

Feed. Additive

INTERNATIONAL MAGAZINE FOR
ANIMAL FEED & ADDITIVES INDUSTRY

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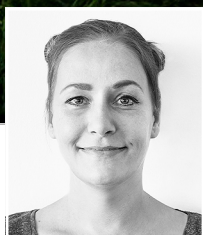
November 2025 Year: 5 Issue: 58

Issue Focus:

Weaning Period &
Young Animal Nutrition

Market Report:

Essential Oils in Animal Feed
and the Global Market Status



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Raspberry flavour benefits: A fruity
solution for piglet weaning success



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Hydrothermal processes
for stable proteins



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Not all encapsulated nutrients
are created equal



In animal farming, each production cycle is defined by a beginning. The most critical stage of this beginning is the weaning period. The feeding pattern, intestinal health, and immune system of young animals are reshaped during this period. However, this

process can also bring problems such as stress, loss of appetite, diarrhea, and growth stagnation.

In this issue, we address the theme of “Weaning Period and Young Animal Nutrition”, examining potential health problems encountered during the weaning period, feeding strategies to prevent these problems, and the impact of proper nutrition on long-term performance. We hope that expert opinions and innovative product solutions will offer producers a holistic view for sustainable success in feeding their young animals.

This month also brings an important reminder with World Antibiotic Awareness Week, November 13–19, regarding the responsible use of antibiotics. Preserving the effectiveness of antibiotics safeguards both animal and human health and is everyone's shared responsibility. The livestock sector can do its part in combating this shared problem by implementing preventive strategies that reduce the need for antibiotics. For example, proper feeding approaches during the weaning period, probiotics, prebiotics, organic acids, and phyto-additives can play a critical role in reducing the need for antibiotics by supporting the immune system.

The right start and preventive measures form one of the strongest foundations of sustainable production.

We hope to see you in the next issue...

Enjoy your reading...

Feed Additive

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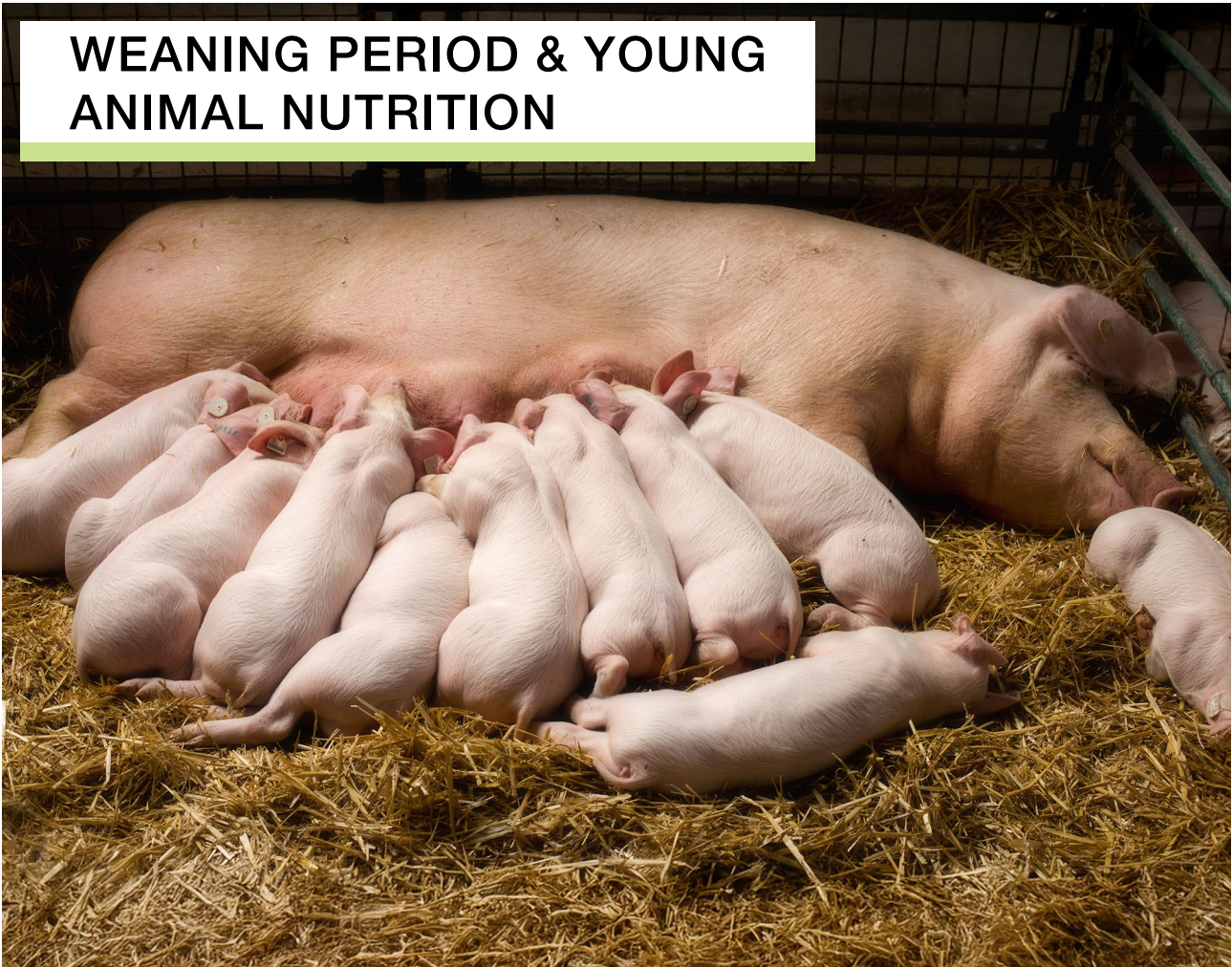


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WEANING PERIOD & YOUNG ANIMAL NUTRITION



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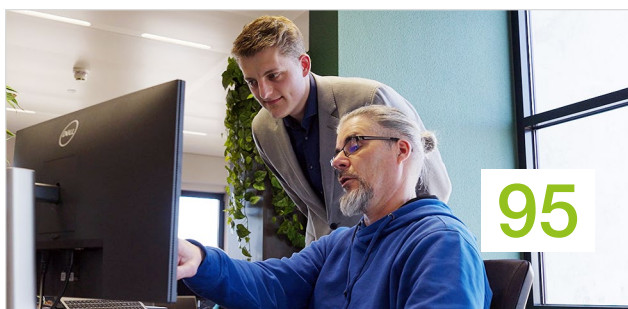
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FFAR CATALYZES RESEARCH PARTNERSHIPS TO AMPLIFY IMPACT

Dr. Jasmine Bruno
Scientific Program Director
Foundation for Food & Agriculture Research



Livestock and poultry producers face unprecedented pressure to increase productivity and profitability, while providing safe, affordable protein, adapting to consumer preferences and protecting animal health. They also confront complex, interconnected challenges such as antimicrobial resistance, manure management and disease threats like H5N1 and New World screwworm.

PUBLIC-PRIVATE PARTNERS GENERATE ACTIONABLE SOLUTIONS

Through research-based, cross-sector partnerships, the animal agriculture industry has the power to address major challenges with actionable solutions. Across the United States, public-private collaborations unite producers, researchers, funders and other stakeholders to ensure research is practical, timely and applicable in the real world. These partnerships also extend public investment, bringing additional resources to accelerate breakthroughs from lab to field, driving innovation, resilience and growth across food and agriculture.

FOUNDATION FOR FOOD & AGRICULTURE RESEARCH

Congress established the [Foundation for Food & Agriculture Research](#) (FFAR) in 2014 to catalyze the creation of [public-private partnerships](#) to support bold science addressing big food and agriculture challenges. These collaborations bring together experts from academia, industry, government and nonprofits to increase public investment in agriculture research and deliver impactful, industry-aligned [research solutions](#).

Consortia Accelerate Research by Pooling Resources

[Consortia](#) are one of FFAR's signature models for collaboration. They bring together multiple public and private entities to co-design a mission, define research priorities and establish a governance framework that guides funding, fosters collaboration and produces actionable results. FFAR brings public funds provided by Congress to leverage additional investments from consortium members. Together, these pooled resources support research on challenges too large for any single organization to tackle alone.

International Consortium for Antimicrobial Stewardship

FFAR's [Production Systems Priority Area](#) includes the [International Consortium for Antimicrobial Stewardship](#) (ICASA). Antibiotics are vital for animal health, but protecting their effectiveness is crucial for both humans and animals. [FFAR partnered with industry leaders, researchers and producers](#) to fund research through ICASA on diagnostics, health and management practices that reduce antibiotic reliance while keeping livestock healthy. Over five years, it has invested more than \$15 million in 29 projects advancing animal health and stewardship. Building on this foundation, ICASA is exploring new collaborations to foster innovation and continue advancing responsible antimicrobial use in livestock production.

Greener Cattle Initiative

Another FFAR consortium, the [Greener Cattle Initiative](#) (GCI) is the first to share knowledge, leverage in-

vestments and accelerate research for scalable, commercially feasible solutions to reduce dairy and beef enteric methane emissions. GCI exceeded its initial \$5 million funding goal by 45% thanks to increased stakeholder commitments, awarding \$7.2 million across [three projects](#) through its first request for applications (RFA). Results from a second RFA will be announced soon.

SMART Broiler Program

FFAR sometimes partners with just one or two organizations to advance animal production research as well. For example, in collaboration with McDonald's Corporation, FFAR launched the [SMART Broiler program](#) to develop automated tools that objectively assess broiler chicken welfare across the supply chain. The program offered \$4 million in grants to successful developers, with Amazon Web Services, Accenture and USPOULTRY providing management, technical support and sponsorship, demonstrating strong support from the U.S. broiler industry for this initiative.

Commodity Groups & Check-Off Programs

FFAR frequently partners with farmer and commodity groups and check-off programs, also. FFAR collaborated with the Swine Health Information Center, for example, to develop and fund three research programs, two of which were additionally funded by the Pork Checkoff program. These programs address [H5N1 risk to swine](#), [Japanese encephalitis virus](#) and [wean-to-harvest biosecurity](#). The United Soybean Board has also partnered with FFAR on several research initiatives, including FFAR's new [Crop-Animal Systems Research Program](#).

Beef Research Roadmap

Successful public-private partnerships can take other forms, too. FFAR collaborates with organizations through industry working groups that identify research gaps, align stakeholders around shared goals and chart paths for continuous improvement. One result of these groups is the U.S. Roundtable for Sustainable Beef's (USRSB) new publication, [Innovation in the U.S. Beef Value Chain: A Sustainable Beef Research Roadmap](#). With FFAR's support, USRSB conducted industry focus groups and convened experts from across the beef value chain to shape the roadmap, ensuring a unified strategy for advancing U.S. beef sustainability.

Manure Management

Manure management is another challenge requiring collective action. Leveraging its strength in catalyzing research partnerships, FFAR convened a stakeholder working group, guided by an advisory council with representatives from Colorado State University Ag Innovation Center, Dairy Management Inc., the University of Vermont, the U.S. Department of Agriculture (USDA) Agricultural Research Service and a major food and beverage company. This year, the group commissioned a literature review and hosted the Advancing Innovation in Dairy Manure Management Workshop, focusing on innovations for medium-sized farms, adoption barriers and opportunities to create manure products that increase producer profitability and environmental sustainability.

Emerging Pests & Pathogens: ROAR Program

While consortia, working groups and smaller partnerships are effective for developing long-term programs to tackle persistent challenges, animal agriculture also faces urgent, immediate threats, such as H5N1, New World screwworm and Asian longhorned tick. FFAR's Rapid Outcomes from Agricultural Research (ROAR) program deploys funding to support research and outreach in response to these emerging or unanticipated threats to the nation's agricultural systems. For example, FFAR and the National Pork Board awarded a \$1 million ROAR grant that enabled USDA researchers to rapidly respond to African Swine Fever, a deadly virus that threatens the U.S. pork industry. The researchers identified immunity-providing proteins in swine and developed a vaccine, now in field trials. Once commercialized, the vaccine has the potential to save the U.S. pork industry \$2.5 billion annually if the virus enters the U.S.

JOIN US TO HELP PRODUCERS OVERCOME TODAY'S CHALLENGES

This spirit of collaboration fuels our funding partnerships and the [transformative impact they are having on U.S. agriculture](#). If you share FFAR's vision of a world in which pioneering, collaborative science provides everyone access to affordable, nutritious food produced on thriving farms, we want to hear from you. [Contact us](#) to explore partnership opportunities that drive innovation, resilience and growth across the food system. Innovation occurs faster when we work together.

dsm-firmenich and Bayer partner for Sustell

dsm-firmenich Animal Nutrition & Health and Bayer signed a Memorandum of Understanding (MoU) to advance sustainability in the animal agriculture sector.

This new collaboration will enable the value chain to accurately measure and effectively reduce the environmental footprint of farming by combining Bayer's expertise in primary crop life cycle assessment (LCA) data with Sustell™—an ISO-assured environmental footprinting solution for animal protein.

Consumers, retailers, food service providers, processors, and even the finance community increasingly demand transparent and

credible environmental reporting. Animal nutrition, and especially the crops used for feed, play a decisive role in the overall footprint of animal protein. Reliable, primary data from crop to feed to farm to processor is essential for building trust and enabling smarter, sustainability-driven choices.

Bayer has been supporting companies in measuring the carbon footprint of crops since 2020, offering primary crop data.

Sustell™, developed by dsm-firmenich, is highlighted as a widely recognized as the most advanced solution for accurate and credible environmental footprint measurement and reporting in animal protein value chains. Sustell™ enables



companies to understand the true impact of their operations and identify the most effective areas for improvement while unlocking significant business value.

By bringing these two strengths together, the collaboration aims to establish a new benchmark for transparency and accountability across the entire animal protein value chain—from crop production to processed products.

[Read more>>](#)

BASF returns to market with innovative vitamin A and D3 blend

BASF launched Lutavit® A/D3 1000/200 NXT – a next-generation vitamin formulation – that combines vitamin A and vitamin D3 in a single, microencapsulated form. This innovative product marks BASF's return to the market with a product that delivers convenience, performance, and sustainability.

“Our customers can count on BASF's decades of expertise in vitamin A formulation, drawing on the strengths of our unique production Verbund site in Ludwigshafen. With our commitment to highest quality, we provide ingredients that our partners can trust to support their success,” said Christian Müller, Vice President Business Management Vitamins & Carotenoids at BASF. “By producing Lutavit® A/D3 1000/200 NXT at the world's largest vitamin A formulation facility, we leverage advanced resource efficiency and utilize energy sources as well as raw materials that help reduce our carbon footprint. This not only ensure reliable supply and



excellent product quality but also supports the sustainability goals of our customers.”

According to the statement from BASF, Lutavit® A/D3 1000/200 NXT delivers a consistent 5:1 ratio of vitamin A to D3, making it suitable for all animal species. It demonstrates superior stability across all relevant applications, even in demanding premixes and pellets. The product offers an 18-month shelf life under standard storage conditions and proven bioavailability of vitamin A in all relevant species.

