifically validated benefits for immunity and gut health. By listening to regional preferences and investing in research-driven innovation, Cargill is helping pet parents worldwide provide the best possible care for their furry companions."

The global pet food industry is undergoing rapid transformation, driven by shifting consumer expectations, regional preferences, and a surge in product innovation. With nearly 50 new launches every day, totaling over 16,000 annually (Innova, NPD 2024), brands are racing to meet the evolving needs of pet parents who increasingly view their animals as family. At Cargill Animal Nutrition & Health, we're responding with science-led, regionally tailored solutions that support pets' health and well-being because today's consumers demand more than just nutrition; they want products that deliver real, measurable benefits.

CHINA: PREMIUMIZATION AND DIGITAL-FIRST SHOPPING

China's pet food market is one of the fastest-growing globally, fueled by a surge in pet ownership and digital commerce. Nearly 70% of pet food purchases occur online, making e-commerce the prominent channel. Chinese pet owners are highly informed and willing to pay a premium for trusted brands that deliver advanced nutrition. To maintain our competitiveness, we focus on continuous innovation balanced with a science-driven approach to enhancing pet health and nutrition. Cargill's regional brand PetMaster®, which is sold online through a variety of e-commerce platforms, has steadily built loyalty through functional dry food and nutritional supplements for dogs and cats. The line incorporates natural ingredients and a patented postbiotic that supports immunity and digestive health. This focus on science-backed solutions aligns with consumer expectations for transparency and advanced health benefits.

LATIN AMERICA: HUMANIZATION AND MARKET POLARIZATION

In Latin America, pet humanization is a defining trend and reshaping the market. Pet parents increasingly view their animals as family members, and owners seek products that mirror their own values, including science-based nutrition, clean labeling, and sustainability. Cargill recently launched two new lines, Dogui® Bienestar and Gati® Bienestar.

The new lines are among the first in the region to incorporate next generation postbiotics, delivering proven gut health and immune benefits. These products also respond to key trends in Latin America, including:

• **Developed with functional ingredients to provide measurable health benefits**: While emotional drivers still dominate the market, prioritization of nutritional benefits are gaining traction, especially among dog owners. According to Cargill research, almost half of dog owners prioritize nutrition when selecting their dog's food.

• **Free from artificial colors and flavors; made with natural ingredients**: Transparency matters, however consumers favor "free-from" claims.

• **Designed for different life stages and sizes to ensure precise nutrition**: Life-stage and size-specific formulations are now expected in dog food, while kitten-specific offerings remain a differentiator in cat food.

Economic pressures have split the market, and the value-seeking consumers are gravitating toward economical brands, while premium-oriented segments are growing, driven by emotional bonds and desired nutritional benefits. Sustainability is also an emerging trend, with packaging leading the conversation, though ingredient sourcing will likely gain importance over time.

NORTH AMERICA: FUNCTIONAL BENEFITS AND INGREDIENT TRANSPARENCY

In North America, pet parents are looking for solutions. They increasingly look for functional benefits such as skin and coat health and digestive care to name two of the most sought-after solutions. Ingredient transparency is also critical, with rising interest in real ingredients, postbiotics, fibers, and antioxidants. To meet these demands, Cargill introduced Loyall Life Super Premium Pet Food using the highest-quality ingredients. It is designed to deliver the functional benefits pet parents care most about, focusing on the skin, coat, and healthy digestion.

GLOBAL FOCUS ON GUT HEALTH

Modern pet diets require modern ingredients. Over half of global pet food launches from 2021–2023 included proactive health claims, with this category growing 72% (Innova, NPD 2024). To stay ahead, Cargill introduced an ultra-concentrated postbiotic, designed specifically for pets. This advanced ingredient:

• Supports gut health, immunity, and vitality

Photo: Cargill


Photo: Lightspruch | Shutterstock

through hundreds of metabolites.

• Remains effective through processing like extrusion and retort.

• Delivers benefits at a fraction of one percent inclusion, offering flexibility for wet and dry diets, treats, toppers, and supplements.

Backed by multiple pet-specific clinical trials, this ultra-concentrated postbiotic helps pet food manufacturers deliver comprehensive health benefits in any format, meeting the demands of pet parents who are looking for pet food that includes science, indulgence, and convenience.

COMMITTED TO ADVANCING PET NUTRITION

Across all regions, the pace of innovation is accelerating. Consumers are eager to explore new formulations, supplements, and functional ingredients that promote longevity and vitality for their four-legged best friends. Pet parents across the globe feel compelled to ensure an optimal 'health span' for their pets, providing everything necessary for their pets to remain healthy, active and in good condition for as long as possible. Pets enhance the lives of their humans and owners want to return the favor by providing the highest possible quality of life to their dogs and cats.

As pet ownership continues to rise and pets become integral family members, Cargill remains committed to advancing nutrition through science, sustainability, and transparency. Today's pet parents expect more than basic nutrition. They're looking for holistic solutions that deliver measurable health benefits and integrate seamlessly into their daily routines. For example, postbiotics, once a niche concept, are now central to Cargill's strategy, offering scientifically validated benefits for immunity and gut health. By listening to regional preferences and investing in research-driven innovation, Cargill is helping pet parents worldwide provide the best possible care for their furry companions.

About Dr. Mark Franklin

Cargill's Technology Advisor, Global Pet, Dr. Mark Franklin is responsible for technical and customer support of the company's additive portfolio for pets. Dr. Franklin has a B.S., M.S., and Ph.D. in Animal Science from the University of Tennessee at Knoxville, and over 25 years of experience in animal nutrition, formulation, and product development.

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Erik Visser, CEO of Hamlet Protein: "Ever since I joined Hamlet Protein in 2019, my focus has been on the customers we serve and the people we work with. Our global market presence has grown; we have added experienced commercial and technical staff and published data from research projects with leading universities. That is how Hamlet Protein has earned the trust from producers as an expert in providing health through nutrition."

OPTIMIZING EARLY-LIFE NUTRITION: HAMLET PROTEIN'S APPROACH TO GUT HEALTH AND PERFORMANCE

As one of the industry leaders in young animal nutrition, Hamlet Protein has been delivering innovative solutions to its customers for decades. The company develops high-quality, highly digestible protein products and complementary feed solutions designed to support growth, gut health, and overall performance of animals. Combining scientific research, technical expertise, and hands-on experience, Hamlet Protein works closely with producers to address the challenges of early-life nutrition while supporting efficient and sustainable animal production.

In this interview, Erik Visser, CEO of Hamlet Protein, highlights the company's approach to young animal nutrition and the innovations that set its products apart. He also reflects on the challenges and opportunities of supporting producers around the world, as well as the company's strategies for sustainability, growth, and maintaining high standards in an evolving industry. Through his insights, readers will gain a deeper understanding of how the company is aiming to shape the future of animal nutrition.

Hamlet Protein has been recognized for its innovative solutions for young animal nutrition since 1989. How would you describe your work to date, the progress you have made, and your company's current global vision?

For more than 35 years, Hamlet Protein has been effectively and efficiently delivering high-quality specialty protein products to give young animals the best start in life and support the animal protein production industry with science backed solutions.

Our passion and purpose are to bring unique products and service solutions to the industry that can optimize animal performance and address key challenges faced by producers.

Photo: Hamlet Protein

Ever since I joined Hamlet Protein in 2019, my focus has been on the customers we serve and the people we work with. Our global market presence has grown; we have added experienced commercial and technical staff and published data from research projects with leading universities. That is how Hamlet Protein has earned the trust from producers as an expert in providing health through nutrition. Backed by science, hands-on experience, and a strong network, we have become a reliable partner for swine, poultry, and ruminant producers around the world.

You stand out with your highly digestible soy-based protein solutions for young animals during the weaning period. Could you give us a little more detail about your products? What advantages do they offer in terms of digestibility, gut health, or performance?

Let's start with the why: Weaning is an early, abrupt, and stressful event. Young animals still have immature digestive and immune systems, and face multiple stressors such as new environments, feed changes, vaccinations, and management practices. Stress is associated with changes in the gut microbiota, which in an immature gastrointestinal tract leads to a high incidence of diarrhea.

Our goal is to reduce this stress by contributing to feeds that are low in anti-nutritional factors (ANFs), highly digestible, and quickly absorbed. Fast-digesting protein provides the building blocks for efficient tissue development while minimizing undigested protein in the hindgut, which could otherwise fuel the growth of harmful pathogens.

Early-stage nutrition strategies directly affect growth performance, immune development, and feed utilization efficiency of animals. How does Hamlet Protein assess the critical role of this period and shape its product range according to this scientific approach?

We like to say that a good start makes all the difference. Nutrition is a cornerstone of animal health and performance. Ensuring optimal nutrition during early life stages and other critical periods pays dividends for producers in the long run. It means fewer resources; less feed, reduced medication, and faster achievement of genetic growth potential.

To succeed in providing protein for these critical periods, we deliver consistent products batch after batch, which deliver consistent on farm performance. Our quality assurance teams at both production sites conduct more than 10,000 analyses annually to monitor incoming raw materials, adjust processing conditions, and ensure final product quality. Meanwhile, our technical team is continuously present in the field, offering guidance and gathering feedback to refine our programs and product applications, making sure animals receive the optimal Hamlet Protein solution for their needs.

Soy protein can naturally contain certain anti-nutritional factors, which can cause digestive problems in young animals. However, you have developed a bioconversion technology to eliminate this issue. Could you explain this technology, its scientific basis, and how it addresses the anti-nutritional factor challenge?

Our process is optimized to remove three ANFs from soybean meal, compounds that are particularly harmful to young animals, without compromising protein bioavailability. We hold patents on both the process and the production hardware, making it truly unique and, of course, backed by scientific research.

The process uses a continuous flow system. After a quality evaluation, soybean meal (SBM) is

precisely mixed with water and enzymes. This mixture is processed under tightly controlled conditions, including temperature and retention time. Following enzymatic treatment, a gentle sterilization step deactivates the enzymes, reduces heat-sensitive ANFs, and ensures product stability. Finally, the product is carefully dried to preserve protein quality.

What makes this process unique is its ability to produce a consistent product quality, regardless of natural variations in the raw material.

Some of your products highlight fiber and prebiotic effects in addition to protein balance. What physiological or microbial parameters are considered in the development of these products, and how are these innovations received in the market?

Fiber plays a crucial role in animal nutrition. Our goal is to hydrolyze specific linkages in complex fibers to create substrates that support beneficial gut microbiota. HP FiberBoost combines the physiological benefits of insoluble fiber with the stimulating effects of prebiotic carbohydrates on gut health.

Specific enzymes hydrolyze sections of the carbohydrate structure to reduce viscosity while preserving the physical characteristics of fiber. This targeted cleavage enhances the concentration of prebiotic carbohydrate fractions, which stimulate beneficial bacteria in the hindgut to produce significant amounts of butyric acid.

Our feeding concept starts with high-quality protein as the base, with specialty fiber added to improve overall gut health. This approach helps animals become more resilient and uniform. Feedback from producers confirms that HP FiberBoost results in increased uniformity and reduces the incidence of diarrhea.

Soy production on a global scale is the subject of significant environmental debates in terms of deforestation and carbon emissions. How does Hamlet Protein address these concerns? How does your 'responsible soy sourcing' strategy tangibly support environmental sustainability?

Sustainability has always been a priority for Hamlet Protein. We have recently completed our Life Cycle Assessment (LCA) and have defined Science Based Targets (SBTi) which highlights our company's commitment to a sustainable feed-for-food supply chain.

We are ready to comply with the European Union Deforestation Regulation (EUDR). This new EU regulation aims at reducing global deforestation and requires full traceability of all imported soybean meal into the EU.

Something that we are particularly proud of is our cooperation with the regional heating company at our production site in Horsens (Denmark), where we redirect heat from our production to warm more than 3,000 homes.

With restrictions on the use of additives such as antibiotic growth promoters and zinc oxide, the importance of early-stage nutrition solutions has increased. How is Hamlet Protein responding to this shift, and how does your product portfolio meet the needs of this new era?

Early life nutrition has never been more important. Investing in young animals' diets is extremely important as it has a strong impact on their performance later in life.

In the face of restrictions, such as those on antibiotic growth promoters and zinc oxide, producers look for alternatives. Often, the solution is a combination of strategies: improved biosecurity, better management and equipment, targeted feed additives, and highly digestible proteins like HP300, along with fiber specialties such as HP FiberBoost.

Your growing presence in North America and Asia in recent years is noteworthy. What are your growth strategies targeting in these regions? How do regional differences shape your product formulation or nutrition approach?

We place strong emphasis on local partnerships and regional support teams, supported by global

A good start makes all the difference

The first few weeks of a piglet's life are critical – and what you feed them in the beginning can shape their performance for life.

Hamlet Protein's specialty soy protein solutions such as **HP 300** that are low in anti-nutritional factors (ANFs), highly digestible, and rapidly absorbed.

HP FiberBoost is our next-generation fiber ingredient, designed to improve gut health in piglets by stimulating motility and natural butyric acid production.

By incorporating Hamlet Protein into your pre-starter and starter feed, you'll enhance feed efficiency and maximize your return on investment.

Give your piglets the best possible start. Because strong beginnings lead to stronger results.

Better
PERFORMANCE

Optimal
GUT HEALTH

Reduced
ENVIRONMENTAL IMPACT

Want to know how we can help you?
Visit our website and find your local contact

hamletprotein.com

HAMLET
PROTEIN®

category managers. As important as science is in our industry, trust and relationships may be even more important. I am a strong believer that it is our people that make an impact every day, by going the extra mile for their customers and working alongside them to build success together.

Each market has unique demands. In North America, growth is fueled by efficiency, adopting strategies that increase productivity and are highly profitable. At the same time, a big segment is aiming to maintain their feeds antibiotic-free production.

In Asia, we are seeing rapid growth in animal protein production, driven by rising demand from the expanding middle class. Of course, health challenges can reshape global markets in unexpected ways, so agility and local insight are key. That is why we have feet on the ground in all important export markets.

Hamlet Protein positions itself not only as a product supplier but also as a business partner offering integrated nutrition solutions. What new opportunities do these partnerships open up for the industry? What results are you observing, particularly in projects carried out with producers?

Hamlet Protein has been a trusted partner in nutrition and health for young animals for more than 35 years – starting in Denmark and expanding globally. Our customers become part of our community. We learn from each other, share insights, and exchange data that help improve our products and their applications.

Photo: Hamlet Protein

For example, we have developed pre-starters that focus on faster and more efficient protein digestion, which can even help reduce nitrogen emissions. We partner with universities and producers to evaluate products and find the best applications in production animals, expanding our benefits to other life stages or species.

We work directly with customers and through a network of distributors to make sure we truly understand the local market dynamics, which allow us to tailor our approach to delivering products and services that make a difference.

Which areas will Hamlet Protein be innovating in over the coming years? What are your future priorities in terms of R&D, sustainability, or new protein sources?

All innovation starts with understanding our customers' needs and challenges. From there, we enhance our production methodologies, improve factory efficiency, and design new concepts.

For proteins, this is largely influenced by the speed of protein digestion and absorption, which is a priority research area currently. We are evaluating protein sources through in vitro studies of "fast protein," which is the portion digested and absorbed within the first 30 minutes, and in vivo studies of digestibility and protein disappearance per intestinal segment.

These insights will help us build the feeds of the future: more efficient, better for gut health, and contributing to reduced nitrogen excretion into the environment.

Is there anything else you'd like to add?

We are proud to be part of an innovative industry that contributes to feeding the world in a sustainable manner.

When looking at early life nutrition, choosing the right protein source is critically important. That's where Hamlet Protein delivers unparalleled value. With a track record across species and geographies, our science-backed solutions have become the industry benchmark.

USING UNEATEN FOOD TO CREATE QUALITY ANIMAL FEED AND REDUCE ENVIRONMENTAL IMPACT

Will Clark
Vice President of Commodity Trading
Denali

"While animal feed created from recycled food may be a new concept to some, it's an established product that's been used for decades. It's consumed by animals across the U.S. each year and fuels the larger circular economy, while also offering benefits to stakeholders across the food system. Farmers and ranchers get safe, nutritionally similar animal feed for the same price or less than the feed they currently use. Their animals get a nourishing food source that meets their nutritional needs and has a reduced risk of mycotoxins."

Farmers are famously resourceful. They work tirelessly to create maximum yields from minimal inputs. However, the food they work so hard to produce often isn't treated with the same level of care. Today, one-third of all food in the U.S. goes uneaten, according to the USDA.

Much of this uneaten food is still highly nutritious, containing the same starches, sugars, fats, and proteins found in conventional feed ingredients. The good news is that much of this food does not have to end up in landfills.

Across the country, organic recycling companies are transforming uneaten food into high-quality feed ingredients and other agricultural inputs. When recovered and properly processed, this animal feed can become a consistent and reliable ingredient for livestock nutrition.

Creating a second life for unsold or uneaten food doesn't just ease the burden on landfills – it benefits farmers and ranchers. It gives them a premium feed option at an affordable price point, while helping protect the land they depend on by supporting a circular agricultural economy.