[Read more>>](#)

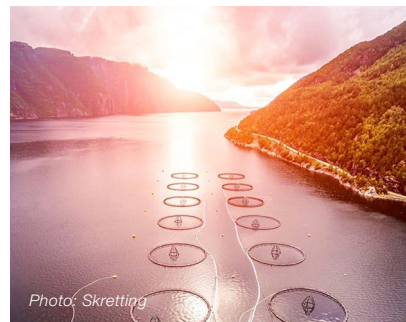
Skretting introduces Necto for fish welfare

Skretting announced the official launch of Necto — a new functional health diet formulated for fish that is powered by proprietary EDGEOS PhytoComplexes. With Necto, the company highlights the focus as being on meeting one of the main industry challenges today: Safeguarding fish health and welfare.

Supported by many years of research and studies, Necto is the first Skretting product ever to feature commercially PhytoComplexes, representing a significant milestone in the company's innovation journey in fish nutrition. These PhytoComplexes were spe-

cially created for use in aquaculture in partnership with Nutreco Exploration, a Nutreco division that specialises in plant research and the development of novel and unique ingredients.

Improving fish and shrimp survival has always been a top priority for the aquaculture industry. As this can be impacted by a multitude of factors such as stress, environmental issues, and infections, the industry's focus has shifted from disease resistance towards welfare and well-being, with growing emphasis placed on resilience – the ability to withstand and cope with challenges.



With Necto, Skretting aims to go beyond traditional feed formulations and set a new standard in functional diets. In addition to the PhytoComplexes, Necto reportedly provides the most advanced composition of functional ingredients.

[Read more>>](#)

Crown introduces Monarc, new alcohol-based extraction technology

CPM|Crown announced Monarc Clean Oilseed Processing™, a revolutionary, patent-pending alcohol-based solvent extraction technology that is projected to have competitive operational efficiency to traditional hexane-based extraction systems while delivering significant advantages in safety, environmental impact and consumer appeal.

Historically, oilseed processors have relied on hexane-based extraction as the most efficient and cost-effective method to produce the cooking oils, protein meals and ingredients that form the foundation of countless food products consumed worldwide. According to CPM|Crown, without the efficiency of hexane-based extraction, the world simply couldn't produce enough affordable protein and oil to feed today's population of over 8 billion people.

Kris Knudson, President of Crown, describes the effort that went into creating Monarc: "Starting from our company's foundation of industry-lead-



ing experience in solvent-based extraction technology—and specifically over 50 years in alcohol-based extraction—our experts spent over 5 years developing this revolutionary technology with cutting-edge process simulation software, our unmatched R&D resources and dozens of runs at our state-of-the-art Innovation Center. We're proud of the perseverance and hard work of our team and are thrilled to introduce Monarc to the industry and the world."

[Read more>>](#)

New study shows krill meal enhances salmon growth

A new study, unveiled by Aker QRILL Company, found that including QRILL Aqua in low fishmeal diets helps Atlantic salmon maintain growth, nutrient utilization, and fillet quality, while reducing the need for plant proteins and synthetic additives. Conducted by researchers from the Atlantic Veterinary College (UPEI), Dalhousie University, and Aker QRILL Company, the trial also found that higher krill meal inclusion improved the visual appearance of wounds after healing, a potential benefit for harvest quality and market value.

As today's salmon feeds are

mainly plant-based with small inclusion of marine ingredients to address resource sustainability, farmers face challenges such as reduced palatability, nutrient imbalances, and increased reliance on synthetic supplements.

Mark D. Fast, PhD, Professor at the University of Prince Edward Island, states, "Our findings show that higher inclusion of QRILL Aqua in low-fishmeal diets preserves fish growth and nutrient use — but importantly also leads to reduced scarring and improved gross appearance of wounds, which helps to improve fillet quality and reduces



Photo: Andrei Armiagov | Shutterstock

economic losses for producers"

Kiranpreet Kaur, Director RCD, Aker QRILL Company, adds, "This research shows that QRILL Aqua can maintain high fish performance in plant-based diets, low fish meal. It's a functional ingredient that delivers both nutritional and environmental benefits."

[Read more>>](#)

Ecolex Commercial Director highlights gut health strategies to reduce AMR

Edward Manchester, Global Commercial Director of Ecolex Animal Nutrition, delivered a compelling presentation on "Nutritional Interventions to Reduce Antimicrobial Resistance (AMR)" at the Vietstock 2025 AMR Forum on October 9, 2025. He emphasized that the AMR crisis is intensified by the absence of new antibiotic classes, with no discoveries made since 1984, only modifications of existing compounds.

Manchester advocated for integrating nutritional interventions into a feed strategy as part of a comprehensive and integrated One Health approach that also includes biosecurity and hygiene, and good farm management practices aligned with Vietnam's National Action Plan on AMR.

The selection of alternatives to antibiotics should consider specific gut health challenges, farm management systems, economics and regulatory requirements. According to Manchester, just some of the nutritional interventions to enhance gut health and reduce AMR include: Mitigating Mycotoxins, Reducing Pathogen Load and Increasing Digestion, Maximizing Nutrient Absorption, Novel Antibac-



terials, and Medium Chain Fatty Acids (MCFAs).

Manchester concluded that ensuring a sustainable future for animal agriculture requires strong industry collaboration. This includes uniting farmers, veterinarians, nutritionists, feed millers, and feed additive suppliers under a comprehensive One Health approach. By working together across disciplines and sectors, stakeholders can implement integrated strategies that combine nutritional interventions with biosecurity, hygiene, and good farm management practices. Such collective action is essential to effectively reduce antimicrobial resistance, safeguard animal and public health, and support resilient and productive livestock systems.

[Read more>>](#)

New research reveals diverse APEC threats for poultry

E. coli bacteria are typically harmless, but certain strains, known as Avian Pathogenic *E. coli* (APEC), can cause serious illness in poultry, leading to significant financial losses and animal welfare issues. New research from the UK-based University of Surrey and University of Bristol, in collaboration with Poultry Health Services, has determined why various strains of APEC behave so differently.

The study, published in *Virulence*, analysed a colibacillosis outbreak in turkeys in the UK, and found that a strain called ST-101 was the dominant cause of the outbreak, accounting for nearly 60% of cases. This strain of APEC had not been previously

reported as the primary cause of a turkey outbreak in the UK.

By comparing ST-101 to a variety of high-risk APEC strains, the team from Surrey, led by Dr. Jai Mehat, Dr. James Adams, and Professor Roberto La Ragione, found that the ST-101, ST-95 and ST-140 strains were found to be better at invading and surviving inside chicken gut cells and immune cells (macrophages) compared to the ST-23 and ST-117 strains. However, despite being less effective at invading cells, the ST-117 strain was found to be the most lethal in an insect model of infection, suggesting that different strains cause disease differently.

“Our research shows that a one-size-fits-all approach to controlling



Avian Pathogenic *E. coli* (APEC) infections is not effective. Current vaccination strategies often target specific strains, but they may not protect against emerging APEC threats. Therefore, we need to develop new vaccines that can target a variety of APEC strains,” says Dr. Jai Mehat, senior author of the study and Lecturer in Molecular Bacteriology at the University of Surrey.

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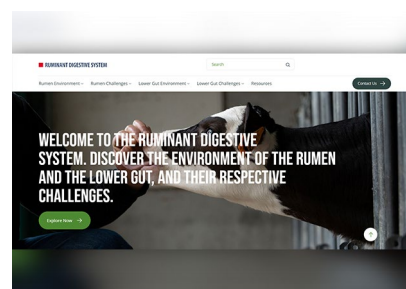
Lallemand launches ruminant digestive health program

As part of Lallemand Animal Nutrition Services, Lallemand Animal Nutrition is launching a comprehensive educational program on ruminant digestive welfare, featuring the newly relaunched ruminantdigestivesystem.com in an enhanced interactive format. The program aims to provide nutritionists, farmers, advisers and veterinarians with valuable training information on critical topics related to the entire ruminant digestive tract and its impact on overall cattle welfare and productivity.

Previously focused on rumen health, the relaunched platform

now expands to cover the complete ruminant digestive system, Lallemand highlights. The redesigned website introduces interactive learning resources alongside a forward-thinking educational format. These enhancements ensure nutrition professionals remain at the forefront of ruminant digestive health science through ongoing education and access to innovative technical resources.

“The future of ruminant production lies in sustainable practices that support herd health naturally,” said Laurent Dussert, Global Category Manager for Ruminants at Lallemand Animal Nutrition. “We’ve



transformed years of research and field expertise into an accessible learning platform that equips professionals with practical strategies to optimize digestive health across the entire tract helping reduce reliance on conventional treatments while maintaining strong animal welfare and performance.”

[Read more>>](#)

FAO and IFIF conclude 2025 global animal feed forum

The Global Forum for Animal Feed and Feed Regulators, organized by the Food and Agriculture Organization of the United Nations (FAO) in collaboration with the International Feed Industry Federation (IFIF), concluded with the successful 18th International Feed Regulators Meeting (IFRM). The forum was held from October 2-3, 2025.

The joint forum and IFRM brought together national and regional feed regulatory authorities, representatives of FAO Members, producer organizations, the scientific community, development organizations, private sector leaders, international financial institutions, donor agencies, civil society, technical media, and grassroots organizations. Participants exchanged experiences and explored how the feed sector can contribute to the sustainable transformation of the livestock sector, with a strong focus on innovation, safety, and collaboration.

The forum was officially opened by QU Dongyu, Director-General of FAO, alongside Constance Cullman, Chair of IFIF, and the Ministers of Nigeria and Uganda. Their interventions highlighted the pivotal



role of the feed sector in delivering sustainable livestock transformation and global food security.

The first session provided a global outlook on feed production and trade, followed by national perspectives from Nigeria, Uganda, the USA, and Uruguay. FAO’s Assistant Director-General, Thanawat Tien-sin, outlined the organization’s support to national programmes and policies. A high-level panel with representatives from the African Union Inter-African Bureau for Animal Resources (AU-IBAR), the European Federation of Animal Science, the International Finance Corporation, and IFIF discussed collaborative priorities for the future.

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LALLEMAND ANIMAL NUTRITION



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Vilomix invests in new premix factory in Poland

Vilomix Group is making a significant strategic investment in a new factory for the production of premix and mineral feed in Siedlec, Poland. The investment is made through the subsidiary Blattin Polska and is a strategic step in the Vilomix Group's continued international growth. Blattin Polska currently has two compound feed factories in Poland.

The new factory is expected to be fully operational by the end of 2026 and will have a capacity of approximately 35-40,000 tonnes per year. The increased production capacity will ensure shorter delivery times, reduced transport costs and more flexible delivery options for Polish farmers.

In addition, the factory will serve as a hub for neighbouring markets where Vilomix is already active, further strengthening regional supply chains.

"The investment is an important milestone in the Vilomix Group's international growth strategy. Poland is one of our key



strategic markets in our FEED FORWARD strategy towards 2028, and this step strengthens our position in one of Europe's most dynamic agricultural regions. It demonstrates our long-term commitment to supplying high-quality premix and mineral feed to farmers across borders," says Peter Iversen, CEO of the Vilomix Group.

At the local level, Blattin Polska sees great opportunities for customers. Blattin Polska's management team, Zbigniew Pustula, Andrzej Mirek and Piotr Pstragowski, explains: "With our own premix and mineral feed production in Poland, we can

serve farmers more efficiently with faster deliveries and solutions tailored to local needs. The investment is a strong signal of confidence in our team and the Polish market, and it will provide our customers with significant benefits in terms of flexibility and competitiveness."

With the new factory, Blattin Polska will expand its presence in all major livestock segments and increase its market share in premix and mineral feed. The factory will be equipped with modern production technology and flexible packaging options that ensure high quality and efficiency.

[Read more>>](#)

Phytobiotics highlights innovation and development in animal nutrition

Phytobiotics Futterzusatzstoffe GmbH held its 2025 International IQ Inside Seminar from September 21 to 26, once again bringing together leading experts and partners from around the world. The event combined a guided tour of Phytobiotics' state-of-the-art production plant in Neuendettelsau, Germany, with two days of high-level scientific exchange in the scenic alpine town of Kufstein, Austria. This year's overarching theme, "Develop-

ment and Innovation," set the tone for an inspiring week of discussion and discovery.

The scientific seminar opened with welcoming remarks by Dr. Hermann Roth, CEO, and Kurt Wegleitner, Managing Director of Phytobiotics, who presented the company's latest innovations and provided insights into its ongoing global growth. They emphasized Phytobiotics' philosophy of uniting research, innovation, and practical application

— a guiding principle that has shaped the company for 25 years and remains central to its success. Looking ahead, Dr. Roth and Mr. Wegleitner also spoke about the future direction of the company, reaffirming that Phytobiotics will continue to remain family-owned, with the next generation of the Roth family ready to carry its legacy forward.

The keynote address by Dr. Jessika van Leeuwen, Member of the European Parliament, proved to be one of the true highlights of the seminar. In her presentation, “Farming of the Future in a Fast-Shifting Geopolitical Landscape: The Road to Food Security,” she discussed how global politics, sustainability, and innovation must align to secure the future of food production. Her forward-looking and politically grounded perspective bridged the gap between agricultural science and policy-making, resonating strongly with participants from around the world.

The scientific program continued with a diverse series of presentations from international experts.



Prof. Dr. Frank Siewerdt from North Carolina State University, USA, examined “Broiler Production: Current Trends and Future Perspectives,” focusing on how genetics and management are shaping more efficient and sustainable poultry systems. Tom Axelgaard, Secretary General of Danish Farmers Abroad, followed with “How and Where Should Pork Be Produced Now and in the Future?,” exploring the economic and ethical dimensions of global pork production.

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Volac Wilmar launches tool to assess dairy fat supplements

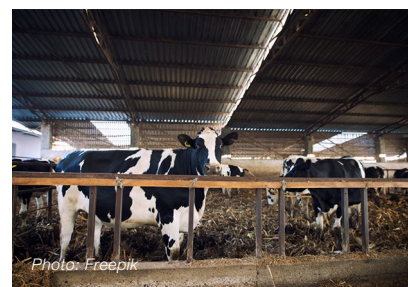
Volac Wilmar Feed Ingredients launched the upgraded Return on Investment (ROI) Calculator 2.0, which reportedly offers farmers and nutritionists further support in assessing the financial and nutritional impact of rumen-protected fat supplementation in dairy rations globally.

According to Paul Fransen, the Developer and Business Development Manager for Volac Wilmar Feed Ingredients, the ROI Calculator 2.0 feeds off the original performance-to-financial correlation 'return on investment' model, with more datasets and features to guide on-farm decision making.

"The Return on Investment

Calculator 2.0 allows farmers anywhere in the world to input their own herd data, such as milk prices, feed costs and fat supplement pricing, for an instant projection on profitability and nutrient digestibility," explains Fransen. "By tailoring recommendations to individual farm economics, the tool empowers producers to strike a balance between cash flow constraints and long-term herd performance."

Key inputs for the model, including expected milk yield, milk composition and feed efficiency, come from two meta-analyses from Dr. Adam Lock's group at Michigan State University,



US, that collated more than 65 peer-reviewed research papers.

The new ROI Calculator 2.0 builds from those data points, giving users the ability to analyse hydrogenated fatty acid products, calcium salts and high-C16 rumen-protected fat supplements at flexible inclusion rates, according to the announcement.

[Read more>>](#)

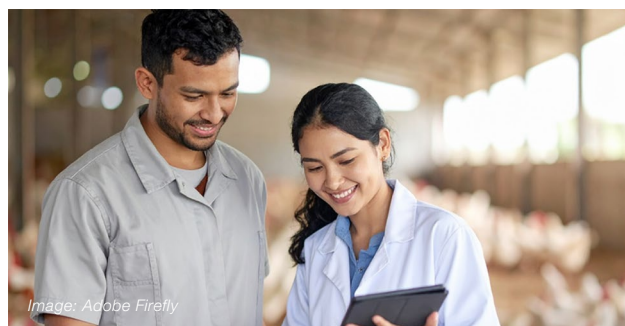
UC Davis launches upgraded Disease BioPortal for farmers and veterinarians

The University of California, Davis School of Veterinary Medicine launched a new version of the Disease BioPortal, an online platform designed to help veterinarians, producers, and diagnostic labs make faster, data-driven health and biosecurity decisions.

The Disease BioPortal makes it easier to track important livestock health issues, spot disease trends early, and make informed decisions to protect animals and operations.

Developed by the Center for Animal Disease Modeling and Surveillance under the leadership of Dr. Beatriz Martínez-López, Disease BioPortal integrates diagnostic and field data from multiple sources and delivers interactive maps, dashboards, and predictive modeling in real time. The result: improved outbreak detection, reduced response times, and better farm management strategies.

"The adoption by some of the top swine industry producers, large pharma companies and veterinary



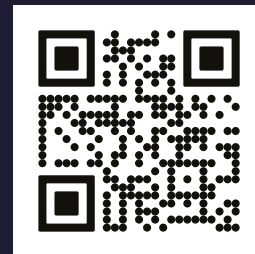
clinics demonstrates the trust and impact of this platform," said Dr. Martínez-López, professor of epidemiology and disease modeling at the UC Davis School of Veterinary Medicine. "As we expand to additional sectors, our goal is to provide the same level of support and insight to help safeguard animal health, food systems, and ultimately public health."

Producers and veterinarians already using the platform say it has transformed the way they manage animal health data.

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Alltech introduces next-gen mycotoxin binders

One of the global leaders in sustainable agriculture, Alltech announced the launch of Mycosorb® A+ Evo and Mycosorb® Evo, the next generation in its Mycosorb® range of mycotoxin management solutions. These advanced technologies represent a significant evolution in protecting livestock health and performance against the most challenging multi-mycotoxin threats, Alltech states.

Building on Alltech's decades of experience and expertise in mycotoxin management, the Mycosorb Evo range delivers enhanced mycotoxin-binding efficacy and broader-spectrum coverage, according to the announcement. These solutions have been rigorously developed and tested to provide increased protection against harmful toxins such as deoxynivalenol (DON), fusaric acid (FA) and Penicillium-derived toxins, among other frequently occurring mycotoxins in livestock feed.

Data from the Alltech 37+® testing program, together with insights from the annual Alltech Harvest Analysis, have consistently highlighted the ongoing



Photo: Alltech

and escalating risk of mycotoxin contamination worldwide. Alltech states that these latest technologies are designed to provide feed and livestock producers with the most advanced and targeted tools available to address this critical challenge.

"Producers around the world have long relied on Mycosorb to protect animal health, performance and productivity under the challenges of mycotoxin pressure," said Dr. Alexandros Yiannikouris, Global Mycotoxin Management Research Group Director at Alltech.

[Read more>>](#)

Tanmiah unveils new poultry plant and feed mill

Tanmiah Food Company, one of the leading vertically integrated poultry and food producers, announced the launch of two new facilities in the central region of Saudi Arabia: A state-of-the-art poultry processing plant in Al Majmaa (Majmaa 2) and a cutting-edge feed mill in Dahna. These additions complement Tanmiah's existing network of hatcheries, feed mills, and processing plants, reinforcing its commitment to advancing food security, enhancing operational efficiency, and supporting local communities with job creation and sustainable development initiatives.

The official inauguration ceremony was held at the Ministry of Environment, Water and Agriculture (MEWA) in Riyadh, in the presence of Eng. Abdulrahman Abdulmohsen AlFadley, Minister of Environment, Water and Agriculture, along with esteemed dignitaries and distinguished guests, and was attended by Amr Al-Dabbagh, Chairman of Tanmiah, Zulfiqar Hamadani, Group CEO, and a number of Tanmiah's Board Members and senior executives.

In pursuit of its vision to become the number one global halal sustainable healthy protein company by 2030, over the past



Photo: Tanmiah

two years, Tanmiah has invested over SAR 1.5 billion (~400 million USD) within the Kingdom, while also facilitating more than SAR 400 million (~106 million USD) in foreign direct investment into the agri-food sector, with the aim of increasing the pace of private investments in this sector through 2030.

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Kemin strengthens pet food business in Europe

Kemin Industries, a global ingredient manufacturer, opened a new regional headquarters and state-of-the-art research laboratory for Kemin Nutrisurance, the company's business unit dedicated to developing innovative ingredients and solutions for the pet food and rendering industries, in Veronella (VR), Italy, on Thursday, October 9, 2025.

According to the announcement, this new facility marks a significant milestone for the company, underscoring its ongoing commitment to investing in innovation, people, and the local community. It represents a strategic expansion that complements the existing production facility and laboratory in Veronella to further strengthen the site's role as a central hub for Kemin Nutrisurance's operations across Europe, the Middle East, and Africa (EMEA).

Kemin Nutrisurance established a presence in Europe in 2011 with a team of 20 people, which has grown to 125 employees. The new Kemin Nutrisurance regional headquarters will reportedly support



the development of a region that currently contributes around 30% of Kemin Nutrisurance's global revenue and has achieved an average annual growth of over 11% over the past five years.

The investment in Veronella covers 3,400 square meters, including 1,000 square meters dedicated to research, and involved more than 30 local companies, generating value for the local economy and community.

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FEFAC warns of EU soy supply chain disruptions

The European Feed Manufacturers' Federation (FEFAC) sent a letter to the Danish EU Farm Council Presidency to share an urgent warning on the imminent risk of essential soy supply chain disruptions linked to the recent "targeted simplification" proposal on European Union Deforestation Regulation (EUDR) of the European Commission. The letter includes a chart on soybean meal price developments over recent months, illustrating the market reactions on September 23, 2025 (following the announcement of 'imminent' EUDR postponement) and on October 20, 2025 (when the Commission released its cur-

rent proposal) as well as FEFAC's updated EUDR Economic Impact & Feed Supply Chain Disruption Risk Assessment for soybean meal.

FEFAC President Pedro Cordero said, "European compound feed manufacturers once again face a 'frozen' soy market. Suppliers have withdrawn offers for 2026 deliveries; while remaining 2025 offers have become scarce and subject to sharp increases of respective EUDR price-premiums. Existing purchases of soy products for Q1-Q2 2026 are now clouded by legal uncertainty, as the commission's proposed six-month postponement of checks and penalties by competent authorities, which may or may not see ret-



Photo: Aedka Studio | Shutterstock

roactive enforcement. FEFAC expects that this will translate into soy supply chain disruptions for key soy sourcing origins, ensuing additional cost impacts for the EU livestock sector of up to 1,5 Bio €, thereby strongly undermining the EU Vision on Agriculture & Food, which precisely seeks to boost the competitiveness of the EU livestock sector."

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ADM expands animal nutrition and performance services

ADM expanded its suite of SINCRO services to enhance the consistency and efficiency of farm animal production in Mexico, Indonesia and across Europe. SINCRO is a synchronized ecosystem of smart, data-driven solutions and services designed to support farmers and feed professionals with nutritional insight, feed formulation inputs and continuous monitoring with real-time adjustments for responsive operations management and improvement.

Services are delivered by dedicated in-house teams with specialized knowledge across multiple fields, providing expert consulting to farmers and feed professionals, and are supported by digital solutions that can be deployed directly in the field, ADM highlights. For example, an integrator and egg producer in Mexico recently incorporated SINCRO services like near infrared (NIR) technology, mycotoxin analysis and formulation support with ADM feed solutions to improve eggshell quality, ultimately increasing marketable production by 10% and



Photo: ADM

raising annual profits over \$200,000. In Indonesia, a key producer of aqua feed is using SINCRO to significantly improve feed formulation performance and accuracy with precise nutritional values. Full year estimated sales for this producer reportedly grew over 60% compared to the previous year.

"SINCRO offers a comprehensive, science-based, tailored approach to achieve precision nutrition for all species through the different life stages," said Pierre-Joseph Paoli, President of Growth & Commercial Excellence, ADM Animal Nutrition.

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Adisseo brings science into practice in ruminant nutrition at IMEA SmartSchool 2025

Adisseo, one of the world's leading feed additive specialists dedicated to research and innovation, hosted the IMEA SmartSchool seminar in Istanbul, Turkey on October 14–15, 2025. The event brought together approximately 100 ruminant industry representatives from Africa and the Middle East, along with leading global experts in animal nutrition. Held under the theme “Health for Lifetime Performance”, the event focused particularly on the strategic role of amino acids in ruminant nutrition.

The seminar began with a brief welcome speech by Özgür Gültekin, Director of Marketing and Business Development, MEA at Adisseo, and discussed topics such as amino acid-balanced nutrition, protected methionine applications, the effect of nutrition on reproductive performance, and feeding strategies against heat stress. Attendees listened to the latest scientific data from leading academics and Adisseo experts.

Professor Dr. Phil Cardoso from the University of Illinois at Urbana-Champaign in the US was one of the event's featured speakers. He emphasized that proper nutritional management in dairy cattle is decisive not only for milk yield but also for herd fertility and overall profitability.

Cardoso pointed out the importance of an individualized nutritional approach, stating, “The individual needs of each cow must be taken into account; cows in the dry period require as much attention as those in lactation.”

He also shared examples from studies showing that cows fed with rumen-protected methionine demon-



strated higher growth performance. According to Cardoso, methionine and lysine are among the most critical amino acids for milk yield, reproductive success, and combating inflammation.

Adisseo Global Ruminant AA and Protected Nutrients Business Director, Dr. Brian Sloan, celebrating his 38th year with the company in 2025, assessed the transformation of the ruminant nutrition sector over the last thirty years. Sloan noted that in the 1990s, the market was not yet ready for commercial applications of methionine, but today, protected amino acid solutions are central to modern dairy cattle nutrition strategies.

Sloan emphasized that heat treatment can reduce the bioavailability of lysine in protein sources, requiring careful management of amino acid balance in rations.

IMEA SmartSchool attracted attention not only with presentations but also with case studies, group discussions, and interactive technical sessions. Attendees had the opportunity to examine the effects of amino acid optimization in ruminant nutrition on performance, environmental sustainability, and economic efficiency from various angles.

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Bioiberica expands Nucleoforce line for animal immunity and gut health

Bioiberica, a global life science company, announced the launch of its extended Nucleoforce® product line for animal immune and intestinal health. Under the new unified positioning – “Immunity Force, Life Force” – the reimagined range will feature three new functional ingredients

designed to address demand for a broader and more aspirational approach to animal nutrition: Nucleoforce® Immunity, Nucleoforce® Performance, and Nucleoforce® High Flowability (HF). In conjunction with the new launches, Bioiberica also shared emerging evidence of the ingredients’ synergistic

benefits when combined with specific bioactive compounds. This combination of new solutions with fresh scientific backing gives pet food, livestock and aquaculture feed manufacturers an even broader selection of efficient and ethically-sourced solutions for essential health, wellbeing and development, the company states.

As building blocks of DNA and RNA, nucleotide compounds are fundamental to the function of all life on earth. They are especially critical for the proper development of tissues with a high cell replication rate, such as those of the immune and intestinal systems, and during periods of rapid development or stress. According to the company statement, each containing a nucleotide-rich concentrate naturally obtained from yeast, the original Nucleoforce® range consisted of three high-performance solutions. Each of these was designed to support farmed fish and crustaceans, livestock and pets through periods of stress, rapid development, malnutrition or challenges, during which capacity for endogenous nucleotide synthesis is diminished. The new additions to the portfolio take these benefits to the next level, with



ingredients specifically focused for immune health (Nucleoforce® Immunity), enhanced production efficiency (Nucleoforce® Performance) and growth and development (Nucleoforce® HF).

Victor Beneito, Director of Animal Nutrition at Bioiberica, commented: “Part of our company mission is to provide high-quality solutions attuned to the needs of our customers and their end-consumers. Our vision for Nucleoforce®, evidenced by the new product launches, expresses this drive to deliver – giving feed and food manufacturers the tailored ingredients they need to help animals grow and thrive.”

[Read more>>](#)

Rangen Group debuts in animal nutrition market

Rangen Group announced its official launch as a new company in animal nutrition, uniting livestock, pet, and aquaculture businesses under a single brand. With a strong foundation in nutrition expertise, Rangen Group is spotlighted as being built to meet the needs of aquaculture, livestock and pet industries while looking ahead to future challenges and opportunities.

“Rangen Group marks an exciting new chapter in animal nutrition,” said Mark G. Essig, CEO of Rangen Group. “We’re bring-

ing together world-class expertise and trusted brands to deliver safe, innovative, and sustainable solutions that help our customers succeed today and prepare for the challenges of tomorrow.”

According to the company’s announcement, Rangen Group’s brand identity reflects the company’s commitment to innovation, reliability, and progress across the livestock, pet, and aquaculture industries. It represents a forward-looking approach focused on delivering trusted nutrition solutions and supporting the evolving needs of the markets.



For customers and partners, the transition will be seamless, Rangen Group remarks. Products, people, and services remain the same, but the Rangen Group name reflects a broader commitment to advancing nutrition across species and industries.

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dsm-firmenich opens pet-only premix facility in Kansas

dsm-firmenich, a leading innovator in nutrition, health, and beauty, opened its next generation, state-of-the-art, pet-only premix facility in Tonganoxie, Kansas, US. The new facility—NextGen Tonganoxie—sets a new standard in pet food safety with 100% automated micro-ingredient additions and fully traceable batch assembly, the company states. From basic nutrition to sophisticated functional formulations on-par with human supplements, NextGen Tonganoxie meets the pet food industry's full spectrum of demand. The facility will be able to blend dsm-firmenich's own specialty ingredients with those sourced from third parties, giving dsm-firmenich's customers the flexibility they need to better support the health and nutritional needs of pets all over America,

Canada, and Mexico.

According to dsm-firmenich, this opening marks a major milestone in the company's growing pet food portfolio, following the launch of its European facility in Haag, Austria, earlier this year. With two sites now dedicated exclusively to pet food—completely separate from any animal feed lines—dsm-firmenich is uniquely positioned in Europe and North America to drive innovation and shape the future of pet nutrition. The opening also delivers an economic boost to the Animal Health Corridor, with 20 new jobs created to date and around 30 expected once the facility reaches full production.