A HIGH-QUALITY, LOWER-COST FEED OPTION

Animal feed made from uneaten food is produced with the same level of rigor, care, and oversight as any other animal feed product. As demand grows for lower cost and lower carbon feed options, these ingredients offer a few key advantages that have made them a go-to feed option for many producers:

It's a nutritionally balanced food source for animals. For example, feed created from bakery goods provides a drop-in replacement for corn in dairy and feeder cattle, hog and poultry rations. These blends typically provide predictable levels of dry matter, starch, sugar, and energy that align closely with the nutritional profile of corn. Their consistent particle size and palatability make them easy to incorporate into existing formulations.

The result is a palatable ingredient that can support milk fat production, improve rumen health, and increase overall dry matter intake when incorporated into dairy and beef cattle rations.

It's produced under rigorous safety standards and offers health advantages. Feed made from recycled foods is produced to the same standards as conventional feeds. It's also less susceptible to most of the mycotoxins, like aflatoxin and vomitoxin, that can be found in grain-equivalent feeds.

It can lower farmers' input costs. Feed created from unsold and uneaten food can be supplied at a price equivalent to or lower than a farmer's lowest-cost feed formulation. It can also reduce the need for fat additives that are sometimes used with grain-equivalent feed to further save costs.

These ingredients also offer reliable flowability, uniform grind, and predictable bulk density, which makes them straightforward to store, handle, and blend in commercial feed mills.

HOW UNEATEN FOOD BECOMES A RELIABLE FEED INGREDIENT

When uneaten food is recycled into animal feed, food that would have gone to the landfill begins a whole new journey and gains a whole new purpose.

The process begins with raw materials that have already been pre-identified at the source. The organic recycling company works with food manufacturers, retailers, and restaurants to determine which of their unsold food streams are suitable for animal feed. This pre-identification is important because it ensures that only feed-grade material is collected for feed manufacturing.

Once received at a feed manufacturing facility, all incoming food material is screened to ensure quality and suitability for feed. If needed, the material is then depackaged on-site. Depackaging machines mechanically separate the feed-grade food materials from their packaging. This mechanical separation ensures only the clean, feed-grade materials enter the feed manufacturing process. After depackaging, the bulk raw material is aggregated and prepared for processing.

Next, the material is put through a validated heat process to neutralize any potential pathogens. After heating, it is mixed and ground to create a homogeneous finished product that meets defined nutritional specifications.

Throughout this process, several steps are taken to protect the quality and safety of the food product as it is recycled into animal feed. These steps include:

Chips collected for animal feed production

Cotton seed animal feed production

• Conducting product inspection and testing on all received food products.
• Employing individuals who are qualified in FSMA-compliant preventive controls at each facility.
• Using feed manufacturing procedures with standard operating procedures (SOPs) that have been refined over decades.
• Conducting lab analysis on raw materials received to regularly ensure feed suitability and on finished feed product to confirm its quality and nutritional composition.

The results of a lab analysis can be provided upon request to producers and nutritionists to give assurance of the feed's nutritional composition. This allows producers to confirm that the feed correctly matches the nutrient specifications their animals need.

BENEFITS FOR AGRICULTURE AND THE PLANET

While animal feed created from recycled food may be a new concept to some, it's an established product that's been used for decades. It's consumed by animals across the U.S. each year and fuels the larger circular economy, while also offering benefits to stakeholders across the food system.

Farmers and ranchers get safe, nutritionally similar animal feed for the same price or less than the feed they currently use. Their animals get a nourishing food source that meets their nutritional needs and has a reduced risk of mycotoxins. Retailers, food producers and restaurants save money and improve their sustainability by reducing their waste streams. Our planet receives less food filling its landfills where it emits methane as it decomposes.

Put simply, giving unsold food a second life offers a practical and proven way to lower feed costs, strengthen supply resilience, support the circular agricultural economy, and make productive use of food that would otherwise be sent to the trash heap.

About Will Clark

As the Vice President of Commodity Trading at Denali, Will Clark oversees sales, procurement, and risk management for animal feed ingredients, biofuel feedstocks, renewable fuels, and renewable energy credits. Before joining Denali, he held roles in commodity risk management and procurement at Tyson Foods and began his career as a financial analyst at ExxonMobil. He holds a BS in Agricultural Business and an MBA in Finance from the University of Arkansas. Outside of work, he enjoys spending time with his family and being outdoors.

MOISTURE MANAGEMENT BOOSTS FEED MILL EFFICIENCY AND PROFITABILITY

Antony Wildon
Mill Optimization Product Manager
Perstorp Group

"Moisture management has become a strategic pillar of feed mill performance. Better moisture control not only protects feed quality and safety, but also boosts operational efficiency, reduces costs and enhances profitability. Feed mills should be auditing their current water activity control and considering moisture management as a strategic focus to improve output and profitability."

Feed mills face constant challenges balancing variables such as raw material availability, pellet quality and production efficiency. Moisture management is an often-overlooked area of feed production. It may seem simple, but it's a highly sophisticated discipline at the heart of feed manufacturing efficiency. Every percentage of moisture lost during pelleting translates into reduced volume, compromised durability, and higher energy costs. Moisture management is an important factor to be considered by feed mills, especially because of the impact it has on feed cost and mill performance.

Moisture management may seem simple but is in fact a highly sophisticated discipline with efficiency at its core. New technologies have furthered our understanding of the importance of water activity in feed, giving rise to patented solutions like ProSid™ Pellet Pro.

WHY MOISTURE MATTERS

Water is a critical part of the nutritional specification of feed. Pelleting and heating cause water losses of around 3% through evaporation. When moisture levels drift below intended targets, mills lose production volume. Additionally, the pellets are often compromised in terms of quality, often with reduced uniformity, poor consistency and compromised durability. Conversely, poorly managed added water increases water activity, heightening the risk of microbial growth.

Moisture influences many areas of feed production including:

1. Feed safety – the contamination risk grows significantly when water activity is high. Most bacterial pathogens cannot proliferate below a water activity of 0.9, and most molds are inhibited below 0.65.

2. Milling efficiency – moisture evaporation accounts for a 1-3% loss of final feed tonnage, equivalent to 40 million tons of saleable feed worldwide. These losses are compounded during dry seasons or in high friction milling environments. More energy is consumed and throughput is lower.

3. Pellet quality – insufficient moisture in the mash reduces steam uptake which weakens pellet adhesion, leading to poor starch gelatinization and reduced hardness.

4. Animal performance – it is a misconception that drier feed improves feed conversion. Optimal

moisture levels in the feed mean starch gelatinization is improved and feed digestibility increases, therefore supporting improved animal performance.

MOISTURE MANAGEMENT TECHNOLOGIES

Traditional moisture management products relied on surfactants and propionic acid which lack longevity, stability and consistency in commercial milling conditions. Esters of fatty acids are well known emulsifiers and surfactants.

ProSid™ Pellet Pro represents a breakthrough in moisture management solutions and contains:

- Glycerol esters of propionic acid which:
  - allow for more penetration of moisture in the feed materials,
  - help to draw water into the feed pellets as bound moisture,
  - support mold inhibition programs, improving the shelf life of the final feed,
  - have a prolonged efficacy,
  - are stable, less-corrosive with no dangerous goods restrictions on transport or storage.
- Surfactants which substantially lower the water surface tension for improved moisture distribution.
- Glycerol which acts as a humectant, capable of holding many times its own weight in water.

The combination of activities in ProSid™ Pellet Pro (Figure 1):

- Enhances moisture absorption into feed particles, giving feed producers the ability to replace moisture that evaporates during pelleting, increasing volumes and throughput.
- Reduces free water and lowers water activity (aW) which supports microbial control.
- Improves starch gelatinization which reduces moisture migration and caking for improved pellet quality.
- Reduces volatility leading to the persistence of the product and its functions.

ProSid™ PELLET PRO IN PRACTICE

ProSid™ Pellet Pro has been tested in many commercial trials in various feed mills and extruder plants, with consistent results throughout (Figure 2).

What is water activity?

Moisture percentage tells us how much water is present in the feed. Water activity (aW) is a measure of the water available for microbial growth and chemical reactions ranging from 0 (completely dry) to 1.0 (pure water). An aW over 0.65 is conducive to mold growth. Factors such as temperature, humidity, storage conditions and internal water migration all influence water activity. The central goal of a moisture management program is to reduce the aW.

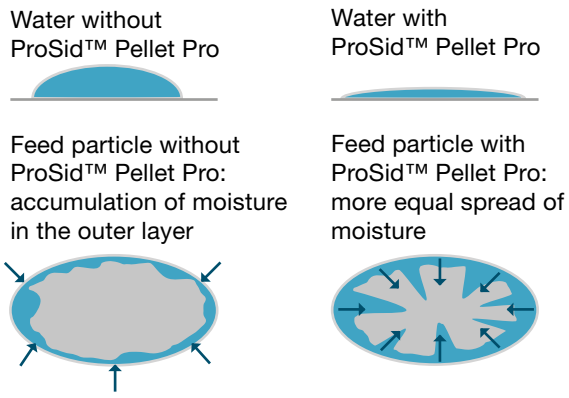


Figure 1. Illustration of ProSid™ Pellet Pro interacting with water to improve absorption and distribution

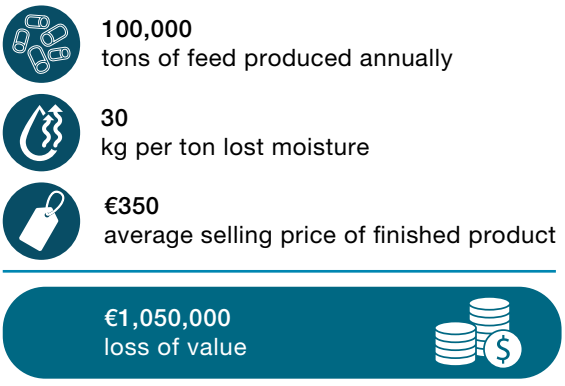


Figure 2. The financial impact of 3% evaporation loss per 100,000 tons of feed

In practical terms, ProSid™ Pellet Pro mitigates moisture losses of up to 3%, therefore recovering up to 3,000 tons of feed in one year for a feed mill that produces 100,000 tons annually.

ProSid™ Pellet Pro is more effective at reducing water surface tension than propionic acid and an ammonium buffered moisture management solution (Figure 3).

ProSid™ Pellet Pro improves moisture retention compared to untreated feed (Figure 4).

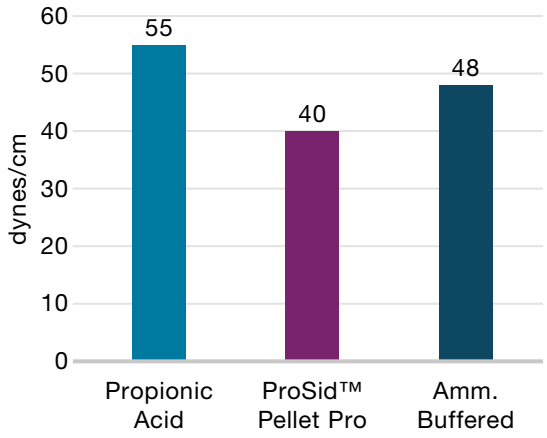


Figure 3. Surface tension trial data. Products dosed at 1% (400 g/10 kg solution).

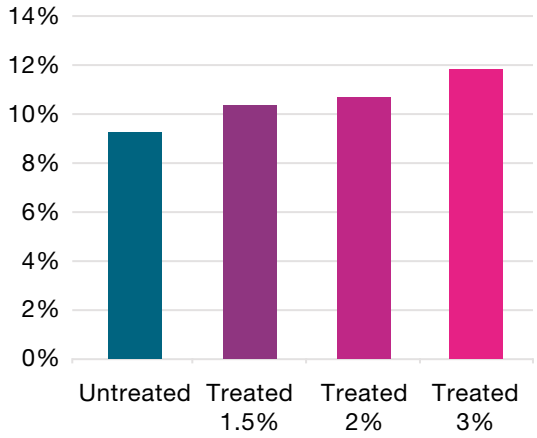


Figure 4. Moisture retention trial data. ProSid™ Pellet Pro increased water retention by up to 28% more compared to the untreated feed

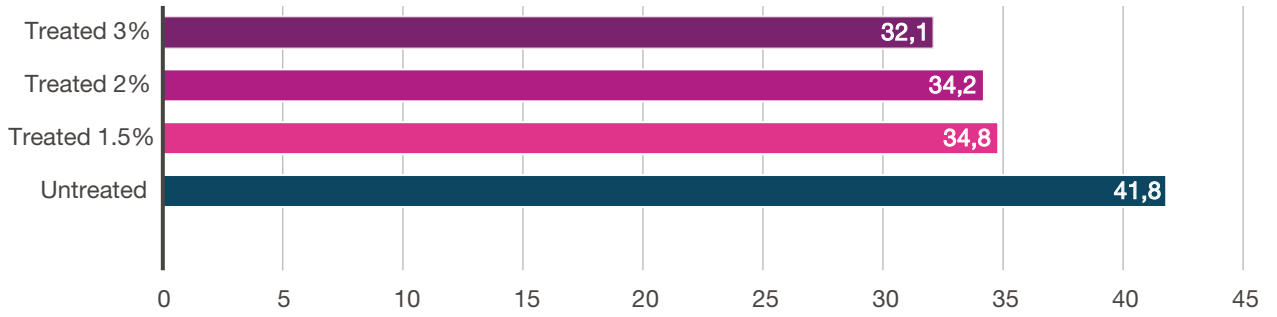


Figure 5. kWh ProSid™ Pellet Pro is included at three different concentrations

ENERGY SAVINGS

ProSid™ Pellet Pro helps optimize milling operations by improving throughput by up to 18%. In one trial, the throughput improvements of feed treated with ProSid™ Pellet Pro compared to the untreated feed led to 23% less energy (kWh) being used (Figure 5). This reduction in energy consumption due to the lubricating effect of feed containing optimal levels of moisture and the reduced drier requirements equate to savings of up to €1.10 per ton.

In summary, there are many benefits of using ProSid™ Pellet Pro including:

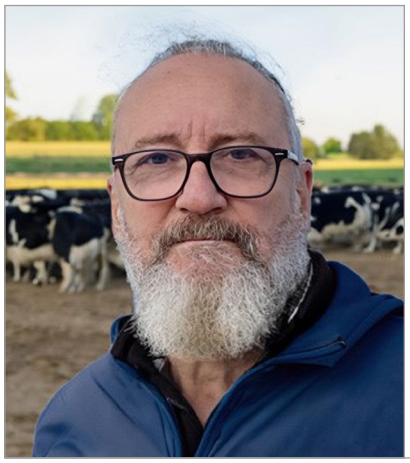
- Moisture losses of up to 3% are mitigated,
- Water is more evenly distributed in the feed which preserves high pellet quality and uniformity,
- Cost savings due to lower energy requirements,
- Improved pellet uniformity, consistency and durability,
- Higher throughput – more feed produced in the same amount of time,
- Improved pellet quality has been shown to improve feed intake which supports optimal animal performance.

MOISTURE MANAGEMENT IS NO LONGER OPTIONAL

As global demand for high-quality and safe feed grows, moisture management has become a strategic pillar of feed mill performance. Better moisture control not only protects feed quality and safety, but also boosts operational efficiency, reduces costs and enhances profitability. Feed mills should be auditing their current water activity control and considering moisture management as a strategic focus to improve output and profitability.

About Antony Wildon

Graduating from the Faculty of Animal Science at The University of Pretoria, Antony Wildon entered a career as a monogastric nutritionist in various roles from the nineties with a heavy focus on companion animal product development and aquaculture management and nutrition both in South Africa, neighboring countries and the rest of EMEA. The last decade has seen a role change to the feed additives arena where a solid background in animal health and nutrition support his offering to the market. Experience with feed mills across EMEA over the last 12 years has also strengthened his knowledge and approach to a practical way of doing business in an ever-demanding animal production sector. Wildon has been with Perstorp Animal Nutrition over 6 years and based in England, is currently Mill Optimization Product Manager whilst also managing a diverse portfolio of sales responsibilities.



ECONOMIC RETURN OF FEEDING CHOLINE TO TRANSITION COWS

Dr. Alvaro Garcia
Feeds Specialist and Nutritionist
Dellait Animal Nutrition and Health

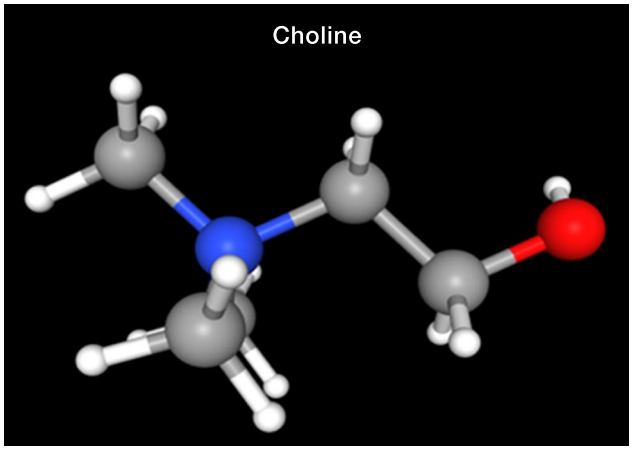
"Studies show that feeding choline around calving helps cows eat more and produce more milk when the dose is right. A 2025 review of thirty experiments by the Institute of Animal Science at the University of Bonn, Germany, evaluated the dose–response to identify how much choline is needed to maximize feed intake and milk production, providing producers with practical guidance for transition cow programs."