Rishabh Pande, Global VP, Pet Food at dsm-firmenich says: "Just as pet parents go to extraordinary lengths to ensure their companions



receive only the best, we've gone the extra mile to ensure that every aspect of our new, strategically located facility reflects the mindfulness, protection, and uncompromising standards they demand and deserve. With complete dedication to pet food, we're setting a new standard for safety, quality and the well-being of pets everywhere. Whether you're developing essential nutrition or premium pet food with added health claims, our team is here to help you exceed expectations."

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New Study: Whole cottonseed boosts milk fat

Despite US per capita-milk consumption falling significantly in recent decades, according to the US Department of Agriculture, Americans are consuming a record amount of dairy in butter and cheese — products made from milk fat. In a new study, a team led by researchers at the Pennsylvania State University demonstrated that supplementing dairy cattle feed with 15% whole cottonseed can increase milk fat concentration and yield. Whole cottonseed, which is high in unsaturated fatty acid and protein cows need to produce milk

fat, is a byproduct of processing cotton for fiber.

"Dairy farmers are paid for fat and protein today because people are eating more products that contain these milk solids — we're not drinking as much fluid milk," said team leader Kevin Harvatine, Professor of Nutritional Physiology in the College of Agricultural Science and senior author on the study. "That's been the market demand, and over the last 10 years, we've been selecting and managing cows for producing higher milk fat."

In findings published in Journal



of Dairy Science, the researchers reported that when cows were fed diets supplemented with 15% whole cottonseed, they produced milk that was 0.2% higher in milk fat and produced 5% more fat per day than cows not eating whole cottonseed.

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Balchem European seminars deliver scientific insights

Balchem Animal Nutrition & Health successfully concluded its European seminar series in the United Kingdom and Italy in September 2025, welcoming more than 300 participants from 19 countries across Europe and the Middle East. The exclusive events featured top international speakers and lively peer-to-peer discussions under the “Real Science Exchange” concept, confirming the growing momentum behind precision amino acid nutrition in dairy systems.

Keynote presentations featured Dr. Mike Van Amburgh (Cornell University), who emphasized the pivotal role of amino acids in energy efficiency, milk fat yield, and energy-corrected milk (ECM), while stressing the importance of model-based ration formulation such as CNCPS.

Dr. Usman Arshad (ETH Zürich) presented a meta-analysis showing that lysine supplementation in early lactation increased milk yield by 1.5 kg/day, and that supplementation over >70 days raised milk



fat yield by ~100 g/day.

Balchem experts Dr. Sion Richards and Dr. Stefano Vandoni shared field data using AminoShure™-XM (methionine) and AminoShure™-L (lysine), confirming consistent improvements in milk yield, efficiency, and ECM. They also emphasized the importance of balancing all essential amino acids—not only methionine—and presented bioavailability and stability results for Balchem’s rumen-protected amino acid solutions.

[Read more>>>](#)

LATAM feed experts unite to advance quality and efficiency at FeedTechnoVision

Trouw Nutrition, the livestock feed business line of Nutreco, organized the LATAM edition of FeedTechnoVision, held in Guatemala City on 2-3 October 2025. Building on previous FeedTechnoVision summits in Europe and Asia, the conference attracted more than 200 feed mill operators, quality control managers, and nutritionists from the LATAM region to explore how collaboration, communication, and innovation can enhance the quality, consistency, and efficiency of feed production.

LATAM’s animal protein markets continue to surge, growing over 4% per year — double the global growth in animal protein output. However, the adoption of feed technological innovations varies across the region, and raw material sourcing and sustainability issues present additional challenges. Throughout the conference, global feed thought leaders addressed these issues and explored approaches to accelerate innovation, enhance op-



erations efficiency, and empower people across the feed production chain.

Raw material and process optimization; technology paired with people supports efficient, safe operations; prioritize pellet quality and microstructure; people will make the difference; and create a culture of precision, control, and continuous improvement — these are the five takeaways shared from LATAM 2025.

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New Frontiers in Poultry Production: EW NUTRITION LEADS GROWING POULTRY SECTOR IN AFRICA AND THE MIDDLE EAST



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

Africa and the Middle East have undergone a remarkable transformation in the livestock sector in recent years. A growing population, rising income levels, and food security policies are making the region one of the new centers of global animal protein production. Poultry production, in particular, is rapidly expanding in terms of both investment and production capacity. However, this growth brings with it significant structural challenges: Sustainability, productivity, biosecurity, and heat stress are the most critical issues that producers face.

It is precisely at this point that the “New Horizons in Poultry Production” conference, organized by EW Nutrition in Hurghada, Egypt’s tourism hub, served as an important platform to assess the region’s current situation and discuss solutions for the future. The event, which brought together 250 participants from 40 countries on October 21–23,

2025, featured globally recognized academics, application specialists, and professional industry representatives sharing their knowledge and experience over three days.

Attending this event as *Feed & Additive Magazine*, we had the opportunity to closely follow the transformation of the sector and the vision that EW Nutrition offers to the region.

REGIONAL GROWTH: A RISING ANIMAL PROTEIN HUB

Africa and the Middle East have shown significant growth in feed and poultry production, particularly over the last five years. Many countries in the region have significantly expanded their production capacity through investments in new feed mills. For example, new feed mills, hatcheries, and integrated facilities in countries such as Egypt, Saudi Arabia,

and the United Arab Emirates are driving momentum in the sector. However, this rapid growth is accompanied by fundamental challenges, including dependence on external sources for feed raw materials, the effects of climate change, and heat stress limiting production efficiency. EW Nutrition's event was built around precisely these dynamics: Offering scientific and practical solutions to make the region's growth potential sustainable.

DEMAND FOR ANIMAL PROTEIN IS RISING

The conference began with an opening speech by **EW Nutrition's CEO Jan Vanbrabant** titled "Market Outlook and Industry Perspectives." Vanbrabant noted that the global demand for animal protein is expected to increase by 16% over the next decade, emphasizing that this growth will largely occur in emerging markets such as Asia, Africa, and Latin America. He also stated that limited natural resources and increasing geopolitical risks are forcing producers to focus on efficiency, sustainability, and innovation. In his speech, Vanbrabant highlighted the resilience of the poultry sector despite economic uncertainties, noting that poultry products remain as the most accessible protein source for consumers. Defining EW Nutrition's vision as "supporting safe, affordable, and sustainable protein production," Vanbrabant summarized the priority areas for



Jan Vanbrabant

future work as: Disease prevention, biosecurity and hygiene, combating antimicrobial resistance, reducing mycotoxin risks, operational efficiency, and genetic and nutrition optimization.

KEY SPEECHES SHAPING THE SECTOR

On the first day of the conference, **Prof. Dr. Saadia Nassik from Morocco's Agronomic and Veterinary Institute Hassan II** gave a presentation titled "Antimicrobial Resistance: Risks and Practical Mitigation Tools," highlighting that antimicrobial resistance has become a global threat not only for veterinary care but also for food safety and sustainable production. Nassik stated that incorrect or excessive antibiotic use accelerates the emergence of resistant microorganisms and that the solution lies



not in a single intervention but in a holistic approach. Effective biosecurity practices, vaccination, proper feeding strategies, diagnosis and monitoring systems, producer education, and the field applicability of regulations emerged as key elements of this approach.

Poland-based Biosecurity Expert Marcin Wolak, in his presentation titled “A Practical View on Farm Biosecurity,” emphasized the importance of a comprehensive cleaning and disinfection plan. Explaining the entire cleaning and disinfection process step by step, Wolak stressed that staff training, procedures/checklists, and standardized workflows are vital to the effectiveness of this process. **Dr. Mohammad Ezzat, CEO of Al Ajban Poultry & Al Ain Group from the United Arab Emirates**, gave a presentation titled “Preventive Tools in Poultry Production”. In his speech, Dr. Ezzat detailed how a holistic health approach, combining all integration steps such as biosecurity, preventive vaccination, as well as feed and water quality, minimizes disease, growth stagnation, and yield losses that may occur in flocks. **Polish Avi-Vet Servis’ Laboratory Manager Jaroslaw Wilczynski**, in his presentation titled “Enteropathies in Poultry - Challenges in Poultry Production,” emphasized that infections caused by pathogens such as *E. coli*, *Salmonella*, and *Clostridium perfringens* have a serious impact on poultry performance. Wilczyns-

ki highlighted the importance of early diagnosis, proper sampling procedures, and regular laboratory testing in combating these diseases.

The first day of the conference concluded with presentations by **Marie Gallissot, Global Feed Quality Manager at EW Nutrition**, titled “Toxin Risk Management: Current Challenges and What Works Against Them” and **Rani Ahmad, Regional Business Manager, Life Sciences and Laboratory Diagnostics at Hygiena**, titled “Preventing Food Safety Hazards with Proactive Solutions.” In her presentation, Marie Gallissot shared current approaches to feed quality and mycotoxin management, addressing the effects of mycotoxin contamination in feed on poultry health and productivity. Gallissot emphasized that even low levels of mycotoxin contamination can lead to reduced growth performance, immunosuppression, and economic losses. She drew attention to the importance of integrating raw material selection, regular analysis, and regional mycotoxin monitoring programs to reduce risks. Rani Ahmad, who explained the importance of early warning and prevention systems in the food safety chain, drew attention to proactive approaches in food safety. Ahmad stated that smart environmental monitoring and rapid detection technologies help businesses sustainably maintain hygiene standards by identifying contamination risks at an early stage.



DAY TWO: PRACTICAL SOLUTIONS AND VISION FOR THE FUTURE

The second day of the conference featured sessions highlighting practical production experiences. **Regional Technical Manager TMEA of Avia-gen Türkiye, Murat Yakar**, in his presentation titled “Best Practices in Poultry Production,” emphasized that genetic potential must be supported by proper management, feeding, health, and environmental conditions to increase productivity. Yakar pointed out that even small differences can have a significant impact on economic results, drawing attention to the importance of performance tracking and regular analysis of field data. In his presentation titled “Nutritionists' Challenges: Practical Perspectives and Solutions,” **Brett Roosendaal, Technical Executive Animal Feed at South-Africa's RCL Foods**, focused on three main challenges in poultry nutrition: Gut health, antimicrobial resistance, and additive selection complexity. Roosendaal stressed that to overcome these challenges, measurable performance targets must be set, “case-specific” additive evaluations must be conducted, and a continuous improvement culture must be adopted.

Following Roosendaal, **Jurek Grapentin, Commercial Managing Director of Lohmann Breeders GmbH from Germany**, gave a presentation titled “Trends in Laying Hen Genetics, Review and Outlook to the Future,” while **Madalina Diaconu, Global Business Development Manager at EW Nutrition**, gave a presentation titled “Water Hygiene, the Key to Poultry Health and Productivity.” The two-day conference program concluded with a presentation by **Prof. Dr. Necmettin Ceylan from Ankara University in Türkiye**, titled “Holistic Strategies to Alleviate the Heat Stress in Poultry Production”. Ceylan emphasized that heat stress is a significant problem in terms of production efficiency and animal welfare in the MEA region. Continuing his presentation, he touched upon methods for combating heat stress, stating that practices such as balanced feeding, energy management, and the correct electrolyte-amino acid balance yield effective results.



A GLOBAL PERSPECTIVE ON REGIONAL CHALLENGES

A recurring theme throughout the conference was that regional challenges can only be overcome through scientific knowledge, field experience, and collaboration. Participants emphasized that issues such as feed ingredient supply, hot climate conditions, disease pressure, feed hygiene, and production costs can be solved not only through technology but also through managerial awareness.

This event, organized by EW Nutrition, brought together experts from different regions, creating a common ground for knowledge exchange. In this respect, the conference was considered an important step in terms of regional solidarity as well as knowledge sharing.

Overall, “New Frontiers in Poultry Production” stood out not only as a technical seminar but also as a strategic meeting that shed light on the emerging animal protein market in Africa and the Middle East. EW Nutrition's long-term vision serves as a guide for all stakeholders seeking to sustainably leverage the region's potential.

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WEANING PERIOD & YOUNG ANIMAL NUTRITION





- It is not just about organic acids
Sammy Vanden Driessche, Agrifirm
- Combatting calf diarrhea: A cornerstone of dairy success
Dr. Melinda Culver & Miriam Deppe, Biochem
- Managing ABC-4: A key factor in piglet nutrition
Dr. Yron Manaig, Animine
- Enhancing performance without AGPs or ZnO: A smarter gut strategy
Giseli Heim, Trouw Nutrition
- Raspberry flavour benefits: A fruity solution for piglet weaning success
Dr. Anne Winkler, Phytobiotics
- Supporting calf gut health to prevent scour
Sabine Scully, Teagasc Walsh & Geena Cartick, EFFAB
- Rethinking transition cow management
Marie-Valentine Glica, Lallemand Animal Nutrition
- Polyphenols on the early weaning of piglets
Juan Javierre, Layn Natural Ingredients



IT IS NOT JUST ABOUT ORGANIC ACIDS

Sammy Vanden Driessche
Raw Material & Application Specialist
Agrifirm

“Organic acids fulfill multiple roles in weaning diets for piglets. As acidifiers, they must be used in conjunction with a good knowledge of the intrinsic properties (ABC-4) of the other feed ingredients. Some of these have a limited effect on the buffering capacity of the final diet and have very similar batch-to-batch ABC-4 values; whereas others may have a significant impact even at low inclusion.”

Nutritionists know that digestion starts in the stomach, but do they formulate accordingly? In the past, diets for young piglets, that are known to have an immature digestive system that produces only low levels of endogenous gastric acid (HCl) until 6-8 weeks of age, were traditionally supplemented with an (often arbitrary) amount of organic acids. The use of organic acids was common practice to anticipate gut health challenges like post-weaning diarrhea due to maldigestion and the proliferation of pathogenic bacteria. However, arbitrary inclusion of organic acids in diets may lead to undesired effects, such as reduced feed intake and unnecessary increases in feed cost.

The arbitrary use of high amounts of organic acids originates from times when piglets were fed high protein diets supplemented with high pharmacological amounts of zinc oxide (ZnO) to prevent post-weaning diarrhea. These diets were known to have a strong buffering effect in the stomach, and piglet nutritionists anticipated this effect by adding high amounts of organic acids to the diet. Over the years, protein levels in piglet diets have

decreased and the pharmacological use of ZnO has been banned in several parts of the world. Even though the buffering capacity of diets has consequently decreased accordingly, piglet nutritionists often continue to use organic acids as acidifiers. In-depth knowledge of, and awareness about, the Acid Binding Capacity (ABC) of raw materials enable a well-reasoned use of organic acids and a more cost-effective feed formulation, as applied by Agrifirm nutritionists in daily practice.

ABC: THE START OF SMART FORMULATION

Acid Binding Capacity (ABC) is a well-known characteristic of raw materials or complete feed. The higher this value, the higher the capacity to neutralize acids – which is of particular importance when formulating diets for young piglets. A higher ABC value of the feed not only means that a higher quantity of gastric HCl is required to keep the stomach's pH sufficiently low. It also means that, after feed intake, it will take longer for the stomach's pH to return to a value sufficiently low to inhibit pathogens. This “increased pH” time interval oc-

curing after feed intake should be kept as short as possible to minimize the risk of pathogenic bacteria surviving and migrating into the duodenum.

The ABC is an analytical parameter that is determined *in vitro* by adding acid (or base) to a raw material or feed to achieve a preset pH. This preset pH correlates with the optimal pH for the animal's digestive enzymes. It is generally accepted that pH 4.0 is a good reference value for young piglets, because this pH is the maximum value for the proteolytic activity of pepsin, and it is sufficiently low to allow for good (protein) digestion and pH-based pathogen suppression. Therefore, most nutritionists consider ABC-4 (i.e. the amount of acid or base that must be added to an ingredient or feed to reach pH 4.0) to be the setpoint practically relevant for piglets. ABC-4 values can be found in literature and are expressed in milli-equivalents of acid per kg (meq H⁺/kg). Materials consuming acid have positive ABC-4 values, those adding acid(ity) have negative values.

AIM LOW

Limited gastric acid production is typical for young piglets, so ABC-4 values are most relevant in young animal nutrition. It is generally acknowledged that the gastric acid production by a piglet may remain insufficient (pH>3.5-4.0 in fasting state) until 6-7 weeks of age, and suboptimal (pH>2.5-3.0 in fasting state) until approximately 60 days (8-9 weeks). Research by F. Molist *et al.* of Schothorst Feed Research (SFR, NL) and Stas *et al.* of Kansas State University

Table 1. Target ABC-4 values of piglet feed

Target ABC-4 values (meq H ⁺ /kg)	Piglet age	
	< 7 weeks	7-12 weeks
SFR	250-300	
Kansas State	150-250	200-300

establishes target ABC-4 values of a complete feed as a function of the animal's age (Table 1).

When formulating piglet diets, nutritionists can assume that ABC-4 values of raw materials are additive – i.e., that the ABC-4 value of a complete feed can be predicted with sufficient accuracy by the weighed sum of the ABC-4 values of the individual raw materials present in the feed. Therefore, a good knowledge of the ABC-4 values of the different classes of raw materials allows nutritionists to steer the dietary ABC-4 value of a diet towards the target value.

NATURAL = VARIABLE

Pure raw materials containing one type of molecule (e.g., salt NaCl, sodium bicarbonate NaHCO₃, fumaric acid, calcium propionate) have a constant chemical composition and predictable ABC-4 values with low batch-to-batch variability. For these raw materials, differences in ABC-4 values result mainly from their level of concentration – i.e., from the presence of other compounds that dilute the ingredient without having a significant buffering capacity themselves (e.g., water,



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fat coatings, inert silica carriers). In general, for these types of raw materials, the ABC-4 values found in literature can be relied upon for formulation.

Natural or nature-derived raw materials (e.g., starch, protein, fat and fiber sources, and minimally processed minerals) have a more variable composition and, consequently, more variable ABC-4 values between nutritionally equivalent batches. For these types of ingredients, depending on their inclusion level and their potential impact on the ABC-4 value of the feed, it is recommended to analytically determine the ABC-4 value of the batch itself and not rely on literature values (Figure 1).

MACRO-INGREDIENTS: HIGH INCLUSION, LIMITED IMPACT

High inclusion levels make macro-ingredients nutritionally important, but from an ABC-4 perspec-

tive, some are less relevant because major nutrient classes like carbohydrates (starch, sugar) and fats have almost no buffering capacity. Proteins, minerals and fiber, however, do have an impact.

Cereals like barley, wheat, corn and rye have low, positive ABC-4 values (60 to 120 meq/kg) and have a small, increasing effect on the ABC-4 of the diet, even at high inclusion levels. Limited variability in ABC-4 values stems from different protein and fiber contents.

Depending on their structural and compositional characteristics, **fiber**-rich ingredients have variable acid-binding properties, and low-to-moderate, positive ABC-4 values (70 to 400 meq/kg). They may also have high water-binding capacity, leading to a higher gastrointestinal viscosity and complicating the acid diffusion in the stomach. Although fibers

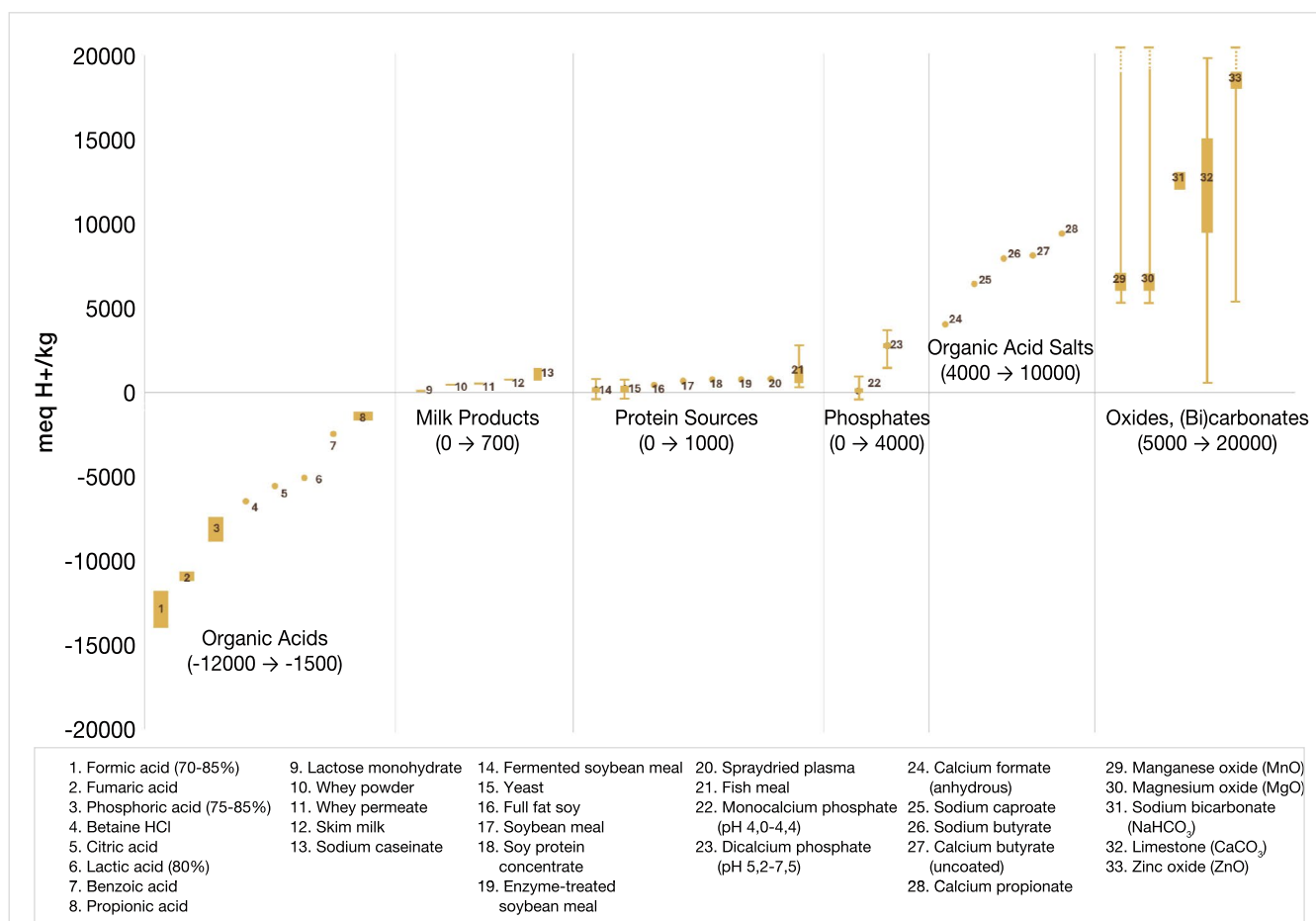


Figure 1. Different classes of feed ingredients have widely different ABC-4 values. Some ingredients show significant variability between batches or origins.

have been studied primarily for their potential to improve gut health, their impact on ABC-4 and acid diffusion rate is a point of consideration when integrating them into diets.

Protein sources are the macro-ingredients that potentially have the largest impact on the ABC-4 value of a feed. Their higher ABC-4 values (0 to 1000, most commonly 400 to 600 meq/kg) compared to starch and fiber sources, are explained by the higher buffering capacity of peptides due to the presence of free amine groups (lysine, arginine and histidine) and free carboxylic groups (glutamic and aspartic acid). Raw materials containing the same protein type (e.g., soy protein) have higher ABC-4 values as the protein content increases (Figure 2). Different protein types (soy, potato, wheat gluten, ...) with the same crude protein content have different ABC-4 values due to their different amino acid and structural composition.

Research (Stas *et al.* 2024) indicates that some protein sources exhibit a wide range of ABC-4 values, with different batches of the 'same' raw material having significantly different buffering capacities (e.g., fish meal). For these, it is advisable to make an ABC-4 determination on the individual batches and not rely on literature values, especially if their inclusion levels in the feed are high. Other sources (e.g., blood plasma powder) have relatively similar batch-to-batch protein levels and uniform ABC-4 values.

Milk-derived ingredients vary in ABC-4 (0 to 700 meq/kg), due to differences in protein and mineral content and in the type of processing. Pure lactose has no acid buffering capacity. Milk powders and sweet whey powders have quite uniform ABC-4 values, due to their relatively constant protein level. In whey permeates, crude ash and especially phosphorus content, correlate positively with ABC-4 values.

Fats have almost no acid buffering capacity when present in their natural (triglyceride) form and are of little relevance with respect to the ABC-4 calculation of a feed. Free fatty acids, either added on purpose or generated by fat source deterioration, are minor contributors of acidity (small negative ABC-4 value).

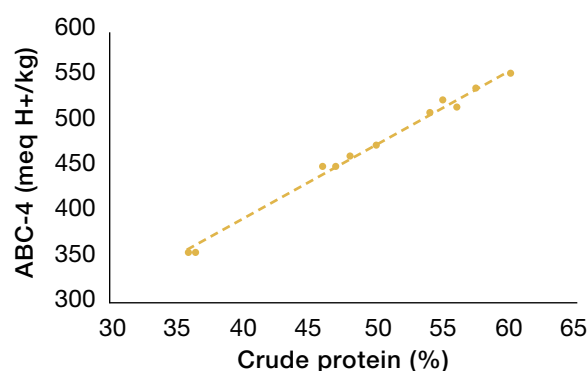


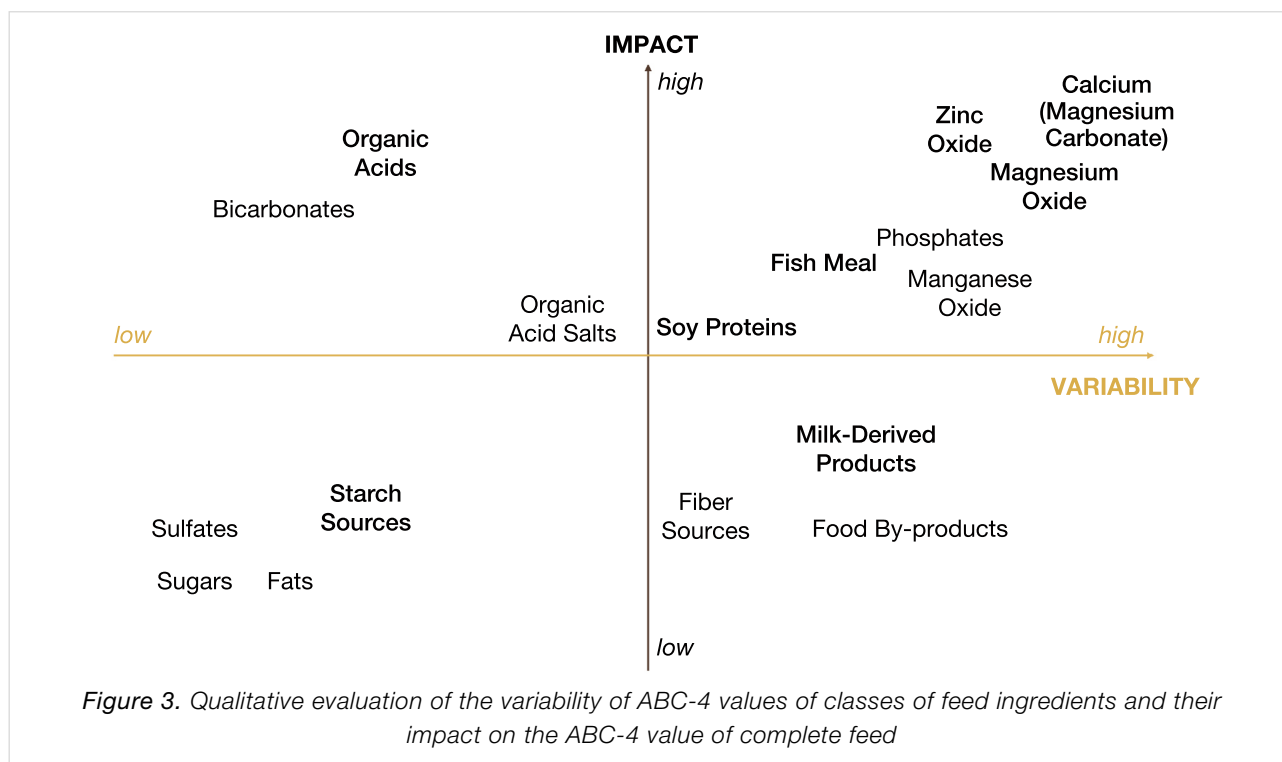
Figure 2. Correlation between protein content (%) and ABC-4 value (meq H⁺/kg) of (unfermented) soy protein sources, showing the high contribution of protein to ABC-4



Image 1. Impurities in zinc oxide (ZnO) lead to significant differences in color and reactivity. Whereas pure ZnO is white (left), the presence of iron (middle, right) causes strong brown discoloration and hampers the reaction with acids, leading to lower ABC-4 values.

THE DEVIL IS IN THE MICROS

Due to their high absolute buffering capacities, some of the micro feed ingredients may have a large impact on the ABC-4 of a diet (Figure 3). **Oxides, (bi)carbonates (5000 to 20000 meq/kg) and phosphates** are the most relevant **minerals** for ABC-4. Zinc oxide (ZnO) deserves particular attention because of its very high capacity to neutralize acids and its potential to form poorly soluble zinc salts upon reaction with organic and phosphoric acids. As can be seen from Figure 1, the ABC-4 value of ZnO can be highly variable, depending on manufacturing conditions, levels and types of impurities (Image 1) and particle size. Because ZnO has a significant impact on the ABC-4 of a feed (even at low inclusion levels), it is definitely one of the raw



materials for which an ABC-4 determination of individual batches/origins is recommended. The same applies to other low soluble oxides and carbonates (e.g., MgO , MnO , CaCO_3). Their acid buffering capacity is theoretically very high, but can vary significantly depending on origin, purity and particle size, which justifies individual batch analysis.

Calcium and magnesium **phosphate salts** (0 to 4000 meq/kg), obtained by the treatment of the aforementioned carbonates and oxides with phosphoric acid, have different ABC-4 values as a function of the relative amount of phosphoric acid used for neutralization. Monocalcium phosphate (MCP) and dicalcium phosphate (DCP) are nutritionally similar, but the former has a low pH and negligible or slightly negative ABC-4, whereas the latter buffers acid(ity) and has high positive ABC-4. Analogously, not all magnesium phosphates have the same buffering effect. If available, use phosphate salts with low ABC-4 values, as they also offer the best phosphorus availability.