The weeks around calving are the toughest part of a cow's life. Feed intake usually drops just as milk production starts, forcing cows to burn body fat. This breakdown releases free fatty acids (FFA), also known as NEFA in scientific literature, into the bloodstream. When too much reaches the liver, it can build up as "fatty liver," lowering appetite, health, and productivity. Supporting the liver during this time directly improves performance. Helping the liver means making it easier for the cow to manage the extra fat that floods in after calving. When the liver can move this fat out instead of storing it, the cow eats better, stays healthier, and produces more milk.

Choline is a small, water-soluble molecule with a structure that helps the cow in three key ways: it acts as a building block for cell membranes, as a carrier to move fat out of the liver, and a supporter of key metabolic pathways.

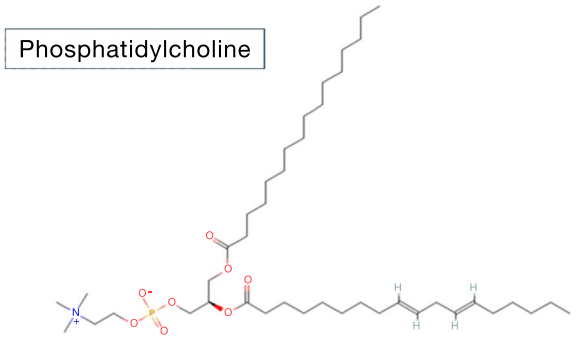
In short, its functions are:

1. Moving fat safely by forming phosphatidylcholine, which the liver uses to package fat into very-low-density lipoproteins (VLDL). These particles carry fat out of the liver and into the bloodstream, where it can be used for energy or milk production instead of building up in the liver (Figure 1).



2. Building healthy cells because choline is a key part of cell membranes in the liver, mammary gland, and immune system, helping these tissues function properly during the stressful transition period.

Figure 1



3. Supporting metabolism by serving as a methyl donor through its conversion to betaine, which helps the cow use nutrients efficiently for energy and protein synthesis.

Because normal choline is destroyed in the rumen, it must be supplied as rumen-protected choline (choline). Research shows that feeding choline from three weeks before calving through early lactation helps cows in several ways.

EXPERIMENTAL RESULTS

Studies show that feeding choline around calving helps cows eat more and produce more milk when the dose is right. A 2025 review of thirty experiments by the Institute of Animal Science at the University of Bonn, Germany, evaluated the dose–response to identify how much choline is needed to maximize feed intake and milk production, providing producers with practical guidance for transition cow programs.

The best results were seen at about 13–14 g per day, where cows ate almost half a kilo (1 pound) more feed dry matter and gave about 1.3 kilos (2.9 pounds) more milk per day. At slightly higher levels, 15–21 grams per day, cows produced over 2 kilos (4.4 pounds) more fat-corrected milk, with direct improvements in the milk check. Importantly, feeding choline before calving alone did not change intake, it is the consistent feeding through early lactation that pays off. For example, if choline costs about $0.25 per cow per day and the extra milk brings in $0.60 to $0.80, the net return is $0.35–0.55 per cow per day. Across 100 fresh cows, this adds up to an additional $1,000–1,500 in profit monthly, making it a cost-effective tool in transition cow programs (Table 1).

MILK FAT AND PROTEIN

Choline does not change the percentages of fat, protein, or lactose in milk, but it can increase the total amount of fat and protein produced each day. Fat yield improved steadily when cows received 12–24 g per day, with the best response adding about 0.09 kg (≈0.2 lb.) more fat per cow per day. Protein yield also improved in the 13–20 g/day range, though results varied more between studies. The best responses were seen when choline was fed beyond 21 days in milk and with

Table 1. Cost–Benefit of Choline (Simplified Example)

Extra milk	Extra milk	Extra revenue	Net return	Net return
($/cow/day)				($/100 cows/month)
1.0	2.2	0.45	0.2	600
1.3	2.9	0.59	0.34	1020
2.0	4.4	0.9	0.65	1950
2.2	4.9	0.99	0.74	2220

This example assumes milk at $0.45/kg (≈ $20.50/cwt) and choline costs of $0.25 per cow daily. The table shows the potential return depending on the extra milk response.

Table 2. Cost–Benefit of Choline on Milk Components

Component gain per cow/day	Gain (kg)	Gain (lb.)	Added income ($/cow/day)	Added income ($/100 cows/month)
Fat yield	0.05 kg	0.11 lb.	$0.25	$750
Fat yield	0.09 kg	0.20 lb.	$0.45	$1,350
Protein yield (avg)	0.05 kg	0.11 lb.	$0.40	$1,200
Protein yield (higher)	0.08 kg	0.18 lb.	$0.65	$1,950

Assuming fat price $5.00/kg ≈ $2.27/lb.; protein price $8.00/kg ≈ $3.64/lb.

some commercial products. For producers, this means that while milk tests may not show higher percentages, choline helps ship more total fat and protein off the farm, directly increasing milk check value (Table 2).

BODY CONDITION AND WEIGHT

Rumen-protected choline (RPC) does not change body condition score (BCS), either before or after calving, which means cows are not gaining or losing visible condition from supplementation. However, overall body weight (BW) did increase, especially when cows received around 11 g/day, with an average gain of about 12.5 kg (≈27.5 lb.). This added weight is not from extra fat but reflects better nutrient use and more feed intake. In practical terms, cows maintained condition while carrying more body mass, a sign that RPC helps them cope with the transition period more efficiently (Table 3).

TAKEAWAY

Feeding rumen-protected choline during the transition period helps the liver handle fat, improves feed intake, and boosts milk. The best results are seen at 13–14 g/day, with slightly higher levels (15–21 g/day) giving more fat-corrected milk and up to 24 g/day improving fat yield. Cows also gain body weight without losing condition, showing better nutrient use. For most farms, choline is a reliable investment, but the most profitable dose depends on milk price, feed costs, and product choice.

Reference

1. *"Based on results obtained from Ghaffari, M. H., Rezaei-Ahvanooei, M. R., Piray, A. H., Bahrampour, J., Ma, T., & Bradford, B. J. (2025). Effects of rumen-protected choline supplementation on lactation performance of dairy cows: A systematic review and dose–response meta-analysis. Journal of Dairy Science, 108(9)*

Table 3. Value of Extra Body Weight from Choline

Extra BW gain per cow	Gain (kg)	Gain (lb.)	Value ($/cow)	Value ($/100 cows)
Moderate gain	6 kg	13 lb.	$12	$1,200
Average gain	12.5 kg	28 lb.	$25	$2,500
Higher gain	17 kg	37 lb.	$34	$3,400

HOW VIRTUAL FENCING OPENS THE GATE FOR SMARTER GRAZING

Alex Bell
US Managing Director
Nofence

Virtual fencing is redefining how producers manage livestock, offering a flexible, tech-driven way to guide herds, expand grazing access, and save time in the field. As adoption grows, the technology is helping operations of all sizes work more efficiently and use their land to its full potential.

Across the country, producers like Stephanie Mathis are finding that smarter grazing starts with flexible boundaries. On her goat and cattle ranch in Santa Barbara County, California, Stephanie found that virtual fencing technology "opens up new ways to protect the land while improving productivity."

Using GPS-enabled collars, her goats clear invasive weeds and restore forage across her family's 14,000-acre ranch, improving both productivity and ecological health. The flexibility of virtual fencing also allows Stephanie to target overgrown areas, remove dense underbrush, and reduce fuel buildup, all of which help her lower wildfire risk, protect feed value, and rehabilitate the land.

Her success reflects a growing shift in livestock management as producers adopt tools that increase farm efficiency and adaptability. Virtual fencing is one of the most transformative of these innovations, helping farms of all sizes save time, improve pastures, and turn underused acres into productive ground. The technology enables producers and ranchers to draw and adjust digital boundaries right from their phones, eliminating the need for physical fencing and maximizing the value of every acre.

Nofence, an innovator in virtual fencing technology, has helped make this approach accessible at scale for producers and ranchers—including Stephanie. Built by farmers for farmers, Nofence's system is giving producers across 48 states more flexibility and control over how herds move and graze.

That flexibility isn't just about convenience; it's paying off in measurable ways.

SMARTER GRAZING, LOWER COSTS

What began as a new way to manage cattle, goat, and sheep herds has quickly become a proven strategy for utilizing resources more efficiently. For a typical 50-head cattle operation, Nofence users report annual savings of $4,000 to $6,500, including reduced hay and fuel use, lower labor needs, and fewer equipment hours.

In Idaho, rancher Tyson Coles notes that "Virtual fencing has completely changed how I manage my cattle. I can create smaller paddocks, rotate them

efficiently, and extend my grazing season by up to two months. That's $8,000 saved in hay costs this year alone."

These savings add up quickly, especially as producers can extend grazing seasons and integrate managed grazing to optimize forage.

TECHNOLOGY BUILT FOR THE FIELD

The efficiencies gained through virtual fencing come from thoughtful engineering. Nofence's virtual fencing systems use solar-powered collars that communicate through existing cellular networks, meaning no new base stations or towers are required. Each collar emits an audio cue as animals near a virtual boundary, followed by a mild pulse if needed. Within just five to seven days, livestock learn that the tone alone marks the limit, allowing producers to manage herds confidently and remotely.

Built for the realities of ranching, the solar-power collars' nine-month battery life and five-year warranty make them durable across every U.S. ecosystem. The system is also easy to use through the Nofence mobile app, where ranchers can draw, move, or close off paddocks with just a few taps.

Beyond convenience, virtual fencing gives producers unprecedented visibility into herd movement and behavior. Real-time data from the collars provides early insight into animal health and behavior, enabling earlier detection of potential health or stress issues. With Nofence's new HerdNet™ system, updates are now faster and more synchronized, ensuring smoother transitions and more precise control for rotational and adaptive grazing management. By minimizing handling and routine fence maintenance, virtual fencing helps reduce stress and promote natural herd movements, leading to improved herd performance.

GRAZING REVENUE AND PASTURE PERFORMANCE

Virtual fencing delivers more than cost savings and animal welfare benefits; it also opens the door to stronger returns from grazing. By giving producers the flexibility to access new or marginal land, it helps turn underused acres into productive ground, increasing grazing revenue and improving overall land performance. Coles highlighted that "With Nofence, I've avoided $35,000 in fencing costs and opened up 100 additional acres for grazing."

Virtual fencing helps producers and ranchers get more value from every acre. For Stephanie, "the

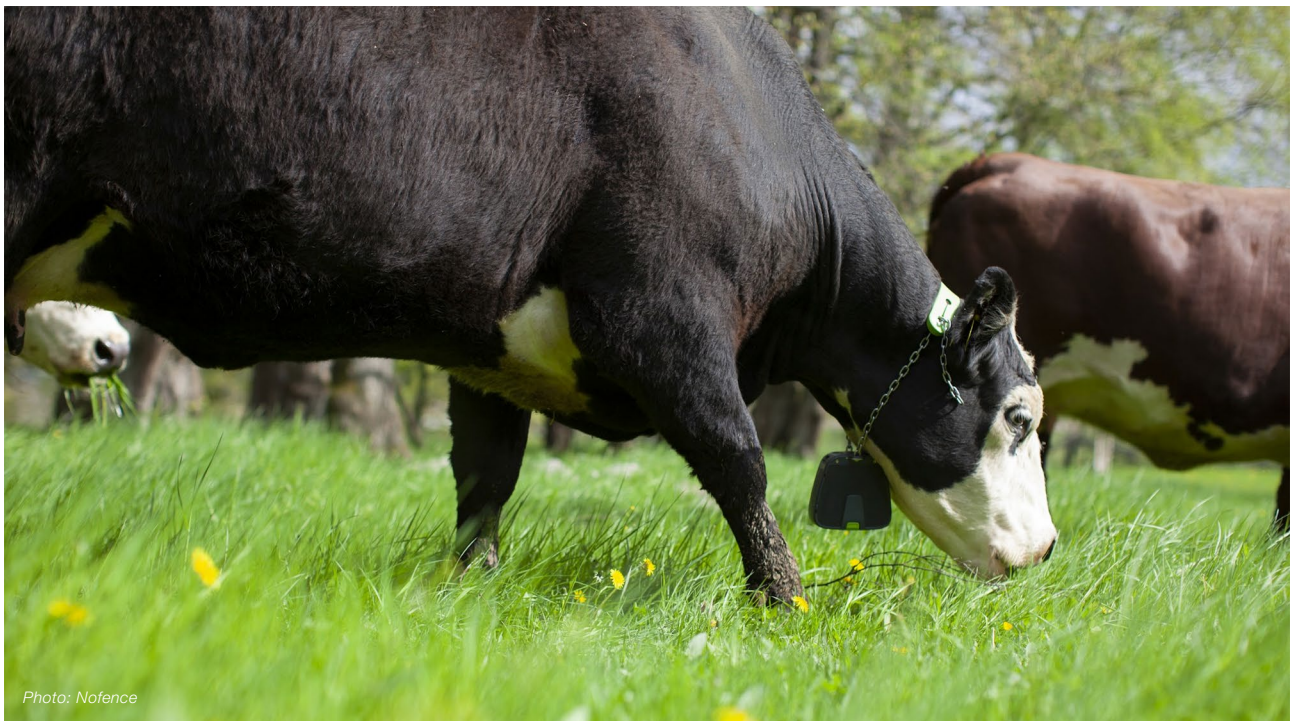


Photo: Nofence


Photo: Nofence

idea of managing both goats and cattle with virtual fencing is exciting." The system is helping her and other producers to rotate herds efficiently, balance grazing pressure, and improve pasture condition. Well-managed grazing pays off by reducing reseeding, soil damage, and supplemental feed requirements.

EQIP COST-SHARE SUPPORT

For producers ready to explore the technology, cost-share assistance is available through the USDA's Environmental Quality Incentives Program (EQIP). The program typically covers 50–75% of approved conservation practice costs, with historically underserved producers eligible for up to 90%.

Virtual fencing systems like Nofence are eligible under NRCS Conservation Practice Standards 382 (Fence) and 528 (Prescribed Grazing), which reward rotational and adaptive grazing approaches that protect soil and forage resources. More than ten states have already published standards or payment rates to provide cost-share for virtual fencing, and several additional states have shared that they expect to make virtual fencing eligible to producers for cost-share under EQIP starting in FY26.

As more producers take advantage of EQIP cost-share opportunities, virtual fencing is moving from innovation to everyday use. With more states recognizing its value, our team at Nofence is hopeful that flexible, tech-enabled grazing will soon become a standard tool for managing working lands nationwide.

MAKING EVERY ACRE COUNT

Across operations large and small, virtual fencing is helping producers transform challenges into opportunities. By helping producers restore pastures, protect resources, and operate more efficiently, Nofence is advancing a future where productivity and stewardship go hand in hand. And as stories like Stephanie's show, this technology isn't just a tool for modern livestock management, it's a bridge between innovation and stewardship, giving producers the flexibility to get more value from every acre.

About Alex Bell

As the U.S. Managing Director at Nofence, Alex Bell is leading the company's expansion and customer growth across the United States. With over 20 years of leadership in ag-tech and sustainable agriculture, he is working to bring Nofence's virtual fencing technology to more operations, helping producers improve efficiency, flexibility, and sustainability in livestock management.

STRENGTH IN STRUCTURE: A NEW PERSPECTIVE ON PATHOGEN BINDING

Monika Leukert
Product Manager, Antioxidative Solutions & Yeast Derivatives
Lallemand Animal Nutrition

"Researchers at Lallemand Animal Nutrition, in collaboration with the Toulouse Biotechnology Institute (INSA Toulouse, France), have developed and published a new in vitro method to measure pathogen binding using flow cytometry (Schiavone et al. 2024). This advanced approach quantifies bacteria–yeast interactions at the single-cell level, bringing new precision and reliability to functionality testing."

In modern animal production, maintaining intestinal health is an everyday challenge. Bacteria such as *E. coli* and *Salmonella* are not just health risks, but they also undermine performance, feed efficiency, and animal welfare. Their ability to attach to the gut epithelium initiates inflammation and stress, setting off a cascade that affects productivity and ultimately profitability.

To counter this, yeast cell wall products have become an established part of nutritional strategies. Their mannan oligosaccharides (MOS) can bind undesirable bacteria, limiting their adhesion to the intestinal mucosa, and together with β-glucans support immune modulation. Yet, not all yeast cell walls perform the same and recent research has revealed why.

A CLOSER LOOK AT HOW BINDING REALLY WORKS

Researchers at Lallemand Animal Nutrition, in collaboration with the Toulouse Biotechnology Institute (INSA Toulouse, France), have developed and published a new in vitro method to measure pathogen binding using flow cytometry (Schiavone et al. 2024). This advanced approach quantifies bacteria–yeast interactions at the single-cell level, bringing new precision and reliability to functionality testing.

Applied to Optiwall (Lallemand Animal Nutrition), a yeast cell wall product with distinct structural features, this method confirmed powerful and consistent binding across multiple *E. coli* and *Salmonella* strains. Testing over 15 batches on different *E. coli* strains (Figure 1) demonstrated strong batch-to-batch consistency and broad-spectrum versatility, providing robust validation of Optiwall's performance and reliability. On average, Optiwall achieved around 80 % binding across three *E. coli* strains and 96 % with *Salmonella*, highlighting its strong and consistent pathogen-binding capacity.