When selecting **organic acids** during feed formulation, several factors (impact on feed palatability, anti-microbial effect, gut health improvement) must be taken into account. In the context of ABC-4,

their acidification power to lower buffering capacity and improve the digestibility of the feed is most relevant and differs greatly (-12000 to -1500 meq/kg) between acids as a function of concentration (e.g., 100% fumaric versus 50% lactic acid), acid strength (pKa value), and molecular weight.

In buffered organic acids and **salts of organic acids** (e.g., calcium propionate), part or all of the acidification power has been removed. These types of raw materials may be equivalent to the organic acids themselves in terms of organic anion sources (e.g., lactic acid and calcium lactate are both sources of lactate) but from an ABC-4 perspective, they are completely opposite. Fully neutralized salts of organic acids do not acidify at all. On the contrary, they actually increase the pH as can be seen from their positive ABC-4 value (4000 to 10000 meq/kg).

THE ROLE OF PROCESSING

Processing of feed ingredients may alter their ABC-4 value, depending on the type of treatment. In general, enzymatic treatment alone has limited impact, unless it requires significant pH correction to maximize the enzyme's hydrolytic activity. The impact of fermentation (e.g., of soy protein sources) depends

on the type(s) of micro-organisms used (lactic acid bacteria, *Bacillus* species, fungi). Both the required initial setpoint pH and the metabolites produced (organic acids) determine the final buffering capacity of the ingredient. Fermentation usually results in lower ABC-4 values.

The presence of acids, either added on purpose (e.g., phosphoric acid during production of DCP or MCP) or naturally present (e.g., lactic acid in acid whey powder), will result in lower ABC-4 values. On the other hand, the use of alkaline substances (e.g., lye) during processing may lead to neutral or mildly alkaline ingredients with a higher ABC-4 value (e.g., caseinates).

FIRST CONTEMPLATE, THEN FORMULATE

Organic acids fulfill multiple roles in weaning diets for piglets. As acidifiers, they must be used in conjunction with a good knowledge of the intrinsic properties (ABC-4) of the other feed ingredients. Some of these have a limited effect on the buffering capacity of the final diet and have very similar batch-to-batch ABC-4 values; whereas others may have a significant impact even at low inclusion. The latter warrant regular individual batch testing, especially if they show highly variable ABC-4 depending on origin. Agrifirm's expertise in testing and selecting dedicated ingredients for young animal nutrition ensures the formulation of high-performance, cost-effective feeds.

About Sammy Vanden Driessche

Raw Material & Application Specialist at Nuscience Agrifirm since 2019, Sammy Vanden Driessche is active at the interface of R&D, Quality and Sourcing. His focus is on analytics and physicochemical quality characteristics of raw materials and their interactions. He holds a degree of M.Sc. Applied Chemistry & Microbiology from the University of Gent. He has previous professional experience in the fields of food ingredients and nutraceuticals, oleochemicals and organic fertilizers.



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Dr. Melinda Culver
*Veterinarian
Biochem*



Miriam Deppe
*Product Manager Ruminants – Dietary Feed Supplements
Biochem*

COMBATTING CALF DIARRHEA: A Cornerstone of Dairy Success

“It is critical for every farm to have an effective strategy to prevent and treat calf diarrhea, as quick action should be taken when diarrhea occurs.

The priority is to minimize the calf’s fluid loss to prevent dehydration and reduce the risk of metabolic acidosis. Stabilizing the intestinal microbiota and promoting the regeneration of intestinal villi are additional key points to address in cases of calf diarrhea.”

The health of young calves has a significant impact on their entire lifespan, affecting growth rates, reproductive efficiency and even future milk production. In fact, calves are more susceptible to mortality during the first three weeks of life than during the rest of their rearing period, which makes this period extremely economically important. Numerous factors, including animal, environmental and management practices, contribute to calf health and disease (Figure 1).

THE CRITICAL FIRST WEEKS

Neonatal disease, especially diarrhea, has a significant impact on growth during the rearing period, long-term future performance and loss of genetic

potential for future herd improvement. To effectively control calf diarrhea, a proactive approach is essential.

Implementing strong biosecurity measures, including cow vaccination programs and maintaining a clean environment, is critical. Providing newborn calves with an adequate amount of high-quality colostrum in a timely manner is another cornerstone of calf health. By focusing on these preventive strategies, farmers can build calf immunity and reduce disease incidence. However, despite significant advances in the understanding of neonatal diarrhea, it remains one of the leading causes of death in calves.



Figure 1. The many factors associated with the health and morbidity of calves

There are numerous infectious and non-infectious agents associated with calf diarrhea—it is not a single disease. Infectious causes include bacteria such as *E. coli*, *Salmonella*, and *Clostridium perfringens*; viruses such as rotavirus and coronavirus; and protozoa such as cryptosporidia and coccidia (Figure 2).

Some pathogens, like *E. coli*, produce toxins that stimulate an enzyme cascade and a large release of

chloride ions into the intestinal lumen. Sodium passively follows to help maintain electron neutrality, and, as the osmotic pressure in the intestine increases, so does water. This is the pathogenesis of secretory diarrhea. Other pathogens—typically rotavirus and coronaviruses—cause osmotic diarrhea. These pathogens attack the intestinal villi causing villus atrophy, reducing the intestine's digestive and absorptive capacity. Unabsorbed nutrients then remain in the

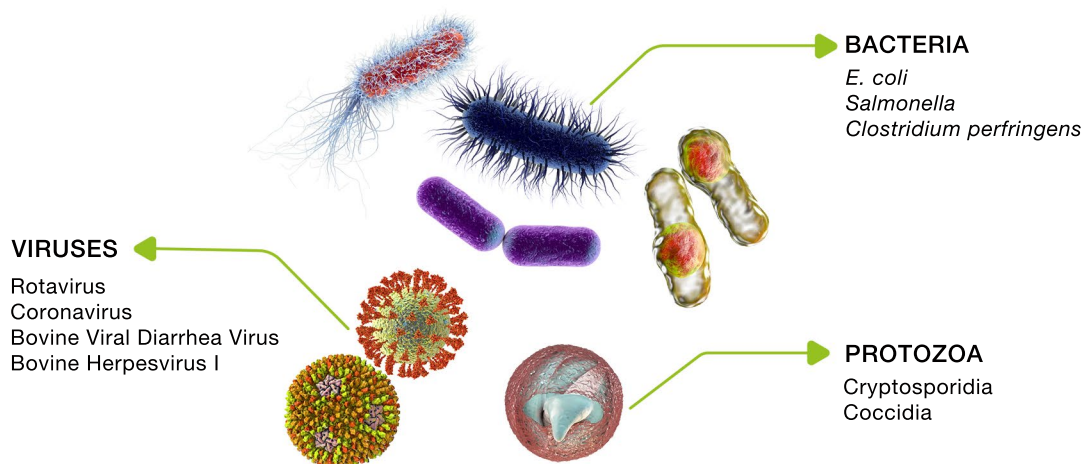


Figure 2. The most common bacteria responsible for calf diarrhea are *E. Coli*, *Salmonella*, and *Clostridium perfringens*. The viruses causing diarrhea in the calf are Rotavirus, Coronavirus, Bovine Viral Diarrhea Virus, and Bovine Herpesvirus 1. A few protozoan species like Cryptosporidia and coccidiosis are responsible for calf diarrhea.

intestine causing an increased osmotic pressure and water secretion into the intestinal tract (Figure 3).

However, regardless of the pathogen or mechanism involved, diarrhea increases the loss of electrolytes and water in the feces and often decreases milk intake. The result is dehydration, potentially causing severe metabolic acidosis, electrolyte abnormalities, and negative energy balance. Even when calves recover from these infections, they may never perform as well as unaffected animals.

A study of the long-term growth effects of cryptosporidiosis found that calves diagnosed with severe cryptosporidiosis had significantly reduced weight gain at 6 months compared to calves with only a few clinical signs of infection. This underscores the negative long-term effects of this pathogen on weight gain and production efficiency.

It is critical for every farm to have an effective strategy to prevent and treat calf diarrhea, as quick action should be taken when diarrhea occurs. The priority is to minimize the calf's fluid loss to prevent dehydration and reduce the risk of metabolic

acidosis. Stabilizing the intestinal microbiota and promoting the regeneration of intestinal villi are additional key points to address in cases of calf diarrhea.

There are two main strategies for treating diarrhea. One is the compensation of existing fluid loss with products containing electrolytes like Prolyt Pack® Extra. The second is the reduction of fluid loss itself by using water-attracting products. This strategy works to decrease fluid loss, retaining it in the body.

PART OF AN EFFECTIVE STRATEGY

One such strategy is a dietary feed supplement, DiaReset, designed to be given to calves during a case of diarrhea to ease the intensity, reduce fluid loss, help restore gut integrity, and minimize performance losses. This unique product contains guar gum and provides fast and effective support when needed.

Guar gum is composed primarily of galactomannan, a polysaccharide that forms a gel when in contact with water. Guar gum increases viscos-

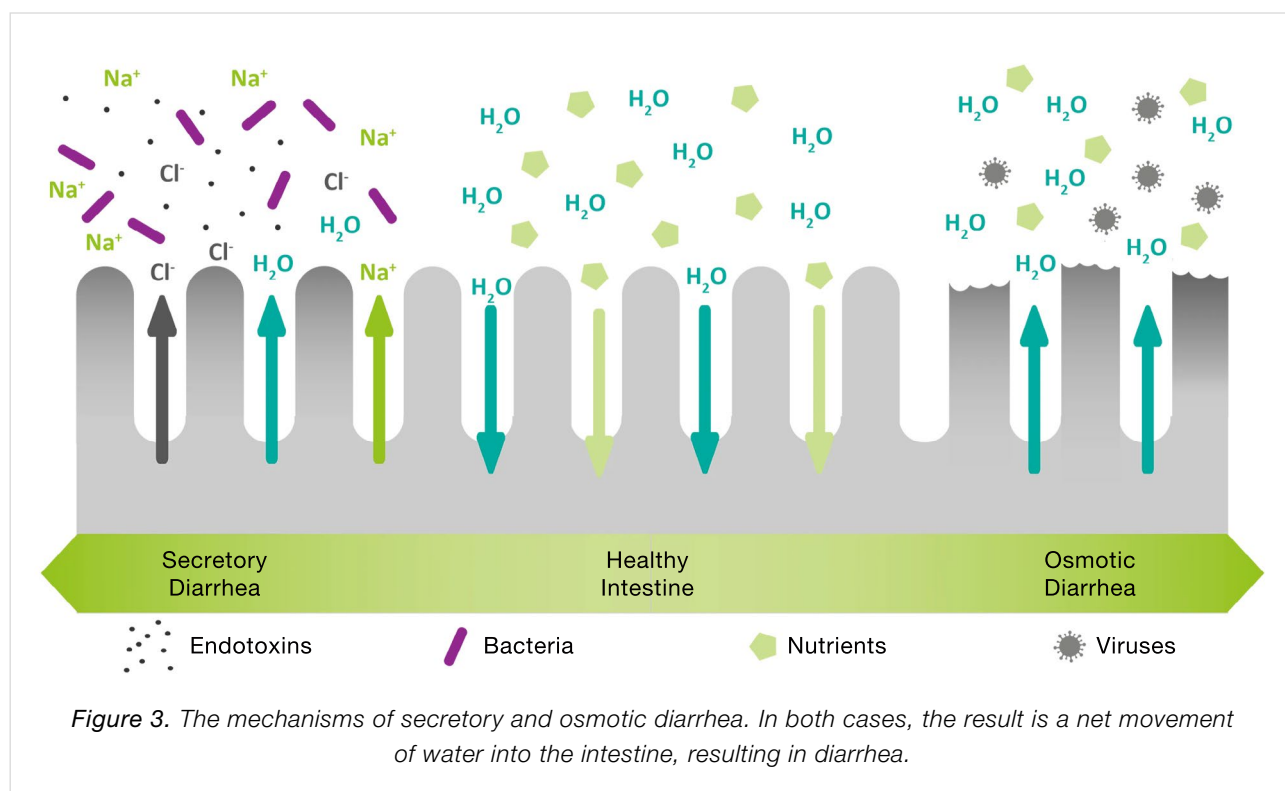




Photo: Biochem

ity and fecal volume, prolongs passage rate, and reduces defecation frequency. Additionally, it is almost 100% fermentable for a positive effect on microbiota growth.

DiaReset combines two natural probiotic strains that suppress the growth of non-beneficial bacteria while promoting the growth of lactic acid producing bacteria, participating in beneficial immune modulation, and increase nutrient digestibility through the production of digestive enzymes. Together, these powerful probiotics stabilize the gut microbiota.

Prebiotic yeast cell walls from hydrolyzed yeast complete the synbiotic component of DiaReset. This prebiotic can bind gram negative pathogens such as *E. coli* and *Salmonella* and help to prevent these pathogens from adhering to the intestinal wall as well as modulating and stimulating the immune system. Hydrolyzed yeast also provides functional amino and nucleic acids to support intestinal development and beneficial intestinal microbiota.

DiaReset also contains a source of saponins—compounds that are part of the defense mechanism of some plants. These saponins have been shown to have antiprotozoal, antibacterial, anti-inflammatory, and immunostimulatory properties. Their effects on protozoa are particularly important as cryptosporidia is a top cause of calf diarrhea. By complexing with a cholesterol moiety of protozoan cell membranes, saponins can induce pore formation, cell lysis, and death.

DiaReset is supplemented with vitamins to support immune function and a highly bioavailable source of zinc. Zinc has many roles, including antioxidant functions, immune support, and tissue repair and healing. This includes the gut, where zinc stimulates cell proliferation, helps restore the mucosal lining, and improves barrier function.

FIELD-PROVEN RESULTS

A 12-week field trial was conducted to evaluate the effect of DiaReset on the regeneration and performance of calves with diarrhea. Calves (n=23) less than two weeks old that were showing signs of diarrhea were assigned

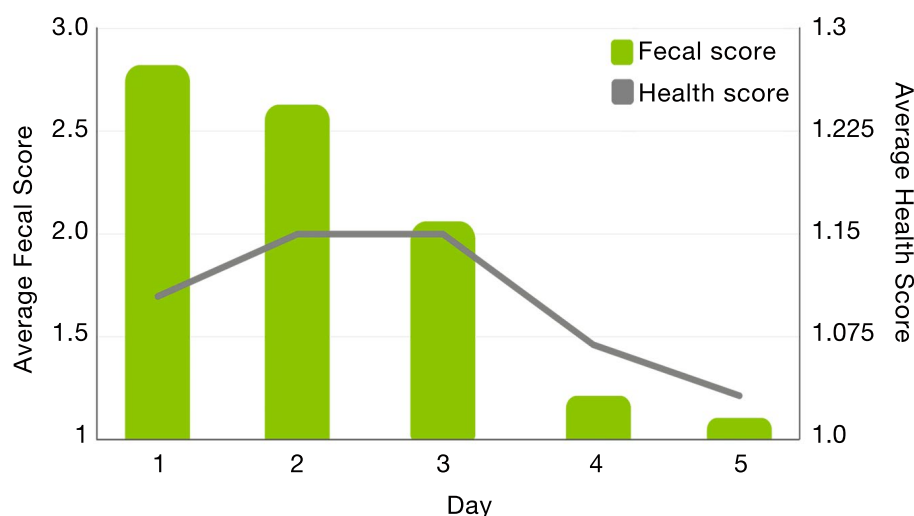


Figure 4. Average fecal and health score of diarrhea-affected calves supplemented with DiaReset. On day 3, 81% of calves had normal fecal consistency (Grade 1) after supplementation with DiaReset, and 91% of calves had normal stool consistency after 4 days, with a corresponding improvement in health score.

to the treatment group. The control group (n=22) consisted of healthy calves that had been matched in age, sex, and dam parity to the treatment group. Calves in the treatment group received 100 g DiaReset twice daily until no signs of diarrhea were visible. The control group received no dietary feed supplement.

Fecal scoring was performed using the following scale: 1 = physiologically normal, 2 = pasty, 3 = thin feces but remaining on the bedding, 4 = very thin feces running through the bedding. In addition, health scoring was performed, and feed intake as well as body weight was recorded. On average, diarrhea occurred for the first time between day 9 and day 10.

In the trial, 81% of calves had normal fecal consistency (Grade 1) on day 3 after supplementation

with DiaReset, and 91% of calves had normal stool consistency after 4 days, with a corresponding improvement in health score (Figure 4).

Although the daily weight gain of diarrheic calves often remains low, mainly due to damaged intestinal epithelium and reduced feed intake, calves supplemented with DiaReset showed significantly higher weight gains during the first 28 days of life. Thus, the high acceptance of DiaReset could help avoid the reduced feed intake in these cases.

Whichever system is chosen, a quick response is needed. DiaReset's unique combination of ingredients can either help prevent or quickly reduce water loss in calves with diarrhea and support rapid regeneration for a quick return to previous performance levels.

About Dr. Melinda Culver

A veterinarian with a strong interest in animal health and nutrition, Dr. Melinda Culver earned her Doctor of Veterinary Medicine degree in 2004. She pursued a Ph.D. in Animal Science at Washington State University (2006), focusing on muscle and fat cell development. Dr. Culver transitioned from veterinary practice to the supplement industry, where she's spent over 15 years using her knowledge to improve animal and human well-being through advancements in nutrition. She joined Biochem in 2022, bringing her extensive experience to the team

About Miriam Deppe

Having finished her master's degree in agricultural science & management at Kiel University of Applied Sciences, Miriam Deppe worked for several years as a young animal specialist in northern Germany and Denmark after her graduation, focusing on optimizing the calf rearing processes. Since 2021, Deppe has been responsible for Biochem's Dietary Feed Supplement portfolio for ruminants.

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Managing ABC-4: A KEY FACTOR IN PIGLET NUTRITION

Dr. Yron Manaig
R&D Manager
Animine

“The extensive use of both antibiotics and ZnO has raised significant concerns, as both can contribute to the development of antimicrobial resistance, while high ZnO inclusion levels also lead to excessive mineral excretion and environmental pollution. These limitations have encouraged the search for alternative strategies that can address the underlying causes of post-weaning diarrhea.”

Managing the acid-binding capacity at pH 4 (ABC-4) is an overlooked but powerful tool to improve post-weaning piglet performance. Recent trials show that optimizing ABC-4 enhances growth, stabilizes gut health, and reduces diarrhea, providing a practical alternative to pharmacological ZnO.

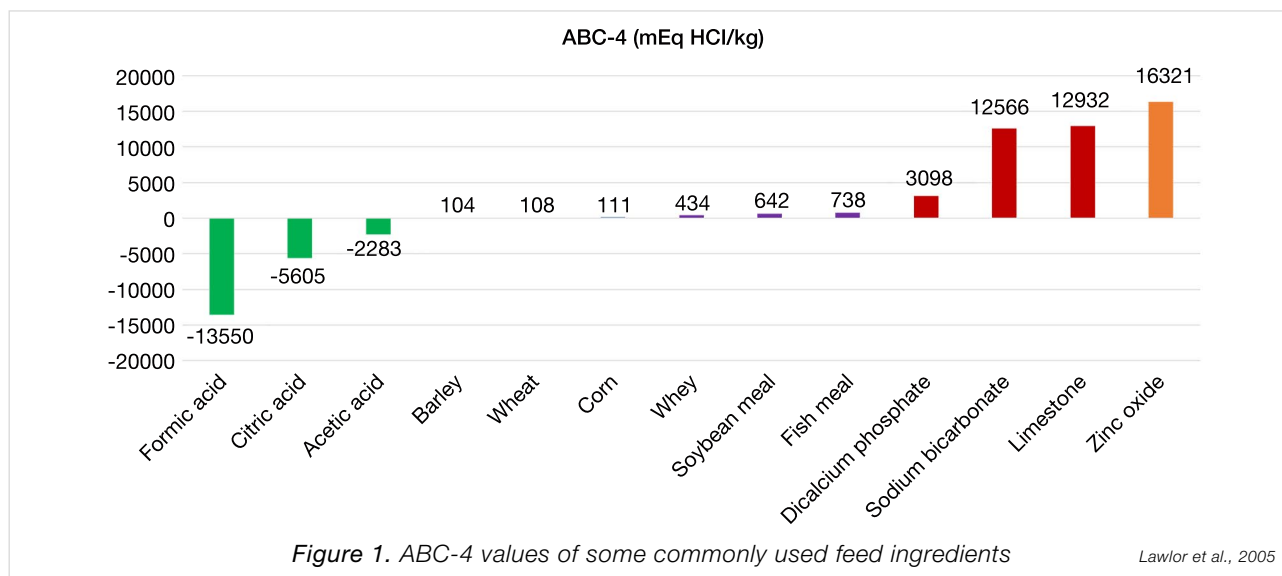
Premature weaning of piglets in regions such as North America and Asia presents significant challenges due to the immaturity of the gastrointestinal tract. The transition from liquid to solid diets, low hydrochloric acid secretion, limited lactic acid fermentation, and irregular feeding patterns all contribute to heightened weaning stress. These factors raise stomach pH and increase susceptibility to digestive issues. As a result, piglets struggle to maintain the acidic gastric environment needed for optimal pepsin activity (pH 2.0–3.5), leading to protein indigestion, diarrhea, and greater risk of pathogen proliferation.

Traditionally, a particular strategy to address these challenges has been the use of antibiotics or pharmacological doses of zinc oxide (ZnO). Both approaches are known to reduce post-weaning diarrhea and

improve growth performance, gut health, and microbiota balance. However, the extensive use of both antibiotics and ZnO has raised significant concerns, as both can contribute to the development of antimicrobial resistance, while high ZnO inclusion levels also lead to excessive mineral excretion and environmental pollution. These limitations have encouraged the search for alternative strategies that can address the underlying causes of post-weaning diarrhea.

One promising approach is managing the diet's acid-binding capacity to maintain gastric acidity. Ingredients with low buffering capacity help sustain acidic conditions, supporting digestion and piglet performance. This concept is quantified through Acid Binding Capacity at pH 4 (ABC-4), which measures the amount of acid (mEq HCl/kg feed) needed to lower feed pH to 4. Maintaining a pH below this threshold is critical, as it inhibits the growth of harmful organisms and optimizes protein digestion.

Ingredients vary widely in ABC-4 values (Figure 1). Protein-rich meals (soybean, rapeseed, fish) and mineral sources (calcium, sodium, zinc) tend to have high ABC,



absorbing large amounts of gastric acid and weakening the stomach's natural defense. In contrast, organic acids exhibit a negative acid-binding value and can offset the adverse effects of high ABC ingredients. Among mineral additives, ZnO is particularly notable, with one of the highest reported ABC-4 values (16,321 mEq HCl/kg). Consequently, inclusion of ZnO at pharmacological levels or the use of certain calcium sources can sharply increase the acid-binding capacity of the diet.

Managing the ABC-4 of the feed is being evaluated as an alternative to replace the pharmacological levels of ZnO. Kansas State University (KSU) has extensively evaluated the role of ABC-4 in weaned piglet diets. Their studies suggest an optimal range of 200–300 mEq HCl/kg, with phase-specific recommendations: 200–250 mEq for phase 1 (0–10 days) and 250–300

mEq for phase 2 (11–24 days) post-weaning. Staying within this window helps maintain gastric function and piglet performance, offering a viable alternative to pharmacological ZnO without compromising results (Stas et al., 2022).

A potentiated zinc oxide source (PZnO, Animine, France), supported by over 30 globally published papers, possesses unique physicochemical properties such as intermediate density, large particle size, and high specific surface area. These features enhance antibacterial activity and bioavailability, making it effective at much lower inclusion levels compared with standard ZnO doses of 3–4 kg/ton of feed. Building on this, KSU conducted a 24-day study in which low ABC-4 diets were combined with increasing doses of PZnO (Table 1), as a potential

Table 1. Zinc sources* at different dosages with the corresponding ABC-4 values

Treatment	Phase 1 (0 to 10 d)	Phase 2 (11 to 24 d)
	Zn, mg/kg / ABC4, mEq HCl/kg	Zn, mg/kg / ABC4, mEq HCl/kg
Positive control (ZnO)	3000 / 296	2000 / 306
PZnO 150/150	150 / 209	150 / 253
PZnO 500/300	500 / 221	300 / 258
PZnO 800/500	800 / 230	500 / 265

*Zinc sources : ZnO = Standard ZnO, PZnO = Potentiated Zinc Oxide (Animine, France)

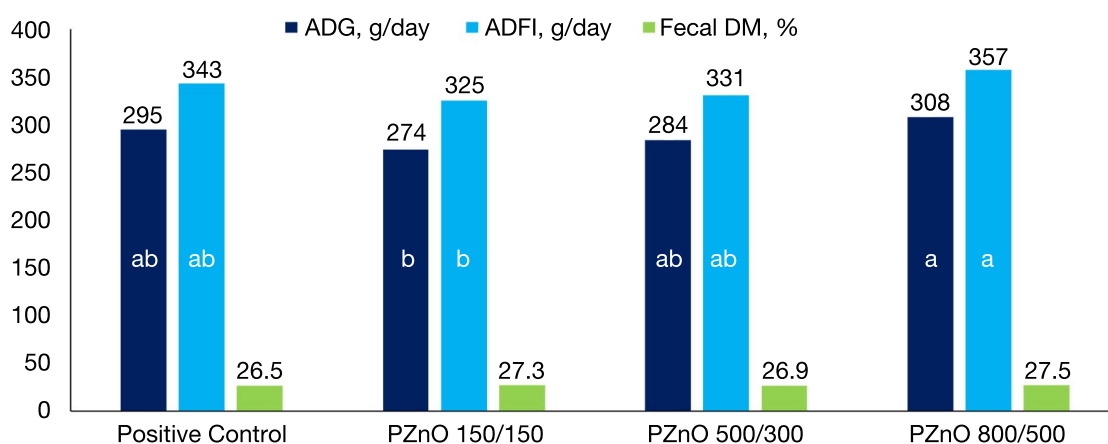


Figure 2. Production performance and fecal consistency of post-weaning piglets at day 24 (P-value < 0.05)

alternative to pharmacological levels of ZnO. The study aimed to evaluate the effect of these diets on the production performance and fecal consistency of weanling piglets.

The results were clear: increasing PZnO improved average daily gain and feed intake across the trial, while feed efficiency was particularly improved in phase 1. Importantly, piglets receiving either PZnO or high ZnO showed firm fecal consistency, with dry matter content above 26%, indicating good gut stability (Figure 2). These results demonstrate that lower doses of PZnO, even at European Union regulated inclusions, can achieve the same positive outcomes as pharmacological ZnO, in terms of feed intake, growth rate, feed efficiency, and diarrhea control, while managing diets within the optimal ABC-4 range of ~250 mEq HCl/kg.

To validate findings under commercial-like conditions, a complementary trial was conducted in Spain to further explore the effects of ABC-4 on piglet performance, and combining PZnO at EU-regulated level of 150 ppm, with the same range of dietary ABC-4 levels: 180/220, 253/280, 327/340, and 400/400 mEq HCl/kg (Phase 1/ Phase 2, mEq HCl/kg). Together with PZnO supplementation at an EU level, growth data revealed a clear linear effect of ABC-4 on piglet performance (Figure 3). Body weights and average daily gain (ADG) declined progressively as ABC-4 increased, with piglets on the lowest ABC-4 consistently gaining more weight compared with those fed high-buffering diets. Interestingly, feed intake (ADFI) showed the same pattern during Phase 2, with piglets consuming less feed as dietary ABC-4

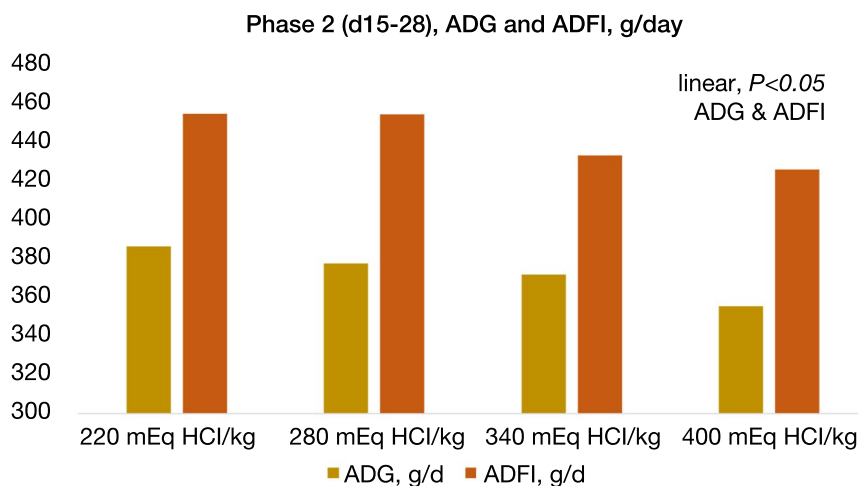


Figure 3. Production performance of post-weaning piglets with PZnO at 150ppm and increasing ABC-4 values at day 28 (linear, P-value < 0.05)

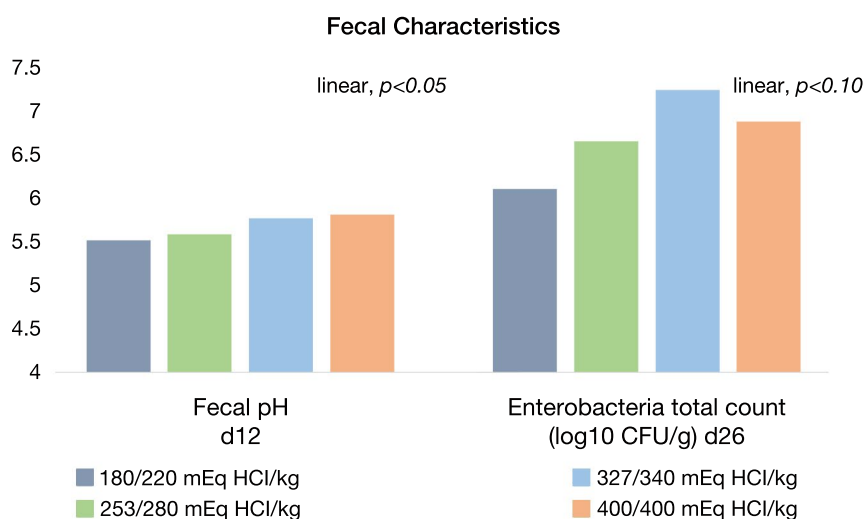


Figure 4. Fecal characteristics of piglets fed with increasing ABC-4 values (linear, P -value < 0.05; < 0.10)

increased. This indicates that reduced performance was not only a matter of nutrient utilization but also of lower voluntary intake under high acid-binding conditions. Despite these differences in intake and growth, feed conversion ratio (FCR) remained statistically unaffected.