STRUCTURE MATTERS MORE THAN NUMBERS

The results bring a clear message: efficacy cannot be predicted by composition alone. Even products with comparable or higher MOS or β-glucan levels may differ widely in functionality. What truly makes the difference is how the yeast cell wall is built: its strain origin, structural integrity, and the length and accessibility of its MOS chains.

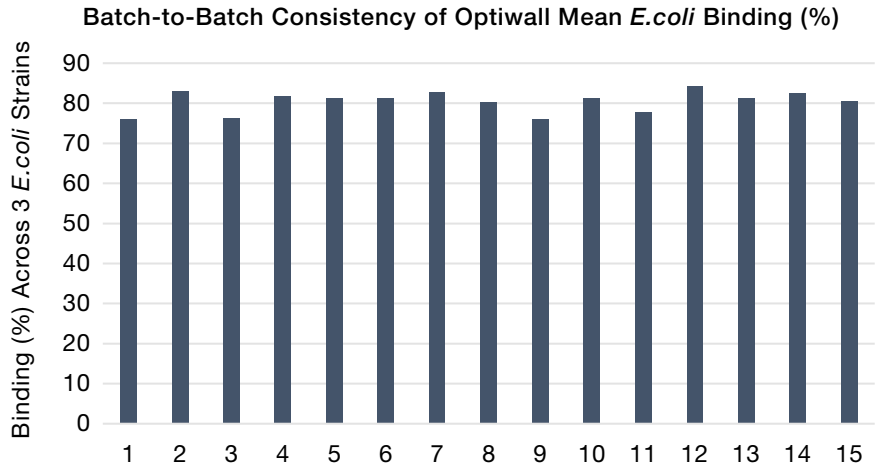


Figure 1. Across 15 production batches, Optiwall demonstrated an average pathogen-binding rate of 80.4 ± 2.65 % (mean ± SD, n = 15), confirming strong consistency and process reliability

Lallemand, internal data, 2025

Optiwall's distinctive strength lies in its thick, cohesive cell wall and long-chain MOS, which offer effective binding sites for bacterial fimbriae, the tiny "hooks" pathogens use to anchor themselves in the gut. This unique structure, preserved through a controlled and gentle production process, turns Optiwall into a reliable tool to help maintain gut health naturally by preventing the adhesion of undesirable bacteria that would normally occur on the gut epithelium (Figure 2).

FROM SPECIFICATION TO FUNCTIONALITY

With this breakthrough method, Lallemand brings new insight to yeast cell wall science. It shifts the focus from specifications to functionality, emphasizing measurable biological outcomes. Optiwall stands for a new generation of yeast solutions, scientifically substantiated, structurally optimized, and designed to deliver consistent efficacy support gut health, animal welfare, and performance.

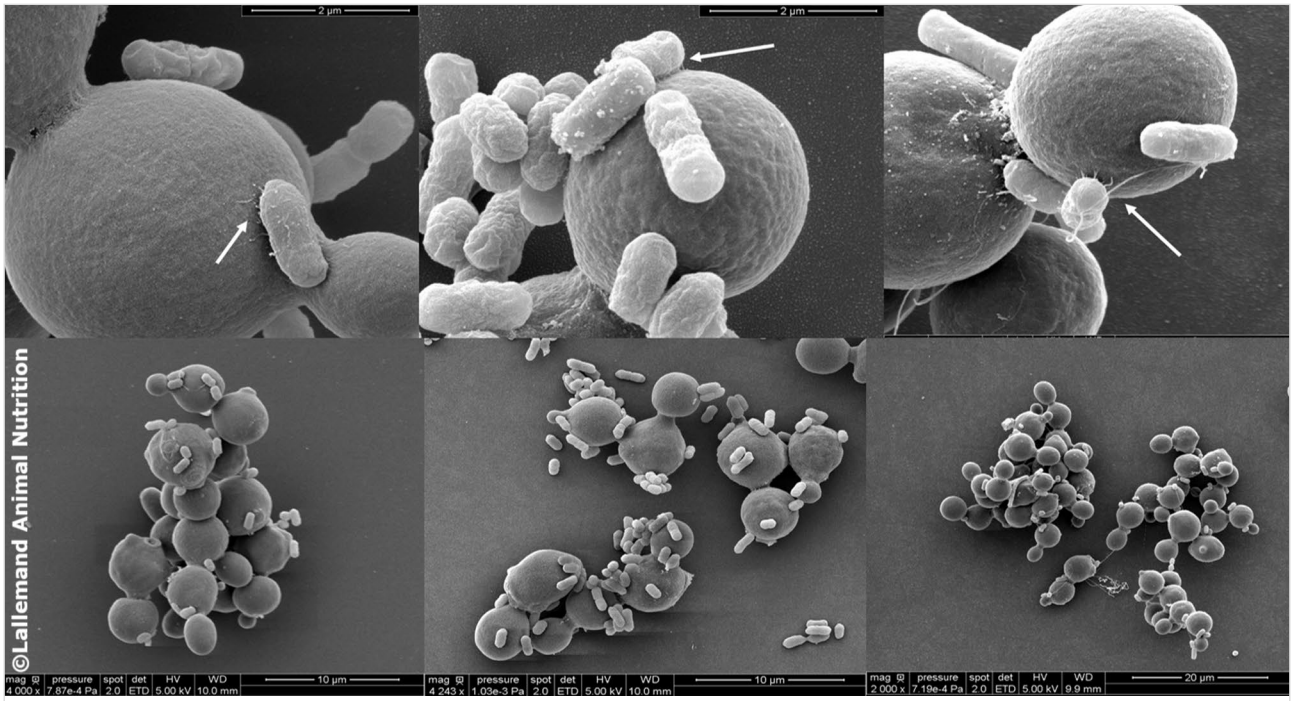


Figure 2a and 2b. Scanning electron microscopy (SEM) images showing Optiwall yeast cell walls with bound Escherichia coli (E. coli)
Optiwall with E. Coli SP15 strain (left), BW strain (middle) and E22 strain (right)

PREDICTIVE MAINTENANCE: **HOW AI IS ELIMINATING DOWNTIME IN THE FEEDMILL**

André Magrini
Chief Revenue Officer
OGI Systems

"The shift toward intelligent operations marks the final evolution of manufacturing excellence. By embracing Predictive Maintenance, Machine Learning, and Agentic AI today, leaders are doing more than simply reducing costs; they are investing in the core predictability and resilience of their business for years to come. This data-driven foresight transforms the hidden risks of component failure into manageable events, guaranteeing maximum uptime and operational efficiency."

The unexpected failure of a critical asset is the single greatest threat to margins and supply chain stability in the modern milling operation. When a component—say, a bearing in a key conveyor or a high-wear part in an extruder—fails, the ripple effect is immediate chaos and a loss of production control. The true competitive edge today belongs to the leader who can turn this operational threat into a source of predictable performance by mastering Predictive Maintenance (PreMa).

PreMa is no longer optional; it is the definitive strategy for moving operations from reactive firefighting to proactive industrial foresight. It centers on deploying AI-driven intelligence across the entire facility, ensuring that every asset, from the primary hammer mills to essential handling equipment, is continuously monitored and understood.

THE UNIVERSAL AI: BEYOND CRITICAL ASSETS

The challenge of downtime isn't isolated to just the most expensive machinery. Simple bottlenecks on a conveyor belt or a failure in an industrial motor can halt an entire line. The new standard for PreMa demands universal coverage, achieved through integrated, smart sensor technology that tracks:

- **Mechanical Stress:** Real-time analysis of vibration and heat (temperature spikes) in rolling elements (bearings) and gearboxes to detect minor anomalies that precede catastrophic failure.

- **Operational Load:** Monitoring of motor and driver run-hours to precisely calculate component fatigue and accurately forecast remaining useful life.

- **Process Flow:** Tracking process variables to ensure the overall system operates within normal parameters, defined by a constant stream of learning data.

This diagnostic capability relies on sophisticated Machine Learning (ML) models that calculate a Compound Anomaly Index (CAI), learning the "normal" state of every asset and flagging deviations the moment they appear.

THE ARCHITECTURE OF FORESIGHT: UNIFYING FRAGMENTED DATA

A common organizational problem arises when multiple advanced monitoring tools and legacy systems operate in isolation, scattering critical data across disconnected platforms. This fragmentation leads to delayed reporting and prevents leaders from forming a single, coherent view of operational risk.

To counter this disorder, leading global firms are adopting an integrated architecture that acts as a system Maestro to orchestrate these diverse data sources:

• **The Problem:** Fragmented data from multiple monitoring tools and infrastructure creates a reporting delay, sometimes taking days to aggregate and analyze operational insights.

• **The Solution:** An organization's technical partner deploys a unified dashboard and central data platform that forces data standardization and aggregates insights from all disparate systems. This central view provides a complete blueprint for the facility's health.

• **The Impact:** This cohesive approach yields powerful and swift results. For one company leveraging this model, the time required for accurate, real-time reporting was drastically reduced from three days to just 15 minutes. This speed gives maintenance teams the clarity needed to act proactively.

THE FUTURE OF CONTROL: AGENTIC AI AND SCENARIO PLANNING

The true value of modern PreMa lies in predictive power, achieved through the deployment of Agentic AI. These next-generation systems push intelligence beyond simply identifying a risk, enabling strategic foresight and giving the leader control over future outcomes.

• **Scenario Generation:** Agentic AI uses the constant stream of high-fidelity data (vibration, temperature) to run millions of hypothetical failure scenarios. This allows the system to predict not only *when* a part might fail, but what the cascading impact would be on the entire production schedule.

• **Autonomous Optimization:** By simulating various outcomes, Agentic AI can recommend the precise next best action, whether that's scheduling a pre-emptive repair immediately or intelligently extending the maintenance window based on real-time risk calculations.

The ability to command this unified, intelligent system gives leaders the ultimate peace of mind. It allows them (the Hero of the operation) to transform the villain of unexpected downtime into a predictable, manageable line item, securing long-term operational resilience.

The shift toward intelligent operations marks the final evolution of manufacturing excellence. By embracing Predictive Maintenance, Machine Learning, and Agentic AI today, leaders are doing more than simply reducing costs; they are investing in the core predictability and resilience of their business for years to come. This data-driven foresight transforms the hidden risks of component failure into manageable events, guaranteeing maximum uptime and operational efficiency. The tangible return on investment isn't just measured in avoided breakdowns, but in the sustained competitive edge achieved when your entire facility operates with unmatched precision and clarity. The technology is here to secure that smarter, more profitable future—the time to implement this strategy is now.

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Alex Diana
Lead Product Manager Actipro
Veos Group

Jordi Ysamat
Technical Sales Manager Actipro
Veos Group

The Post-weaning Pivot: BRIDGING NUTRITIONAL AND IMMUNOLOGICAL GAPS WITH EGG POWDER

Egg powder delivers unmatched dual action: Providing a highly digestible, essential amino acid profile for maximum post-weaning growth, while simultaneously delivering bioactive immunoglobulins (IgY) and antimicrobial proteins to boost gut health, mitigate diarrhea, and serve as a functional alternative to pharmacological measures like zinc oxide (ZnO).

A NUTRITIONAL AND IMMUNOLOGICAL GAP

The period immediately following weaning is the most critical and challenging phase in piglet production, marked by profound nutritional and immunological stress. Piglets face a dual burden: the sudden transition from highly digestible sow's milk to solid, often complex, feedstuffs, and an abrupt drop in passive immunity precisely when the gut is most vulnerable to colonization by pathogens like enterotoxigenic *E. coli* (ETEC). This scenario frequently results in post-weaning diarrhea (PWD), intestinal damage, reduced feed intake (post-weaning lag), and a severe compromise of long-term growth potential.

Addressing this challenge requires more than crude protein delivery; it demands a combination of functional protein sources that work synergistically to offer maximum bioavailability alongside targeted biological activity. Egg powder is specifically manufactured through a gentle spray drying process to meet this requirement, acting not merely as a nutrient source but as a proactive strategy for gut defence and maturation. Its core value lies in its exceptional nutritional profile, a balanced complement of essential amino acids and fatty acids, perfectly paired with a concentration of potent bioactive molecules that bridge the immunological gap and stabilize the intestinal milieu in the absence of traditional prophylactic measures.

BEYOND THE HIGH DIGESTIBILITY OF EGG POWDER

While high protein digestibility is a fundamental requirement in pre-starter diets, the functional properties of egg powder elevate it into a distinct category of functional feed ingredients.

1. Immunoglobulins (IgY): The dominant immunoglobulin in egg, IgY, supplies crucial passive immunity. It binds effectively and specifically to a wide array of intestinal pathogens, including ETEC (e.g., K88 fimbriae) and *Salmonella spp*. By blocking the adhesion sites of these microorganisms to the intestinal mucosa, IgY reduces the pathogen load and mitigates the risk of PWD without driving antimicrobial resistance.

2. Antimicrobial Proteins: Egg powder also contains key antimicrobial proteins such as **Lysozyme**, which hydrolyzes the cell walls of Gram-positive bacteria, improving the balance of the gut microbiota. **Ovotransferrin** acts as an iron-binding protein, sequestering iron required by pathogenic bacteria for proliferation, thereby exerting a potent antibacterial effect. The synergistic action of these proteins promotes a healthy gut microbiota balance, essential for optimal nutrient absorption and defense.

3. Anti-inflammatory and Antioxidant Components: Molecules like Yolkine and carotenoids such as Lutein and Zeaxanthin are naturally concentrated in egg powder. Yolkine helps regulate the immune system, reducing the risk of inflammatory diseases. The antioxidants combat oxidative stress—a common consequence of weaning and inflammation—protecting enterocyte integrity and supporting overall epithelial barrier function. This multifaceted defence strategy ensures the intestinal barrier remains intact, which is paramount to preventing bacterial translocation and systemic infection.

NAVIGATING THE INGREDIENT BASKET: EGG POWDER AND THE ALTERNATIVES

Choosing the optimal protein source for the starter phase is a critical decision for feed formulators. When critically evaluated against three common high-value alternatives—Soy Protein Concentrate (SPC), Whey Protein Concentrate (WPC), and Highly Digestible Fish Meal (FM) - egg powder presents a superior combination of nutritional quality and functional efficacy.

Apparent/Standardized Ileal Digestibility (AID/SID): Egg powder provides an amino acid profile and digestibility (often exceeding 95% for crude protein) comparable to or surpassing WPC, the gold standard. SPC, while significantly improved over soybean meal, retains a lower digestibility profile. The high digestibility of egg powder is crucial, as any excess of undigested protein reaching the hindgut serves as a substrate for pathogenic bacteria, exacerbating PWD.

	Egg Powder	Soy Protein Concentrate (SPC)	Whey Protein Concentrate (WPC)	Highly Digestible Fish Meal (FM)
Digestibility	++	=	++	+
Anti-Nutritional Factors (ANFs)	=	--	=	=
Palatability/Feed Intake	++	-	++	=
Immune Efficacy	++	=	=	=
Impact on PWD	++	--	+	+
Price	+	++	--	+

Ingredients showing a + sign show advantages, = sign shows equal performance and - sign show disadvantages across the compared ingredients

Anti-Nutritional Factors (ANFs): The presence of ANFs is perhaps the most significant functional drawback of SPC. Soy antigens (glycinin and B-conglycinin) can trigger a hypersensitivity reaction and gut inflammation in young piglets. Egg powder, like WPC and high-quality FM, is virtually devoid of ANFs, ensuring minimal inflammatory burden on the fragile intestinal mucosa.

Palatability and Feed Intake: The critical post-weaning feed lag necessitates highly palatable ingredients. Both egg powder and WPC are highly palatable, promoting early and consistent feed intake. While FM is generally palatable, its quality can be variable. Egg powder's high acceptance aids in rapidly restoring nutrient intake, a key priority of successful weaning management.

Efficacy in Immune Function: This is where egg powder establishes a distinct functional advantage. While WPC contains high-quality protein, egg powder provides IgY and bioactive components that provide a targeted, immediate passive immunological defense that is clinically proven to neutralize specific pathogens in the intestinal lumen, directly reducing post-weaning digestive disturbances.

BUILDING RESILIENCE: THE PATH BEYOND PHARMACOLOGICAL INTERVENTION

The global regulatory phase-out of prophylactic zinc oxide (ZnO) has fundamentally changed post-weaning piglet health management. The environmental risk posed by excessive Zn accumulation, coupled with the ongoing push for responsible antimicrobial usage (AMU), demands highly effective functional alternatives.

Egg powder is a confirmed feed ingredient for a comprehensive strategy to reduce the use of ZnO and antibiotic growth promoters (AGPs). Studies have demonstrated that inclusion of spray-dried egg powder in pre-starter and starter diets can result in an Average Daily Gain (ADG) and feed efficiency comparable to, or even exceeding, diets containing high levels of ZnO or traditional growth promoters. This success is directly attributable to the dual action: the superior nutrient delivery minimizes the availability of fermentable protein in the hindgut, while the bioactive molecules such as IgY, Lysozyme, and others, actively suppress the proliferation of enteropathogens, a function previously outsourced to high-dose pharmacological zinc.

By mitigating the inflammatory damage and infectious challenge at the intestinal level, egg powder supports the long-term goal of fostering piglet resilience through nutritional means, reducing the dependency on drugs, and aligning feed formulation with the highest standards of sustainability and responsible livestock production.

PRECISION NUTRITION FOR NEXT-LEVEL PIGLET PERFORMANCE

Egg powder is a unique nutritional and functional ingredient, delivering a comprehensive solution to the complex biological stresses of weaning. Nutritionally, it provides an optimal amino acid profile closely matching the young pig's requirements, with high levels of lysine, methionine, threonine, tryptophan, and a source of highly available good fats, all in a highly bioavailable form. By offering highly digestible nutrients and specific bioactive molecules, egg powder ensures that the piglet's immune system is supported, the gut integrity is maintained, and performance parameters are maximized even in challenging production environments and in the regulatory environment left by high-dose ZnO. It is the definitive choice for nutritionists seeking precision, performance, and an immune boost in the post-weaning diet.

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Precision in Protection: AN EXPERT'S GUIDE TO REDEFINING FEED ADDITIVE MANUFACTURING

Dr. Stephanie Ladirat
R&D Director
Nuqo Feed Additives

"The fundamental challenge in advanced feed additive manufacturing is the technical imperative to ensure that fragile active ingredients, whether they are volatile essential oils, delicate seaweed extracts, or synergistic blends of organic acids and phytogenics, remain stable and bioavailable throughout the entire feed production and consumption chain. Without adequate and specifically engineered protection, these valuable compounds are highly susceptible to degradation, which can lead to a significant loss of efficacy and a diminished return on investment for producers."

In the complex and technically demanding field of modern animal nutrition, the efficacy of a feed additive is not an inherent property but a meticulously engineered outcome. Its true value is achieved only when its active compounds successfully complete a challenging journey from the manufacturing plant to their precise point of action within an animal's digestive system. This journey is fraught with significant technical obstacles, including exposure to the high temperatures and pressures of industrial feed processing, prolonged storage, and the aggressive, low-pH environment of the gastrointestinal tract. To achieve consistent results, a delicate and precise balance must be struck: the active ingredients require sufficient protection to survive these challenges, yet must be designed for a controlled release exactly where and when they are needed for maximum biological impact. This is the core problem that a leader in plant-based and encapsulated feed solutions has set out to solve. Through a sophisticated and multi-faceted manufacturing platform, the company is establishing a new technical benchmark for the industry.

FROM MOLECULE TO GUT: ENGINEERING SURVIVAL AND RELEASE

The fundamental challenge in manufacturing advanced feed additives is the technical imperative to ensure that fragile active ingredients, whether they are volatile essential oils, delicate seaweed extracts, or synergistic blends of organic acids and phytogenics, remain stable and bioavailable throughout the entire feed production and consumption chain. Without adequate and specifically engineered protection, these valuable compounds are highly susceptible to degradation, which can lead to a significant loss of efficacy and a diminished return on investment for producers. Conversely, generic or overly protective technologies can trap the active molecules, preventing them from being released in the specific gut regions where they are designed to perform their function. This intricate technical requirement necessitates a specialized and highly adaptable manufacturing approach that goes far beyond standard blending. Nuqo's extensive and specialized expertise in encapsulation is centrally developed and leveraged at its advanced Swiss facility,

where the focus is on mastering micro-encapsulation and granulation techniques to deliver highly stable, high-performance products. The facility is equipped with state-of-the-art pilot lines and industrial-scale spray chilling and spouted bed granulators, enabling a continuous cycle of innovation and refinement. This technical capability allows for the tailoring of production processes to the unique characteristics of each active ingredient and its intended application.

A NEW TECHNICAL STANDARD FOR FEED ADDITIVES

The commitment to solving these intricate technical challenges is formalized and encapsulated in the proprietary XPR standard, which stands for *eXtra Protection & Release*. This technical benchmark is not a single technology but a comprehensive and systematic development philosophy that guides the design, testing, and manufacturing of every product in the portfolio. The XPR standard is built upon three core technical pillars that work in synergy. The first pillar is the provision of high protection for high stability, which involves employing a toolbox of tailored methods such as spray chilling, fat coating, and advanced double encapsulation to effectively shield delicate active ingredients from the destructive forces of industrial processes. The second pillar is guaranteeing a specific release of actives in the animal, a feat achieved by deploying advanced technologies like micro-encapsulation and multi-layer coating. These techniques allow the targeted deployment of active compounds to the precise site of action, whether it is the olfactory receptors for enhancing palatability or specific segments of the gut for optimal bioavailability. Finally, the third pillar dictates that all solutions must be all-in-one, safe, and easy to use for the end-user. This is accomplished by engineering particles to be completely dust-free, free-flowing, and easily blended, thereby ensuring homogeneity within the final feed and enhancing safety for feed mill operators.

SCIENCE IN PRACTICE: TAILORED TECHNOLOGIES FOR SPECIFIC OBJECTIVES

The manufacturing expertise is most clearly demonstrated through a diverse range of flagship products, each of which has been meticulously designed with a specific application in mind. The innovative technologies enable the creation of highly targeted and effective solutions that address various animal health and performance needs across different species and production stages.

In the crucial domain of palatability and flavor, solutions utilize advanced technologies to significantly enhance feed intake. One such solution employs a sophisticated micro-pearl absorption technology to combine and protect volatile flavoring compounds within a retention-enhancing layer. This ensures the uniform dispersion and long-term stability of delicate aromatic molecules, providing a sustained immediate olfactory impact that is essential for stimulating feed consumption in sensitive or young animals. Another solution elevates this concept further by using micro-agglomeration to combine sweeteners and phytogenics into a single, cohesive particle, which features an inner core of bioactive compounds and an external layer of sweeteners. This dual-action approach not only effectively improves taste perception but also provides synergistic support for gut health, making it particularly effective in young animals during critical growth phases.

In the area of next-generation micro-encapsulated phytogenics, the power of high-concentration,


Photo: Nuqo


Photo: Ivonne Wierink | Shutterstock

high-stability encapsulation is on full display. The technology utilizes a proprietary spray-chilling fat encapsulation process to protect and deliver a potent blend of plant and seaweed extracts, designed for a targeted release within the animal's gut. This advanced process results in a product with an exceptionally high concentration of active compounds and a superior level of stability, even at very low inclusion rates. This enhanced stability is a key technical differentiator and a significant competitive advantage. As demonstrated in extensive comparative studies, this technology consistently outperforms non-encapsulated competitors in key performance metrics such as feed conversion, final body weight, and mortality reduction (Figure 1). This is due to its ability to prevent the degradation of active compounds over time and through feed manufacturing processes.

Finally, for controlled-release technology that provides a robust defense against pathogenic challenges, an innovative and highly effective double encapsulation system is employed. This technology is precisely engineered to provide a sophisticated two-phase release of its active components, which include a synergistic blend of five phytogenics, phycogenics, and six organic acids. One encapsulated layer is designed to release its contents in the early small intestine to stimulate digestibility and immunity, while the second, more robust layer releases later in the gut to provide continuous, broad-spectrum efficacy. This staged and strategically timed-release profile ensures that the active molecules are not only protected from degradation but are also deployed in a manner that maximizes their impact against a wide range of intestinal pathogens, including E. coli, Clostridium, and

Figure 1

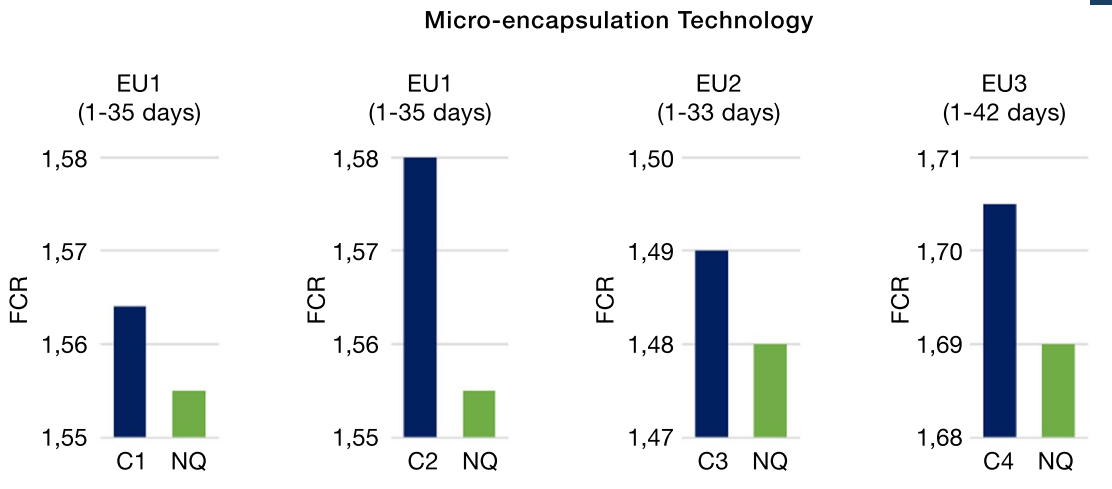
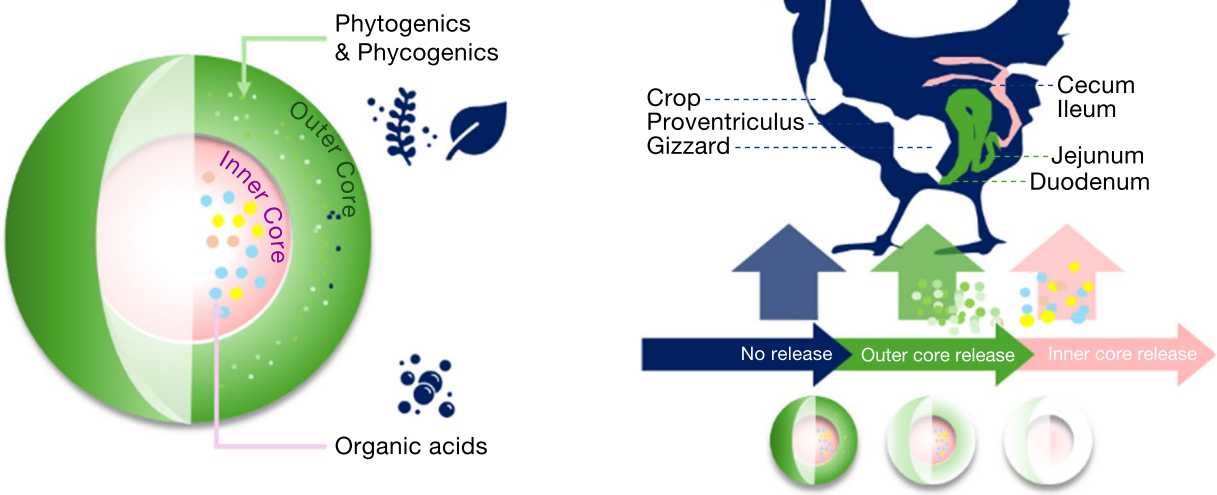


Figure 2



Salmonella, thereby maintaining animal performance under stressful conditions (Figure 2).

CUSTOMIZATION AND INNOVATION: A VISION FOR THE FUTURE OF NUTRITION

What truly distinguishes this approach is not just the breadth of its technological toolbox but its exceptional capacity for rapid prototyping and customization. Thanks to specialized pilot lines and deep industrial partnerships, the company can swiftly adapt existing formulations, rigorously test new concepts, and bring groundbreaking innovations to market faster than its competitors. This flexible and independent innovation model is in constant evolution, with ongoing developments focused on creating novel encapsulation matrices for highly heat-sensitive compounds, developing instantized formats for improved solubility in water applications, and engineering advanced carriers with enhanced odor-masking properties or targeted bioavailability. This forward-looking approach positions the company at the absolute forefront of the industry. By seamlessly integrating scientific rigor, technological versatility, and a deep understanding of customer needs, the company is not simply manufacturing feed additives; it is fundamentally reshaping the very way functional nutrition is delivered to animals. The ultimate goal is to provide a clear, scientifically validated, and highly effective answer to one of the most persistent and significant challenges in modern animal production: how to convert powerful molecules into tangible, real-world impact—a commitment that extends from the precision of the feed mill, to the health of the animal on the farm, and finally, to the integrity of the food chain.

About Dr. Stephanie Ladirat

Currently working as Nuqo's Technology Director, Dr. Stephanie Ladirat obtained her MSc degree in Food Technology with a specialization in Food Ingredient and Functionality and her PhD degree in Food Chemistry from Wageningen University (The Netherlands). During her PhD thesis, she studied in depth the human gut microbiota composition and its modulation upon prebiotic supplementation and/or antibiotic treatments. From 2014 till 2020, she worked at Cargill Animal Nutrition, first as technology lead for gut health additives and, then, as swine portfolio manager. She provided global technical product support for a broad range of products (phytogenics, organic acids, short and medium chain fatty acids, probiotics) and trained technical and sales teams. She most recently managed R&D projects and developed innovative feed additive solutions to answer specific customer needs related to animal gut health and performance.

Photo: Freepik

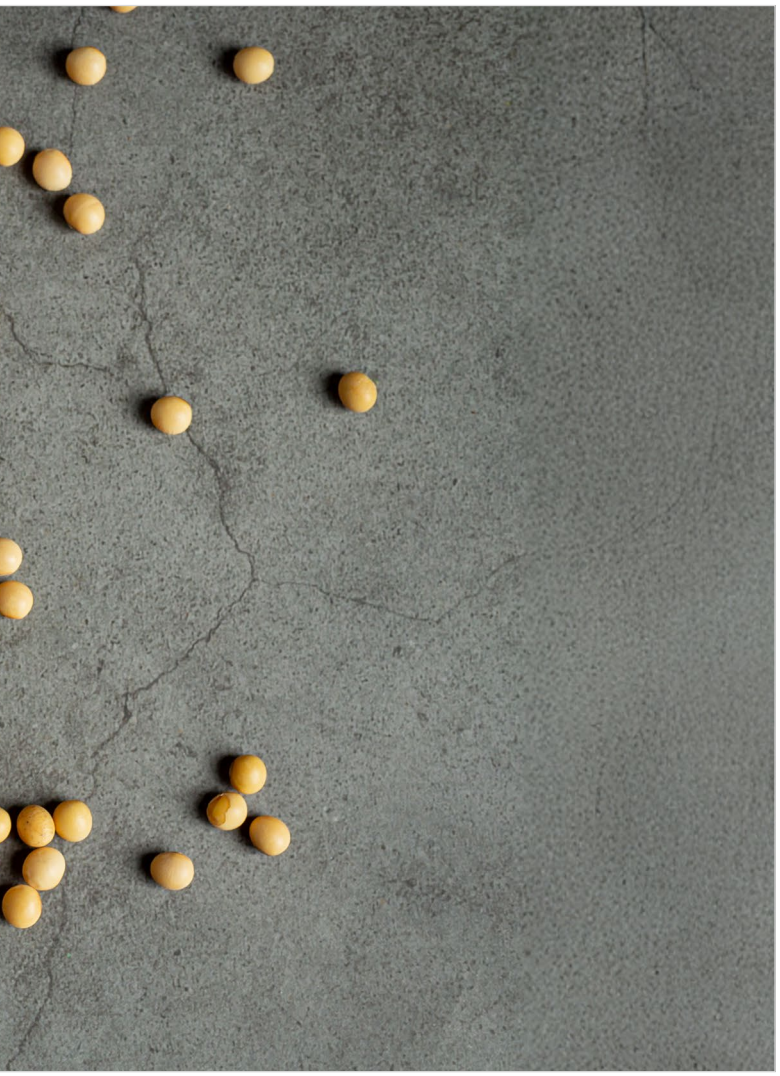
Global Oilseed Supply and Demand Strengthen in the New Season

The global oilseed market is showing strong signs of growth in production, crushing and consumption in the middle of the 2025/26 season. Strong supply dynamics are being maintained in the main product groups, particularly soybeans, rapeseed and sunflower seeds, while feed, oil and industrial demand are driving up global usage volumes. However, changes in China's import strategy, geopolitical risks in the Black Sea region and weather conditions in South America continue to create vulnerabilities in the market.

By Derya Gulsoy Yildiz

Global oilseed supply and demand points to strong production and consumption across all major product groups, particularly soybeans, rapeseed, sunflower seeds, palm kernel and cottonseed, as we enter the 2025/26 season. While demand growth driven by feed, oil and industrial uses continues to be noteworthy, trade-related shifts in some countries are creating sensitive points in the market.

The 2024/25 season saw a generally stable production and trade structure in the global oilseed complex. However, new season projections shared by the United States Department of Agriculture Foreign Agricultural Service (USDA FAS) indicate that growth



expectations for both production and consumption in the oilseed market are continuing in the 2025/26 season.

OILSEED PRODUCTION: 2024/25 SEASON AND 2025/26 OUTLOOK

According to USDA data from September 2025, global oilseed production, which stood at 682.1 million tons in the 2024/25 season, is expected to reach 691.6 million tons in the 2025/26 season. This estimated figure is approximately 9.5 million tons higher than the previous season and indicates a strong increase in production. According to estimates for the 2025/26 season, soybeans account for the largest share of global oilseed production at 61.6%. Soybeans are followed by rapeseed at 13.2%, sunflower seeds at 8%, cottonseed at 6% and palm kernel at 3%. These five oilseed types account for 91.8% of global oilseed production. Production of other oilseeds is around 58 million tons.

Brazil has the largest share of oilseed production on a country basis. According to USDA data, Brazil will produce 182.5 million tons of oilseeds in the 2025/26 season. This expectation indicates an increase of 6.4 million tons compared to the previous season. In global oilseed production for the 2025/26 season, Brazil will be followed by the United States with 126.8 million tons, China with 68.8 million tons, Argentina with 54.8 million tons, and India with 42.3 million tons.

Soybean

Soybean, the most important feed component in the animal feed sector, continue to be the backbone of global oilseed production. According to USDA data, soybean production, which was approximately 424.2 million tons in the 2024/25 season, is expected to reach 425.9 million tons in the 2025/26 season, an increase of 1.7 million tons. However, the latest report from the International Grains Council (IGC) indicates that soybean production will decline. According to IGC data from November 2025, global soybean production, estimated at 429 million tons in the 2024/25 season, will decline by approximately 3 million tons to around 426 million tons in the 2025/26 season.

According to the USDA's 2025/26 estimates, Brazil will maintain its position as the world's largest soybean producer with an estimated output of approximately 175 million tons. Although a slight decline is expected in the United States and Argentina due to weather conditions and changes in planting areas, total soybean production remains strong. The United States is expected to produce 117 million tons of soybeans in the 2025/26 season, while Argentina is expected to produce 48.5 million tons. China and India are the other two major producers contributing to soybean production. China's production is forecast to be around 21 million tons in the 2025/26 season, while India's production is expected to be around 11.6 million tons.

World Oilseed Production				
			2025/26 f'cast	
Production	2023/24	2024/25	Aug	Sep
Soybean	396.36	424.20	424.20	424.20
Rapeseed	89.99	85.73	85.73	85.73
Sunflowerseed	55.97	52.43	52.43	52.43
Cottonseed	39.48	41.07	41.07	41.07
Palm Kernel	19.59	20.61	20.61	20.61
Other oilseeds	56.06	58.03	58.03	58.03
Oilseed, Total	**657.45**	**682.07**	**682.07**	**682.07**

Source: USDA, September 2025, Million Metric Tons

Of the 425.9 million tons of soybeans produced in the 2025/26 season, 287.7 million tons are expected to be marketed as soybean meal. When it comes to soybean meal production, the global producer ranking changes, with China taking the top spot. According to the USDA's 2025/26 season estimates, China's soybean meal production will be around 85.5 million tons in 2025/26. China will be followed by the United States with 54.6 million tons, Brazil with 44.8 million tons and Argentina with 33 million tons in soybean meal production.

Rapeseed

Rapeseed stands out as the second most widely produced oilseed globally. Global rapeseed production, which reached 85.7 million tons in the 2024/25 season, is expected to increase by 5.3 million tons to approximately 91 million tons in the 2025/26 season, according to USDA estimates. This represents the largest expected production increase among all oilseed types. Canada leads rapeseed production with 20 million tons. It is followed by the EU with 19.7 million tons, China with 15.9 million tons, and India with 12 million tons.

In the 2025/26 season, approximately 49.6 million tons of the 91 million tons of rapeseed production are expected to be marketed as rapeseed meal. The EU, China, Canada and India stand out with their strong performance in rapeseed meal production, as they do in rapeseed production. In the 2025/26 season, the EU is expected to produce 14 million tons, China 11.5 million tons, Canada 6.5 million tons and India 6.4 million tons of rapeseed meal.

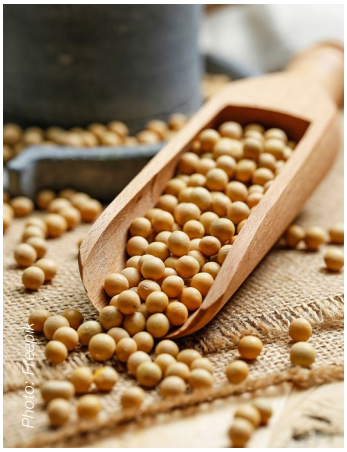
Sunflower Seed

According to USDA data, global sunflower seed production reached 52.4 million tons in the 2024/25 season. Expectations for the 2025/26 season are that production will increase by approximately 2.9 million tons to reach 55.3 million tons. Russia has the largest share in global sunflower seed production and is expected to produce 19 million tons of sunflower seeds in the 2025/26 season. Russia is followed by Ukraine with 12.7 million tons and the EU with 8.9 million tons.

Of the global sunflower seed production, which is expected to reach 55.3 million tons in the 2025/26

World Soybean Supply and Distribution					
Soyabean	2022/23	2023/24	2024/25 est.	2025/26 f'cast	
				23.10	20.11
Production	378	395	395	428	426
Trade	173	178	178	187	187
Consumption	369	385	385	430	431
Carryover stocks	62	72	72	79	77

Source: IGC, November 2025, Million Tons



season, approximately 22.4 million tons are expected to be marketed as sunflower meal. Russia is expected to account for the largest share of sunflower meal production during this period, with 7.4 million tons. Ukraine will follow Russia in sunflower meal production with 5.1 million tons, and the EU will follow with 4.4 million tons.

Cottonseed and Palm Kernel

According to USDA data, cottonseed production, which was 41 million tons in the 2024/25 season, will decline by approximately 200,000 tons to 40.8 million tons in the 2025/26 season. Global palm kernel production, announced at 20.6 million tons for the 2024/25 season, will reach 21.6 million tons in the 2025/26 season.

OILSEED CONSUMPTION: 2024/25 SEASON AND 2025/26 OUTLOOK

Global oilseed consumption is expected to remain strong in the new season for feed, oil and industrial use. According to the USDA, global oilseed crushing consumption volume reached approximately 563 million tons in the 2024/25 season. This volume is expected to increase by 17 million tons to approximately 580 million tons in the 2025/26 season. This figure indicates an increase in both feed protein requirements and vegetable oil demand. Soybeans account for the largest share of oilseed crush at 63.2%, which is directly proportional to their production volume. They are followed by rapeseed at 14.7%, sunflower seeds at 8.7%, cottonseed at 5.4%, and palm kernel at 3.6%. According to forecasts for the 2025/26 season, China will have the largest share of global oilseed crushing at 146.2 million tons. It will be followed by the United States with 73.7 million tons, Brazil with 64.1 million tons, the EU with 48.2 million tons, and Argentina with 46.7 million tons.

Data on oilseed meal consumption points to a significant increase. According to USDA data, total oilseed meal consumption, which was around 380.5 million tons in the 2024/25 season, will reach 395.3 million tons in the 2025/26 season. Soybean meal accounts for approximately 283.9 million tons of this consumption, while rapeseed meal accounts for 49.2 million tons. China accounts for the largest share of oilseed meal consumption at 113 million tons. It is followed by the EU with 51.4 million tons, the US with 43.9 million tons and Brazil with 24.4 million tons.

Soybean

Soybean meal and oil production continues to be the main determinant of demand in the feed sector. According to USDA data, the amount of soybean crushing, which was around 354.5 million tons in the 2024/25 season, is expected to reach 366.6 million tons in the 2025/26 season, an increase of approximately 12 million tons. The IGC, which reports total consumption data, forecasts that total soybean consumption, estimated at 419 million tons in the 2024/25 season, will reach 431 million tons in the 2025/26 season, a record increase of 12 million tons. According to the IGC, this increase in consumption will cause carryover stocks to fall from 82 million tons in the 2024/25 season to 77 million tons.

China has the largest share of global soybean crushing on a country basis. According to USDA estimates, China will

World Oilseed Crushing Demand

			2025/26 f'cast	
Crush	2023/24	2024/25	Aug	Sep
Soybean	331.19	354.51	367.71	366.63
Rapeseed	84.53	84.15	85.11	85.50
Sunflowerseed	52.28	47.54	50.66	50.56
Cottonseed	31.41	31.19	30.91	31.05
Palm Kernel	19.45	20.46	21.00	21.00
Other oilseeds	24.61	25.12	25.11	25.21
Total	543.46	**562.97**	580.49	579.95

Source: USDA, September 2025, Million Metric Tons

process 108 million tons of soybeans in the 2025/26 season. It will be followed by the US with 69.5 million tons, Brazil with 58 million tons, Argentina with 42.4 million tons, the EU with 15.3 million tons and India with 10.3 million tons.

A similar picture can be seen in soybean meal consumption. According to USDA estimates, China alone will account for 84.2 million tons of the 283.9 million tons of soybean meal consumption in the 2025/26 season. The United States will follow China in soybean meal consumption with 37.8 million tons, the EU with 29.2 million tons, and Brazil with 21.5 million tons.

Rapeseed and Sunflower Seed

Rapeseed crushing is expected to increase by around 1.3 million tons. According to USDA data, rapeseed crushing volume, which was 84.2 million tons in the 2024/25 season, will be around 85.5 million tons in the 2025/26 season. Rapeseed meal consumption will be 49.2 million tons during the same period. China and the EU will lead rapeseed meal consumption with 14 million tons each.

Approximately a 3 million ton increase is expected in sunflower seed crushing. According to the data, sunflower crushing volume, which was 47.5 million tons in the 2024/25 season, will reach 50.6 million tons in the 2025/26 season. Sunflower meal consumption is also expected to reach 22.1 million tons in the same season. The EU will account for the largest share of this consumption with 6.2 million tons, followed by Russia with 4.4 million tons.

Cottonseed and Palm Kernel

Global demand for cottonseed will decline. According to USDA data, the cottonseed crushing rate, which was around 31.2 million tons in the 2024/25 season, will decline to 31.1 million tons in the 2025/26 season. During the same period, consumption of cottonseed meal is expected to remain limited to 14.2 million tons.

In palm kernel, demand is expected to remain almost unchanged with minimal increase. According to USDA data, the palm kernel crushing volume, which was 20.5 million tons in the 2024/25 season, will be around 21 million tons in the 2025/26 season. Palm kernel meal consumption is forecast to be 10.6 million tons in the same season.

OILSEED TRADE: 2024/25 SEASON AND 2025/26 OUTLOOK

Global oilseed trade continues to expand overall in the 2025/26 season, despite some vulnerabilities. According to USDA data, oilseed imports, which stood at 206.2 million tons in the 2024/25 season, will reach 211.2 million tons in 2025/26 season.

World Oilseed Trade

Imports	2023/24	2024/25	Aug 2025/26	Sep 2025/26
Soybean	178.28	178.17	185.86	186.21
Rapeseed	18.26	20.07	17.73	17.01
Sunflowerseed	2.54	2.69	2.39	2.48
Cottonseed	1.19	1.07	1.08	1.08
Palm Kernel	0.19	0.19	0.15	0.15
Other oilseeds	4.08	4.02	4.24	4.24
Total	**204.54**	**206.20**	**211.46**	**211.17**

Exports	2023/24	2024/25	Aug 2025/26	Sep 2025/26
Soybean	177.81	183.47	187.44	187.78
Rapeseed	18.67	19.49	17.95	17.22
Sunflowerseed	2.71	2.86	2.51	2.61
Cottonseed	1.21	1.37	1.23	1.23
Palm Kernel	0.09	0.12	0.05	0.05
Other oilseeds	4.87	5.10	5.00	4.90
Total	**205.36**	**212.41**	**214.17**	**213.79**

Source: USDA, September 2025, Million Metric Tons

Soya beans (186.2 million tons) account for 88.2% of global oilseed imports, while rapeseed (17 million tons) accounts for 8%.

China has the largest share of oilseed imports on a country basis, and is expected to import approximately 117.5 million tons of oilseeds in the 2025/26 season. Approximately 112 million tons of this will be soybean imports and 4.1 million tons will be rapeseed imports. The EU follows China with 21.7 million tons of oilseed imports. Of the EU countries' oilseed imports, the largest share is soybeans with 14.3 million tons and rapeseed with 5.7 million tons. These countries are followed by Mexico with 8.1 million tons of oilseed imports (6.7 million tons of soybean imports) and Argentina with 7.2 million tons of oilseed imports (all of which are soybean imports).

Brazil has the largest share in global oilseed exports. According to USDA estimates, Brazil will export 112.6 million tons of oilseeds in the 2025/26 season, almost all of which will be soybeans. Brazil will be followed in oilseed exports by the United States with 46.9 million tons (45.9 million tons of soybean exports) and Canada with 11.8 million tons (5.1 million tons of soybean exports and 6.7 million tons of rapeseed exports).

OILSEED MEAL TRADE: 2024/25 SEASON AND 2025/26 OUTLOOK

Oilseed meal trade is expected to grow at a slower pace. According to USDA data, global oilseed meal imports, which stood at 107 million tons in the 2024/25 season, will reach approximately 110 million tons in the 2025/26 season. In the same season, the largest importers by country are expected to be the EU with 22.5 million tons, China with 9 million tons and Vietnam with 7.6 million tons. Argentina ranks first in terms of exports. According to USDA estimates, Argentina will export 31.2 million tons, Brazil 23.2 million tons, and the US 17.6 million tons of oilseed meal in the 2025/26 season.

A very large portion of global oilseed meal trade is in the form of soybean meal. According to USDA estimates, 78.6 million tons of soybean meal will be imported in the 2025/26 season. The EU will lead soybean meal imports with 17.6 million tons, followed by Vietnam with 6.6 million tons and Indonesia with 6.2 million tons. Argentina (30.1 million tons), Brazil (23.2 million tons) and the US (17.4 million tons) will account for the bulk of global soybean meal exports.

Rapeseed meal trade is quite limited compared to soybean meal. Rapeseed meal imports are estimated to reach approximately 10.2 million tons in the 2025/26 season. China is the largest importer in this product group, with 2.6 million tons. In terms of exports, Canada is the clear leader, with 5.5 million tons of rapeseed meal exports. India follows with 1.8 million tons.

International trade in other oilseeds and meal is quite low.

IMPACT OF SUPPLY AND DEMAND EXPECTATIONS

The 2025/26 season is notable for strong production and crushing volumes in the oilseed market. High production figures for key products such as soybeans, rapeseed and sunflower seeds appear poised to meet global protein and vegetable oil demand.

However, dynamics such as China's changing import strategies, rapeseed trade tensions between Canada and China, geopolitical fragilities in the Black Sea region, and production uncertainties in South America due to weather conditions continue to be decisive in the direction of global oilseed trade.

In the feed sector, soybean, rapeseed and sunflower meal retain their importance as primary protein sources, while demand for alternative protein sources such as palm kernel meal is also increasing. In the vegetable oil market, the trio of palm oil, soybean oil and sunflower oil will continue to drive global demand.

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Boehringer avian influenza vaccines receive EU support

Boehringer Ingelheim, one of the global leaders in preventive medicines for livestock, obtained positive opinions by the European Medicines Agency (EMA) recommending the granting of marketing authorisations under exceptional circumstances for its avian influenza vaccines VAXXITEK® HVT+IBD+H5 and VAXXINACT® H5. Both vaccines immunize birds against the H5 avian influenza virus, which is currently causing outbreaks across Europe, the company states.

Avian influenza, commonly referred to as avian flu or bird flu, is a highly contagious disease affecting domestic and wild birds. The H5 strain is one of the most prevalent avian influenza virus strains causing outbreaks in both wildlife and commercial flocks. As avian influenza is a highly regulated and notifiable disease, there is vigilant monitoring. To contain avian influenza outbreaks, large numbers of birds often need to be culled, leading to significant economic losses for poultry producers and possible restrictions in international trade.

As the virus continues to evolve, innovative vaccine solutions are an effective way to help prevent


Photo: Boeh

and manage avian flu outbreaks. Decisions regarding vaccination against avian influenza rest with the national authorities of each country. International institutions like WOAH (World Organization for Animal Health) recommend integrating vaccination into bird flu control strategies.

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Pooch & Mutt advances dog gut health testing with new lab

Pooch & Mutt, a pet food and health brand within the Vafo Group, unveiled a major step forward in its scientific capabilities with the acquisition of a new laboratory at AberInnovation, a world-class campus supporting cutting-edge agritech and biotech research.

Pooch & Mutt acquired BIOME9 in early 2025, a pioneering microbiome research company for veterinary partners across the UK. This allows the growing pet care brand to offer customers an at-home gut health test that uses science, research and AI to deep-dive into dogs' unique microbiomes, to identify current or potential future health issues.

The new facility, located alongside the UK's University of Aberystwyth and Aberystwyth Vet School, will bring all BIOME9 laboratory operations in-house. This move reportedly strengthens the scientific foundation behind Pooch & Mutt's Gut Health Test, ensuring even greater accuracy, faster turnaround times, and expanded research capacity for ongoing product innovation.


Photo: Freepik

Paul Dennison, CEO of Pooch & Mutt, comments, "This expansion strengthens our commitment to bringing even better pet care to owners. By investing in BIOME9's in-house laboratory capabilities, we can ensure the highest level of quality control and deliver faster, deeper insights from our Gut Health Tests. It's another major stride towards making good gut health accessible and actionable for every dog."

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Dr. Zheng receives first-ever Novus International Teaching Award

Novus representatives presented the company's first-ever International Teaching Award to Professor Jiangxia Zheng, Ph.D., during the Poultry Science Association's Pacific-Rim Scientific Conference, held October 13-16, 2025. The award honors exceptional educators outside of the United States who are shaping the future of poultry science through excellence in teaching, research, and mentorship.

A faculty member at the Department of Animal Genetics and Breeding, College of Animal Science and Technology at China Agricultural University, Professor Zheng has dedicated 18 years to advancing poultry education and innovation in the full range of poultry production. She currently leads a research program in egg quality and safety.

Her extensive academic work is matched by her commitment to education. From leading research programs to mentoring doctoral, master's, and undergraduate students, Professor Zheng is known for developing future scientists equipped to solve real-world agricultural challenges.


Photo: Novus

"My teaching philosophy centers on bridging fundamental concepts with cutting-edge industry applications through vivid case studies, aiming to transform abstract theories into practical problem-solving abilities," said Professor Zheng. "I believe effective learning occurs when students not only grasp foundational knowledge but also understand its real-world relevance. This synergy cultivates both professional competence and critical thinking."

Professor Zheng's dedication is informed by her roots: Family ties in rural China that drive her mission to improve farmers' lives through agricultural science.

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Alltech highlights sustainable animal agriculture at COP30

As world leaders, policymakers and sustainability experts gather for the United Nations' 2025 Climate Change Conference (COP30) in Belém, Brazil, held from November 10-21, Alltech stepped forward as a voice for the agri-food sector. Through high-level panels, strategic collaborations and screenings of its documentary World Without Cows, Alltech points out it helped to ensure that agriculture — long underrepresented in climate discussions — is recognized as essential to a thriving planet and meaningful climate progress.

"With a presence in more than 140 countries, Alltech's global perspective allows us to see the best of agricultural innovation in action," said Dr. Mark Lyons, President and CEO of Alltech. "Every day, we witness remarkable innovation taking place around the world — new ideas and technologies that are improving agriculture and enhancing its impact on people, animals and the planet. Science and collaboration are driving solutions that strengthen economies, nourish communities and restore our natural resources. This is the true power of agriculture: its ability to shape the future."


Photo: Freepik

Across Brazil, from Brasília to Belém, Alltech participated in key discussions on the future of sustainable livestock, carbon markets and regenerative food systems.

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New program aims to reduce dairy farm emissions

Farmers for Sustainable Food and Edge Dairy Farmer Co-operative announced the launch of EmPower+, a program that connects farmer-led innovation directly to environmental goals of the dairy value chain.

EmPower+ is described as offering data support services and a portfolio of production efficiency solutions designed to reduce greenhouse gas (GHG) emissions. The program pairs on-farm innovation with a robust accounting methodology to measure, report and verify emission reductions at the farm level.

This farmer-led, data-driven initiative aims to create a practical, transparent path for verified emission reductions to be embedded directly into milk procurement, creating new opportunities to recognize and reward measurable environmental performance across the dairy value chain.

"Dairy farmers have a long history of innovation and environmental stewardship and are ready to lead the next generation of solutions," said Tim Trotter, CEO of Edge and its affiliate Farmers for Sustainable Food, which will administer the program.


Photo: Edge Dairy

"Through EmPower+ we are building a collaborative, industry-aligned effort to promote and support farmer-led solutions to meet today's environmental challenges," Trotter added.

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New Study: Agroecology reduces agriculture's negative impacts

A comprehensive meta-analysis of 170 studies conducted across 21 European countries, led by Horizon EU project Agroecology-TRANSECT, finds that shifting to agroecological farming practices reduces agriculture's negative impacts on nature and contributes to climate mitigation.

The research, published in Agriculture, Ecosystems & Environment journal, brings together scientific evidence showing that agroecology, an ecological, sustainable and integrated approach to farming, consistently benefits ecosystems and contributes to climate mitigation.

Agroecology-TRANSECT's Scientific Coordinator Bertrand Dumont says, "We now have key evidence that the benefits of agroecology are not a notion but a fact. The meta-analysis found that biodiversity increased under agroecological interventions compared to conventional farming methods."

By contrast, conventional farming, characterised by large scale, high input mono-systems, is recognised as a major driver of environmental degradation, including biodiversity loss and greenhouse gas emissions, which contribute to the climate crisis.


Photo: Agroecology-TRANSECT Innovation Hub

"We have been aware for several years that a shift to more sustainable systems is necessary across Europe, and agroecology has emerged as a viable alternative," states Key Researcher Cian Blaix. "Until now, a comprehensive scientific review of its environmental benefits was lacking."

This new study combines data from arable, grassland, horticultural and perennial production systems.

The findings show that agroecological practices outperform conventional methods in supporting biodiversity, including plants, pollinators, insects, and soil organisms.

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AlgaEurope 2025 set to unite experts in Latvia

Organized by DLG Benelux and the European Algae Biomass Association (EABA), the AlgaEurope 2025 Conference is set to take place in Riga, Latvia, from 9-12 December 2025, bringing together the global algae community for four days of collaboration, innovation, and knowledge exchange.

The event is expected to welcome over 400 participants from across academia, research, and industry, making it one of the most significant annual gatherings dedicated to algae biomass.

This year's conference has received 245 abstract submissions, reflecting the diversity and innovation within the algae sector. Topics cover a broad spectrum including biorefinery, biostimulants, cosmetics, feed, food, and regulatory frameworks. Following a review by the Conference Committee, selected authors will present their research as speakers or through poster sessions.

The conference program, now available online, features a rich variety of scientific and industry presentations highlighting the latest research and commercial advancements in algae cultivation, processing, and applications. Sessions will explore emerging technologies, sustainability strategies, and market opportunities, complemented by keynotes from renowned experts Helena Abreu from Portugal, Avigad Vonshak from Israel, Poul


Photo: DLG

Erik Jensen from Denmark, and Leonel Pereira from Portugal.

The poster area and awards will spotlight leading research, with the Poster Presentation Awards - Gold, Silver, and Bronze - selected by the AlgaEurope Evaluation Committee. Participants can also cast their vote for the Audience Award through the AlgaEurope App, ensuring lively engagement throughout the event.

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SalMar and Lerøy partner for closed aquaculture systems

Norway-based SalMar and Lerøy are taking a new step in developing the country's aquaculture through a joint initiative on the next generation of closed production technology – Aquatraz C2. For both companies, this is part of their innovation-driven strategy to develop and test various technologies for the future of aquaculture.

The project includes the construction of six Aquatraz C2 units supplied by Seafarming Systems. The technology has been developed in collaboration with SalMar and Lerøy, building on experience from both the Aquatraz S1 delivered to Lerøy and the first four Aquatraz units developed for SalMar.

Each unit has a water volume of 70,000 m³, with six water intakes at a depth of 35 metres to ensure lice-free water and effective water exchange. This will double the volume of closed production capacity in Norway.

"If everything goes according to plan, the first fish will be stocked in these units in the first quarter of


Photo: BearFotos | Shutterstock

2027, with full operations from 2028," says Frode Arntsen, CEO of SalMar ASA.

Parts of the construction will be produced in modules in China, while assembly will take place at a Norwegian shipyard. The project also involves technology suppliers from Norway and Europe.

The aim has been reported as to help solve key challenges related to salmon lice and emissions.

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New data highlights forage trace element decline in 2025

Data from 1,500 silage samples highlights that while dry matter levels tend to be higher in 2025, there has been a continued decline in magnesium, copper and zinc over the past three years, according to a recent statement by Nettex. The samples show copper levels have dropped from 8mg/kg DM in 2023 to 6mg/kg in 2025, while zinc has fallen from 32mg/kg to 27mg/kg over the same period. The summer drought also contributed to reduced cobalt and iron concentrations.

"This is a particular concern in pregnant animals in all-year-round calving dairy herds and for spring-calving beef and dairy cows, which are typically fed predominantly forage based diets," warns Nettex Commercial and Technical Manager Nia Williams. "Mineral deficiencies in cows during pregnancy significantly affect both the health of the dam and the development of the foetus, leading to complications around calving and poor calf health."


Photo: Nettex

"Key deficiencies can cause severe metabolic diseases like milk fever and grass staggers, as well as problems with reproduction, immunity and foetal development. These can have long-term impacts on cow health, their ability to get back in calf, and longevity within the herd," Williams continues.

She notes, "Unborn calves depend entirely on the cow for their mineral supply, with the dam often prioritising the foetus's needs for trace elements at the expense of her own. However, a maternal deficiency can still cause long-term problems for the calf, affecting their development, immunity and growth."

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nextProtein secures €18M for insect protein production

nextProtein, an AgTech company based in Paris, Lyon, France and Tunisia, unveiled the successful close of its €18 million Series B funding round to scale up and accelerate production to meet growing market demand for insect-based protein.

The new investment will enable nextProtein to significantly scale its operations, including the opening of its second state-of-the-art production facility and expansion of production capacity operations and achieve profitability through its second facility in Tunisia designed to produce 12,000 tons of insect-based ingredients annually (of which 2,500 tonnes per year of protein powder).

The round is co-led by Swen Capital's Blue Ocean Fund and British International Investment, the UK's development finance institution and impact investor, and with continued support from existing investors Mirova through its fund dedicated to ocean protection and RAISE Impact. Additionally, €4 million of senior debt from Société Générale, CIC Paris Innovation, and La Banque des Start-ups by LCL underscores strong investor confidence in nextProtein's technology, business model, and path to scale, according to the announcement.


Photo: nextProtein

Founded to address the growing demand for sustainable protein alternatives, nextProtein produces insect-derived ingredients such as protein powder (nextMeal), oil (nextOil) and fertiliser (nextGrow), for the feed (primarily aquaculture, but also livestock and petfood) and agriculture industries.

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Mushrooms may stabilize dog cognitive health

What if the secret to helping dogs age better has been growing in the forest all along? A new study from MycoDog® suggests that mushroom-based supplements may help senior dogs stay sharper, calmer, and more connected, with 8 in 10 showing measurable improvement or stabilization in cognitive health after taking Clarity, MycoDog's proprietary blend of medicinal mushrooms and adaptogens.

"For more than a decade, I've been studying and using these fungi and adaptogens in clinical practice with rescue dogs," said Angela Ardolino, clinician, researcher, and founder of MycoDog. "Clarity was formulated from that research and real-world case experience. We're now seeing what I've witnessed for years - dogs reversing signs of cognitive decline and reconnecting with their families. These ingredients aren't just extending life, they're improving its quality."

The company states that the study represents the first formal evaluation of medicinal mushrooms for

Photo: Freepik

canine cognitive health. Thirty senior dogs enrolled in a 12-week protocol evaluating the safety, tolerability, and cognitive effects of Clarity in aging dogs showing signs of decline. Conducted under veterinary supervision by the Veterinary Health Research Centers (VHRC), the research was led by Dr. Joel Ehrenzweig, DVM, MRCVS, as Study Director, and Carter Easler, as Principal Investigator and MycoDog's Director of Research and Education.

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New study compares raw and kibble diets in dogs

According to a new study carried out by the DogRisk research group at the University of Helsinki, a high-carbohydrate kibble diet and a low-carbohydrate raw meat-based diet have markedly different effects on dogs' energy metabolism.

In the study, 46 Staffordshire Bull Terriers were fed either kibble or a raw food diet for an average of 4.5 months. The kibble diet was rich in non-fiber carbohydrates, while the raw food diet was high in fat and contained no non-fiber carbohydrates. Researchers measured several biomarkers before and after the trial, including blood sugar, insulin, cholesterol, triglycerides, ketone bodies, and bodyweight.

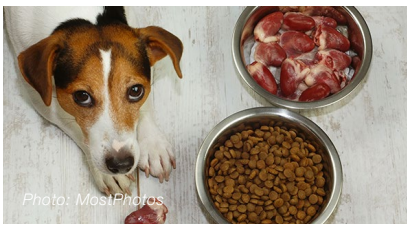
Significant key findings of the study are:

• Dogs on the kibble diet showed increased long-term blood sugar, blood lipids, and bodyweight.

• Dogs on the raw food diet showed decreased blood sugar, blood lipids, and glucagon levels.

• Both groups had increased ketone bodies, but levels were significantly higher in the raw food group, indicating a greater reliance on fat for energy.

• The raw food group also showed a decrease in the triglyceride-glucose index, a marker of insulin resistance previously used only in human studies.



"Interestingly, the kibble diet was associated with changes often linked to adverse metabolic health, while the raw food diet promoted metabolic responses generally considered favorable," said Dr. Sarah Holm, DVM and PhD, the study's lead researcher.

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NRGene Canada enters commercial Black Soldier Fly production

NRGene Canada signed its first commercial supply agreement for MaxBSF™ larvae, marking the company's transition from R&D to full-scale commercial operations in the Black Soldier Fly (BSF) industry.

The agreement establishes NRGene Canada as the newest supplier of one-day-old MaxBSF™ larvae to Infinite Harvest Technologies Inc (IHT), a Canadian CleanTech company launching its innovative Bugs4Rent™ technology which uses BSFL to upcycle AgriFood waste into sustainable, high-value products for animal and soil nutrition. Under the partnership, IHT will scale their waste processing capacity, adding MaxBSF™ as its primary Canadian supplier by 2026, scaling from initial trial volumes that began in 2025.

NRGene Canada describes MaxBSF™ as a novel, naturally bred strain developed by the company through the selective crossbreeding of multiple BSF lines sourced globally. The strain was created by identifying and combining progenies with distinct performance advantages for industrial-scale production—a process accelerated by NRGene's proprietary AI-driven genomics platform.

Extensive trials across multiple commercial environments have demonstrated:

• 50-150% faster growth compared to standard BSF lines,

• 7-8-day production cycles versus the industry standard of 14 days,

• Better adaptation to diverse feed mixes,

• Improved feed conversion efficiency - producing more larval biomass per unit of feed.

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CAT and UMBC partner for aquaculture sterility solutions

The Center of Aquaculture Technologies (CAT), one of the global leaders in sustainable genetic innovation for aquaculture, signed an exclusive licensing agreement with the University of Maryland, Baltimore County (UMBC) covering two patents related to the induction of sterility in finfish using Morpholinos. CAT states that this strategic collaboration strengthens its intellectual property portfolio and further backs their strategy in bringing responsible genome editing solutions to aquaculture.

There are many reasons to produce animals that do not undergo sexual maturation, reasons that align closely with the core goals of the aquaculture industry. Sterility in farmed fish offers benefits across performance, environmental protection, and animal welfare.

Why sterility matters:

• Improved Performance: Sterile fish avoid early sexual maturation, enhancing growth rates and feed

conversion efficiency, reducing production costs, and minimizing waste.

• Environmental Protection: Sterility safeguards the distinctive traits of wild populations, protecting biodiversity and supporting balanced ecosystems. This also addresses regulatory concerns with fish escapes from aquaculture production systems.

• Animal Welfare: By reducing stress and aggression associated with sexual maturation, sterile fish experience improved health and lower mortality rates.

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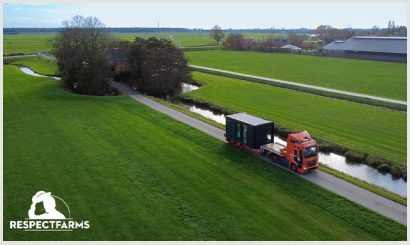
'World's first' cultivated meat farm launches

As a result of RespectFarms collaborating with dairy farmer Corné van Leeuwen, a working farm in Zuid-Holland, the Netherlands, is now equipped to produce cultivated meat, a global first. With the cultivated meat units installed and operational soon, the farm is expected to show how farmers can make meat directly from cells and integrate cultivated meat production into existing farm operations. The project is supported by the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-Agri) and the Province of Zuid-Holland, generating new knowledge and opportunities for livestock farmers, policymakers, and the wider community.

RespectFarms highlights this project as marking two major world-first achievements:

1. The launch of the world's first cultivated meat farm. Designed and implemented by RespectFarms, a farm-scale cultivated meat production unit is placed into Corné van Leeuwen's existing dairy operation, creating a real-world test centre for learning how cultivated meat production can complement livestock farming.
2. The first farmer in the world to receive agricultural funding for



cultivated meat production. Corné van Leeuwen has received support through EIP-Agri, which connects farmers, researchers, and businesses to accelerate innovation in agriculture across Europe. This framework enabled the use of agricultural funds to test a completely new food technology on an active farm, as an additional business model.

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Moldovan poultry producer secures EU export approval

Invest Moldova unveiled a landmark achievement for the country's agri-food sector: Axedum, a family-run enterprise from Anenii Noi, became the first Moldovan poultry producer officially authorized to export to the European Union. Invest Moldova views the milestone as a reflection of the growing impact of Moldova's national efforts to modernize its production ecosystem and integrate more deeply into European value chains.

Invest Moldova states that Axedum's success is a clear demonstration of how targeted guidance, investor-facing support, and market expansion initiatives can translate into tangible results for Moldova's private sector. It also showcases the country's capacity to meet the EU's strict food safety, traceability, and quality requirements—an essential criterion for the country's long-term export diversification agenda.

Founded by Natalia and Sergiu Paladi, Axedum has evolved from a small family farm into a

modern, EU-compliant production facility. According to the statement, the company's milestone reinforces the role of local producers in positioning Moldova as a reliable destination for high-standard agri-food goods.

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SGS urges vigilance on antibiotic residues in seafood

One of the world's leading testing, inspection and certification companies, SGS urged seafood producers to be vigilant in the monitoring and control of antibiotic and drug residue contamination in their products.

With the intensification of aquaculture for shrimp, salmon, trout, tilapia, catfish and other finfish, disease management has become a critical concern. Many aquatic diseases are caused not by bacteria, but by viruses, parasites, fungi or multifactorial conditions that suppress immunity. Despite this, antibiotics are often misused – posing serious risks to public health and the environment through antimicrobial resistance and contamination.

Underscoring growing concern over drug contamination in aquaculture products, the European Rapid Alert System for Food and Feed (RASFF) has reported a sharp rise in notifications related to prohibited substances or residues exceeding maximum residue limits (MRLs) in seafood. In the first ten months of 2025 alone, RASFF recorded 26 notifications involving drug residues. This follows a 50% increase in such alerts in 2024 compared to 2023.

EU Regulations 37/2010 and 470/2018 prohibit the use of chloramphenicol and nitrofurans – antibiotics reserved for human medicine – and Regulation 2019/1871 bans carcinogenic triphenylmethane dyes such as malachite green and crystal violet. While quinolones, tetracyclines, amphenicols and sulfonamides remain widely used in aquaculture, ensuring compliance requires technical expertise, especially when some residues may originate from natural sources or cross-contamination.

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VIV MEA 2025 explores future trends in animal production

VIV MEA 2025 reaffirmed its position as one of the premier B2B platforms for the feed-to-food industry in the Middle East and Africa, welcoming 10,830 professional visitors and 144 industry leaders from over 110 countries. Held from November 25–27, at ADNEC, Abu Dhabi, the event featured 505 exhibitors from 49 countries, showcasing cutting-edge solutions and technologies for animal protein production, animal health, breeding and hatching, croptech-feedtech, food engineering, feed ingredients and additives, aquaculture, and related sectors.

The organizers highlight that, over three days, VIV MEA delivered a vibrant marketplace for knowledge exchange, networking, and business development. Industry leaders, innovators, and decision-makers gathered to explore trends, forge partnerships, and discover solutions shaping the future of livestock, poultry, dairy, aquaculture, and related industries. The show's strategic partnership with the Abu Dhabi Agriculture and Food Safety Authority (ADAFSA) reinforced its commitment to advancing the region's feed-to-food industry, focusing on food safety and sustainable agricultural development.

Photo: VIV

Eng. Majed Musabah Almemari, Hay Supply and Storage Section Head at ADAFSA, shared "Supporting VIV MEA 2025 gave ADAFSA valuable opportunities to strengthen its role across the feed-to-food value chain. The event enabled our teams to engage directly with international experts, learn about the latest technologies, and exchange knowledge on food safety, animal health, and sustainable farming."

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Innovative soy supply expected to cut broiler feed emissions

At the request of Albert Heijn, a major Dutch supermarket chain, Plukon Food Group developed an innovative soybean supply chain to reduce the climate impact of soybean meal for broiler feed. By fully replacing conventional soybean meal in broiler feed with soybean meal sourced from this new soy chain, the climate impact of Albert Heijn's Beter Voor Natuur & Boer chicken products can be reduced by as much as 38%.

With this initiative, Plukon points out that it actively supports Albert Heijn's ambition to reduce greenhouse gas emissions across the supply chain by 45% by 2030 (compared to 2018). Together, they are aiming to pave the way for a more sustainable future for poultry production.

The new soy supply chain was established in close collaboration with feed manufacturer De Heus, soy suppliers ADM and Bunge, and with expert guidance from Merieux NutriScience | Blonk. All carbon footprint calculations


Photo: Freepik

were independently verified by EY and Kool Planet. The World-Wide Fund for Nature (WWF-NL) has recognized this approach as an important step forward in the sustainable cultivation of soy, Plukon remarks.

Read more>>

New Utrix poultry solutions debut in Lebanon

Utrix S.A.L. officially launched BactiCid®NG and 6 new liquid solutions in the Lebanese market. The company highlights this launch as representing another step forward in its mission to provide innovative, science-backed solutions that support animal health, productivity, and well-being.

The launch was marked by a customer event in Beirut, Lebanon. At the event, Dr. Maarten De Gussem, International Poultry Expert and founder of Vetworks, gave a keynote presentation on gut health and performance. He highlighted the importance of precision nutrition and practical field understanding, setting the stage for the introduction of Utrix's new solutions.

Dr. De Gussem said, "In the last 15 years in Europe, an estimated 50-70 % of broiler antibiotic use has been linked to bacterial enteritis (BE). For a long time, BE was confused with NE, but while NE is driven by one bacterium, BE is a complex, multifactorial disease. Antibiotics are not a long-term solution - even narrow-spectrum drugs


Photo: Freepik

disturb the beneficial microbiome and problems often relapse after treatment. The future lies in better diagnosis, data-driven management, natural, non-toxic alternatives and, above all, a clear focus on gut health as the key driver of performance."

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Phileo visits Nasekomo's Insect Center of Excellence

Nasekomo welcomed representatives from Phileo by Lesaffre – one of the world leaders in yeast and microbial fermentation – to its Nasekomo Insect Center of Excellence (NICE) in Sofia on October 29, 2025.

The visit was the result of an enduring exchange and cooperation, initiated and developed by Marco Tejeda, Head of R&D at Nasekomo, and Juan Paredes, Phileo's Global Species Manager – Insects. The collaboration began with a joint study of how selected products of Phileo can improve the growth and health performance of the black soldier fly (BSF). Nasekomo highlights that the promising results of these studies laid the foundation for more in-depth discussions and future prospects for collaboration between the two biotech companies.

The Phileo delegation, including Gildas Joaland, Director of Strategy and Partnerships, Juan Paredes, Global Species Manager – Insects, and Nadège Richard, R&D Aqua and Insects, was welcomed by Nasekomo's CEO Marc Bolard, Marco Tejeda, Head of R&D at Nasekomo, and key members of Nasekomo's technical team.

Photo: Nasekomo

Later, Xavier Marcenac, Executive Chairman of Nasekomo's Board of Directors, joined the discussions.

During the visit, the guests toured the industrial demonstration center, bioconversion facility and microbiology laboratory, gaining insight into Nasekomo's integrated process for converting organic side streams into high-value insect-based ingredients. The agenda also included cross-presentations highlighting the complementarity between the two companies' expertise in microbial and insect biotechnology.

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Proteine Resources secures new investment

Proteine Resources, a Polish biotech startup, announced a new investment round with participation from Radix Ventures. Radix's investment extends the €9.5 million financing secured in July 2025 from the European Innovation Council (EIC) Accelerator, bringing the company's total capital access to nearly €12 million in 2025.

The Proteine Resources team has patented the production process of EntoPro™, which the company describes as a revolutionary ingredient with exceptional properties. Firstly, Proteine Resources points out that the alternative proteins it has created are simply delicious, with over 80% of dogs and cats choosing food supplemented with EntoPro™, making it one of the most palatable alternative proteins on the market. Secondly, the alternative protein's composition matches 1:1 with beef, providing a full amino acid profile ensuring complete nutrition. Thirdly, it simultaneously possesses additional nutritional and

prebiotic properties, validated by numerous tests.

"Science confirms that the gut is the second brain, and we believe animals deserve the very best," says Bartłomiej Roszkowski, co-founder and co-CEO of Proteine Resources, adding: "EntoPro™ is not just an ingredient but the foundation of the Dual-Action Gut Health system, combining prebiotics and postbiotics to support gut health as the basis for the entire organism."

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Leaft Foods enters pet food market

Leaft Foods, a company that extracts Rubisco, the planet's most abundant protein, directly from green leaves, announced its expansion into the pet nutrition market with Alfalfa Protein Concentrate (APC), a sustainable protein ingredient that delivers meat-like nutrition with dramatically reduced environmental impact. The company simultaneously announced a strategic partnership with Meateor Pet Food Ingredients New Zealand for distribution in the United States, with European expansion planned for 2026.

The company highlights the move as representing a natural evolution of Leaft's comprehensive food production system, which creates maximum value from multiple nutrient streams within harvested alfalfa plants. While the company has gained recent recognition for its Rubisco Protein Isolate for human nutrition applications, APC represents years of intentional development specifically for pet food applications, demonstrating how Leaft's total utilization approach serves both human and animal nutrition markets through distinct, purpose-built products.

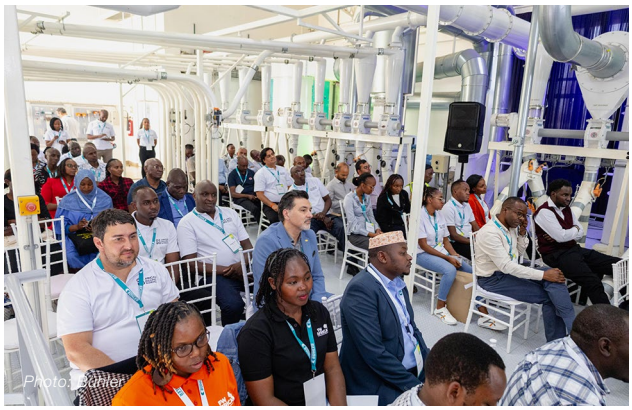
"Our total utilization approach was always designed to create value from the entire leaf, and pet nutrition represents the perfect application for our Alfalfa Protein Concentrate," said Ross Milne, CEO of Leaft Foods. "We're not just adding another ingredient to the market. We're providing pet food manufacturers with a way to maintain their premium meat-forward positioning while significantly reducing their environmental footprint."

Read more>>

Bühler marks 10 years of African Milling School in Kenya

Bühler marked the 10th anniversary of its African Milling School (AMS) in Nairobi, Kenya, with a ceremony that brought together more than 100 guests, including customers, alumni, and local partners. The event celebrated a decade of advancing skills in the milling industry and the graduation of 15 students from seven countries. Since 2015, the AMS has trained more than 1,600 millers from over 30 countries across Africa, the Middle East, and India. In a complex and high-pressure environment, developing a skilled workforce of millers has been essential to drive productivity, strengthen operational resilience, and secure the future of food and feed, Bühler remarks.

Founded in 2015 in response to customer demand for skilled professionals, the AMS was Bühler's first-ever dedicated training mill in Africa. The school was designed as a greenfield project in Nairobi, chosen for its accessibility, modern infrastructure, and strategic location for students from across the region. After four years of intensive planning and construction stages and an investment of



around CHF 5 million, Bühler opened the doors of this center combining state-of-the-art facility, practical and theoretical education, and a highly skilled teaching team.

Since its first class of 24 miller apprentices, the AMS has maintained a rigorous dual-education model inspired by the Swiss system: Students spend five months in their home country followed by one month at the school, completing four modules over two years.

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FAO brings agrifood systems to forefront at COP30

Sustainable and resilient agrifood systems are essential for achieving the Paris Agreement targets on climate change while ensuring food security and nutrition for present and future generations. This was the overarching message delivered by the Food and Agriculture Organization of the United Nations (FAO) to the 2025 United Nations Climate Change Conference (COP30) on November 10-21, in Belém, Brazil.

During the conference, FAO emphasized that science-based agrifood solutions can play a pivotal role in reducing emissions,

enhancing carbon sequestration, restoring ecosystems, and strengthening resilience.

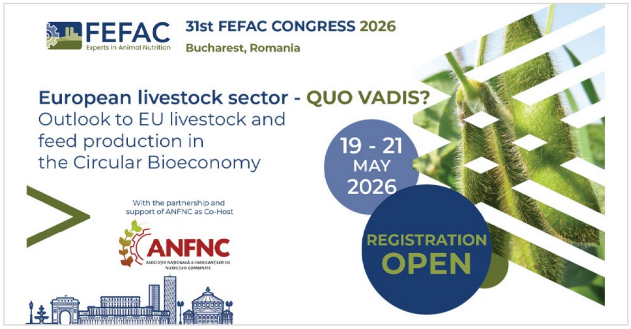
"From restoration of degraded agricultural lands to resilient crops and sustainable aquaculture, and livestock, we have the solutions that deliver across sectors," FAO Director-General QU Dongyu said ahead of the conference.

The biggest challenge, according to FAO, is finance. Despite an increase in critical agrifood investments, forestry, livestock, fisheries, and crop production together received just 4 percent of total climate-related development finance.

Read more>>

31st FEFAC Congress to be held in Romania

FEFAC, the European Feed Manufacturers' Federation, announced that registrations for the 31st FEFAC Congress are now open. The three-day programme will take place on 19–21 May 2026 in Bucharest, Romania, with the main Congress held on 20 May at the Hotel Intercontinental Athénée Palace, organised in collaboration with ANFNC, the Romanian National Association of Compound Feed Manufacturers.



• On 19 May, the programme will begin with the 13th ANFNC Annual Conference "Feed & Foresight 2026 – Vision and Innovation Driving the Future of the Sustainable Feed and Meat Industry in Europe", bringing together Romanian and European feed sector representatives. Congress registration includes access to the ANFNC Conference, as well as the welcome reception and festive dinner in the evening, offering informal networking opportunities with policymakers, academic experts, and representatives from feed and livestock companies across Europe.

• On 20 May, the 31st FEFAC Congress will address the central theme: "European livestock sector – Quo Vadis? Outlook to EU livestock and feed production in the Circular Bioeconomy". Participants will hear from EU policy makers, as well as decision makers from value chain partners and international experts on topics such as key market trends and trade developments, innovation in animal nutrition, and policy incentives for circular feeding practices. The conference takes place at a pivotal time for the European feed and livestock sectors, as the EU is expected to publish the first report on the long-term strategy of the livestock sector, calling for a more competitive, sustainable, competitive, and resilient food system.

Read more>>

Kaley Cuoco's pet wellness brand goes global

One of the world's largest online retailers, iHerb, LLC, announced a strategic partnership with Oh Norman!, the pet wellness brand co-founded by actress, producer and animal advocate Kaley Cuoco. This collaboration marks Oh Norman!'s official foray into the international market, leveraging iHerb's vast logistics network to reach pets and their loving families in over 150 countries.

Oh Norman!, named after Cuoco's beloved rescue dog, offers a curated line of supplements designed to support everything from gut health to itch relief in dogs. The brand describes its philosophy as centering on the simple, unconditional joy pets bring and ensuring they receive the same level of care as human family members.

"When I started Oh Norman!, it was all about giving all dogs the best life possible, and honestly, every pet deserves that VIP treatment," said Kaley Cuoco, Co-Founder of Oh Norman!. "But for us, the mission goes even further: A portion of every sale goes right back to rescue dogs who need help the most. Teaming up with iHerb is a massive


Photo: iHerb

moment for us because it means we can reach pups from London to Singapore, help them feel their absolute best, and boost our support for amazing rescue organizations. Norman would be so proud!"

Read more>>

IFFO: Global fishmeal output up 8% in September 2025

The Peruvian authorities announced on November 12 2025 that the quota for the second fishing season in the North-Centre of Peru - started on November 7 2025 - would be of 1,630,000 metric tonnes.

"This quota is well above the provisional quota set on November 1 and signals a science-based approach for the world's largest single species fishery, which produces 20% of global fishmeal in an average year. The biological survey completed a few days ago places the quota in line with the one granted for the last quarter in 2023 but below the one authorised in quarter IV 2024. Our projections for the 2025 global production remain at 5.6 million tons of fishmeal and 1.2-1.3 million tons of fish oil," commented Dr. Enrico Bachis, IFFO's (The Marine Ingredients Organisation) Market Research Director.

By September 2025*, the total cumulative annual fishmeal production rose by approximately 8% compared to the same period in 2024, according

to a recent statement by IFFO. This increase was driven by higher output in most regions, except for Iceland and North Atlantic area which reported year-on-year declines.

Similarly, cumulative fish oil output through September 2025 showed a year-on-year increase of around 6%. Most countries recorded positive trends compared to January–September 2024, with the exception of Spain and Peru.

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Novus unveils new product logos for enhanced visibility

Novus unveiled its refreshed product logos, designed to improve visibility and align with the intelligent nutrition company's corporate identity. Novus highlights that these updates reflect its continued commitment to delivering high-quality products that exemplify the company's philosophy, Made of More™.

The new logos and colors are already on company brochures, trade show booths, and the website.

Senior Director of Global Strategic Marketing Laura Muñoz says the new look is in service of the company's diverse customer base, which includes nutritionists, poultry, swine, and cattle producers, veterinarians, as well as feed mills and distributors.

"Following a comprehensive brand evaluation last year, we identified an opportunity to enhance the readability and recognizability of our product logos in warehouses, feed mills, and on farms," she expresses. "The result is a new lineup of bright, eye-catching colors and bold logos that are easier to distinguish, making them more user-friendly for crews handling Novus products daily." This change has been

years in the making, according to the announcement. Many of the product logos were unchanged since their launch, some going back as far as the 1990s. As part of Novus's broader rebranding initiative that began in 2020, the company saw an opportunity to unify its product branding.

Read more>>

Aboitiz Foods recognized for Pilmico–Gold Coin rebrand

Positioning itself among Asia's leading integrated food and agribusiness companies, Aboitiz Foods garnered top regional recognition as its rebranding initiative—integrating Pilmico and Gold Coin under a single corporate brand—won Gold in the Philippines and Bronze in Asia-Pacific at the first-ever NEXT Awards 2025.

Held in the Philippines on November 27, 2025, at Shangri-La the Fort Manila, the NEXT Awards celebrated the most innovative branding initiatives across the region.

Aboitiz Foods' rebranding initiative was honored for its creativity, innovation, and excellence in successfully unifying a diverse, multi-country business under one corporate brand, affirming the company's regional growth ambitions and reinforcing its commitment to the brand promise, "Together We Nourish the Future".

"Becoming Aboitiz Foods represented more than a name change or logo refresh; it marked a new chapter for the company," said Joeben Gamatero, Aboitiz Foods' Vice President for Brand & Reputation Management and Agribusiness Marketing, adding, "Bringing Pilmico and Gold Coin together under Aboitiz Foods propelled our business forward, creating a distinct, singular voice that resonates powerfully with both our customers and employees. It clearly demonstrated how a unified identity can inspire teams to pursue shared goals."

Photo: Aboitiz Foods

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