Fecal indicators highlighted the impact of high-buffering diets on gut health. During Phase 2, higher ABC-4 values increased fecal looseness and diarrhea frequency, with piglets on 400 mEq HCl/kg diets showing the highest incidence of diarrhea. While fecal dry matter was not consistently affected, increasing ABC-4 led to a linear increase in fecal pH (Figure 4). Higher fecal pH suggests reduced fermentation activity in the hindgut and can be an indirect measure of volatile fatty acid (VFA) concentration, where higher pH might indicate lower VFA production and inhibition of growth of pathogenic bacteria. By day 26, a linear tendency ($P < 0.10$) was observed for total enterobacteria counts, suggesting that higher ABC-4 levels may predispose to increased bacterial load. Although not statistically significant, this trend supports the observed increase in fecal pH and diarrhea frequency at 400 mEq HCl/kg, suggesting a potential destabilizing effect on gut microbiota at excessive buffering levels.

In summary, these studies confirm that ABC-4 is an important yet forgotten factor in piglet nutrition. Diets with excessively high acid-binding capacity compromise growth performance and gastric acidity, increasing diarrhea risk and microbial imbalance. Conversely, maintaining ABC-4 between 200–300 mEq HCl/kg supports digestion, growth, and gut stability. Practical implementation requires careful management of acid-binding ingredients and the strategic inclusion of mineral in the piglet diets. Producers can reduce reliance on antibiotics and ZnO while keeping piglets growing steadily.

The use of potentiated zinc oxide at EU-regulated levels allows diets to reach these optimal ABC-4 values while maintaining growth and minimizing diarrhea, offering a sustainable alternative in the post-ZnO era.

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ENHANCING PERFORMANCE WITHOUT AGPs OR ZnO: A Smarter Gut Strategy

Giseli Heim
Product Manager Gut Health
Trouw Nutrition

“Shifts in the gut microbiota also can disrupt the microbial balance in piglets’ digestive tracts, leading to an overgrowth of harmful bacteria. To address this imbalance, industry practices have traditionally relied on antibiotic growth promoters (AGPs) and high-dose zinc oxide (ZnO). Regulatory pressures related to public health and environmental concerns are causing the industry to move away from the use of AGPs and ZnO. Today’s swine producers are seeking effective, science-backed alternatives that support intestinal stability and maintain animal performance.”

Weaning is an incredibly stressful time for any animal, and piglets are no exception. Post-weaning stress can lead to alterations in the gut microbiota - resulting in diarrhoea, reduced nutrient absorption, and slower weight gain. Shifts in the gut microbiota also can disrupt the microbial balance in piglets’ digestive tracts, leading to an overgrowth of harmful bacteria. To address this imbalance, industry practices have traditionally relied on antibiotic growth promoters (AGPs) and high-dose zinc oxide (ZnO).

Regulatory pressures related to public health and environmental concerns are causing the industry to move away from the use of AGPs and ZnO. Today’s swine producers are seeking effective, science-backed alternatives that support intestinal stability and maintain animal performance.

Responding to the industry’s challenges, scientists at Trouw Nutrition developed Presan®-FX, a synergistic blend of phenolic compounds, slow release

C12, target release butyrates, MCFAs and organic acids, which supports gut microbial balance and gut wall integrity. Validated in research studies and on-farm trials, Presan®-FX offers a targeted approach to support microbiota stability and gut integrity.

Recent studies have explored how the ingredients in Presan-FX maintain a healthy status of pigs even in poor hygienic conditions. Other research investigated the effects of Presan-FX on levels of volatile fatty acids (VFAs) in digesta in the lower part of weaned piglets’ intestinal tracts. As producers are moving away from supplying high levels of ZnO, researchers also have studied how this feed additive may help reduce or remove the need for high-ZnO to support piglets’ health and performance.

EFFECTIVE INGREDIENTS HELP TO IMPROVE INTESTINAL HEALTH

Researchers ran a series of trials to better understand which ingredients in Presan-FX optimally has a positive effect on gut health of weaned piglets.

Trials first looked at how MCFAs and slow-release C12 (SRC12) affected average daily gains (ADG) for piglets. Groups of piglets were either fed a standard diet or given an MCFA + SRC12 supplement with their standard feed.

The results showed an improvement in ADG when piglets were fed MCFAs + SRC12, especially in the last three weeks of the trial (Figure 1).

IMPROVING POST-WEANING FAECAL CONSISTENCY

A 42-day trial involving 320 weaned piglets was conducted in Spain. Again, two groups were used to demonstrate the effects of Presan-FX on piglets' performance. Piglet body weight was recorded on days 0, 7, and 14, and faecal samples were collected.

Piglets receiving Presan-FX in their diets had firmer stools by day 7 of the trial (Table 1), an indicator of better digestion. Research findings also show that Presan-FX improved the shape and height of villi, tiny finger-like structures in the small intestine. Villi play a crucial role in determining how well piglets absorb nutrients from their food.

When villi are shorter or damaged, piglets can have trouble absorbing nutrients, which may lead to diarrhoea and poor growth. Although improvements in final body weight and feed efficiency were not statistically significant, the trial demonstrated that Presan-FX provided a financial advantage in raising nursery piglets.

Beyond its effects in improving stool consistency and gut structure, researchers also sought to understand how Presan-FX might affect metabolic activity within the gut. One area of focus was VFAs, key compounds produced by microbial fermentation that play a vital role in energy supply and nutrient absorption in piglets.

INCREASING VOLATILE FATTY ACID PRODUCTION

VFAs are important compounds produced when gut bacteria break down fibre in the pig-

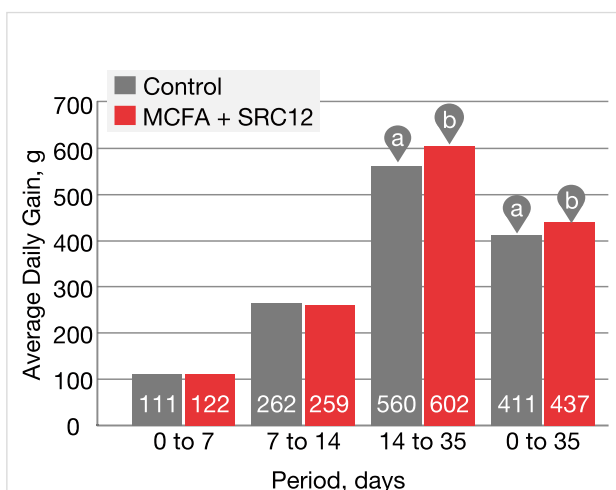


Figure 1. Average daily gain (ADG) of piglets fed one of the two dietary treatments measured at different days post-weaning. Columns with different superscripts (a,b) are significantly different ($p < 0.05$).

Table 1. Faecal dry matter (%) of weaned piglets that received Presan®-FX

	Control	Presan-FX
Day 7	24.9 ^b	26.5 ^a
Day 14	23.1	24.1
Day 21	22.7 ^y	24.0 ^x

Values within a row with different superscripts (a,b) are significantly different ($p = 0.03$), (x,y) tends to differ ($p = 0.09$)



Photo: Budimir Jevtic | Shutterstock

let's diet. These VFAs, primarily acetic, propionic, and butyric acids, are absorbed through the intestinal lining and used as an energy source for the animal. In fact, it is estimated that VFAs can provide more than 20% of a piglet's maintenance energy needs. They also play a key role in helping the intestines absorb water and sodium, which is particularly important during the post-weaning period when piglets are at greater risk of dehydration and diarrhoea.

Trial findings show that piglets receiving Presan-FX had significantly higher levels of acetic and propionic acid in the caecum and colon compared to the control group (Figure 2). Butyric acid levels were also higher in piglets receiving Presan-FX. Butyric acid supports gut lining health and microbial stability. These results suggest that Presan-FX not only helps supports the gut structure and microbial balance. A healthy gut means the gut is more stable, energy efficient, and resilient.

MAINTAINED GUT HEALTH TRANSLATES INTO BETTER PERFORMANCE

Producers ultimately want to see improved weight gain and performance. Across multiple trials, Presan-FX has consistently shown benefits in key zootechnical metrics, including ADG, average daily feed intake (ADFI), and feed conversion ratio (FCR).

In the 42-day trial, piglets receiving Presan-FX showed im-

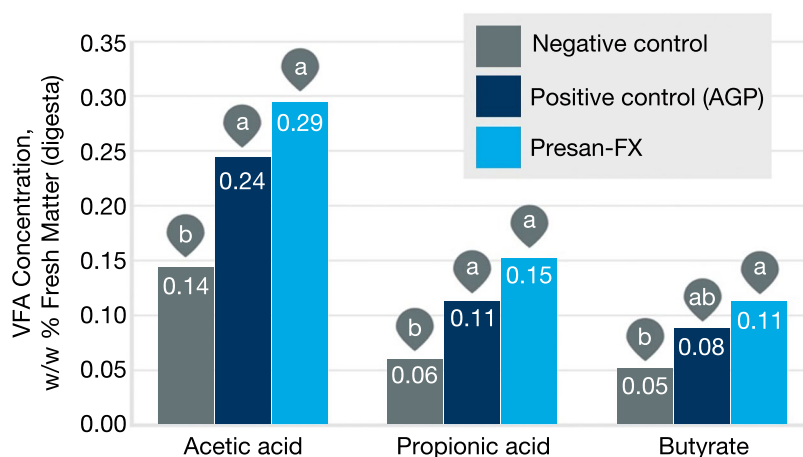


Figure 2. Acetic acid, propionic acid, and butyrate concentration in colon of weaned piglets in negative control, positive control (AGP), or Presan®-FX group for 42 days. Bars with different superscripts (a,b) are significantly different ($p < 0.01$).

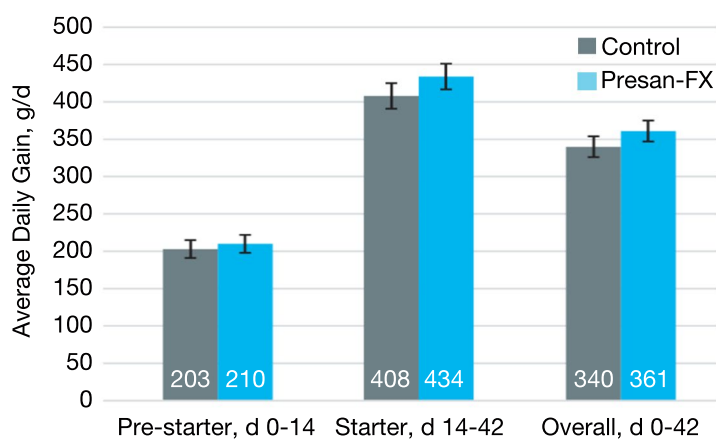


Figure 3. Average daily gain (83% confidence interval as error bars) of weaned piglets that received Presan®-FX from day 0 to 42 post-weaning

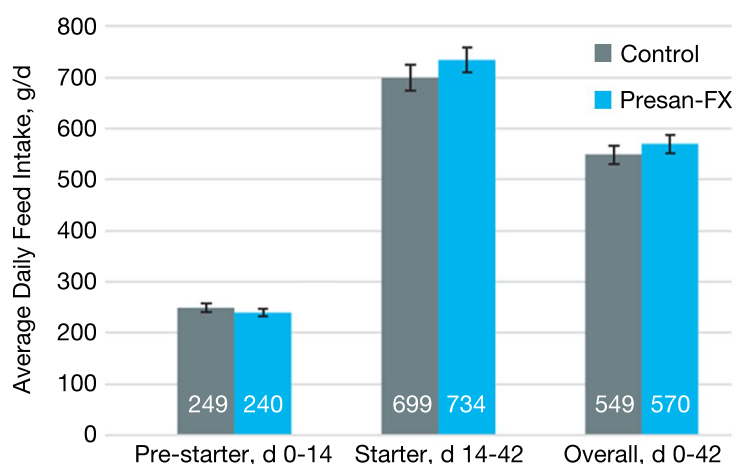


Figure 4. Average daily feed intake (83% confidence interval as error bars) of weaned piglets that received Presan®-FX from day 0 to 42 post-weaning

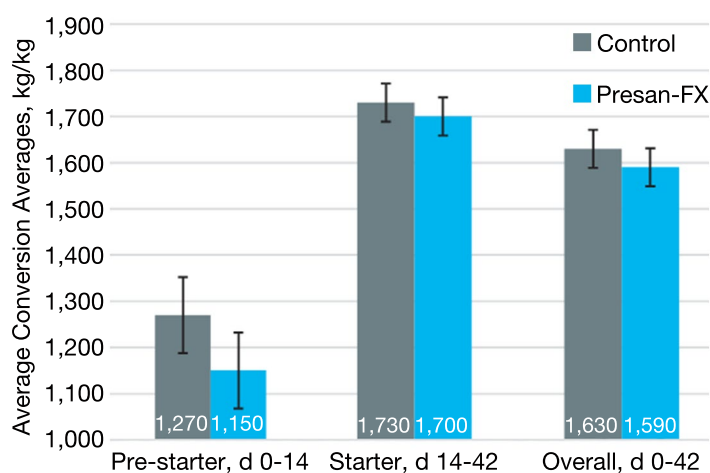


Figure 5. Feed conversion ratio averages (83% confidence interval as error bars) of weaned piglets that received Presan®-FX from day 0 to 42 post-weaning

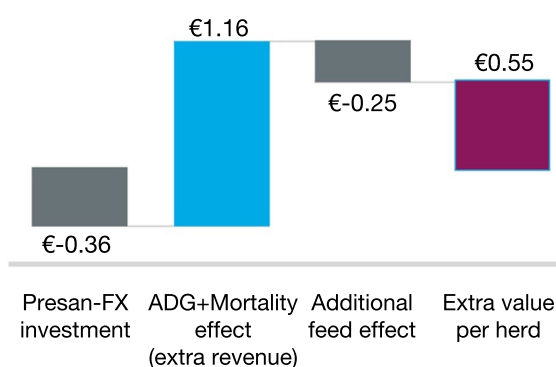


Figure 6. Return on investment of the use of Presan®-FX compared to the control diet in weaned piglets, considering local market prices at the time of the experiment

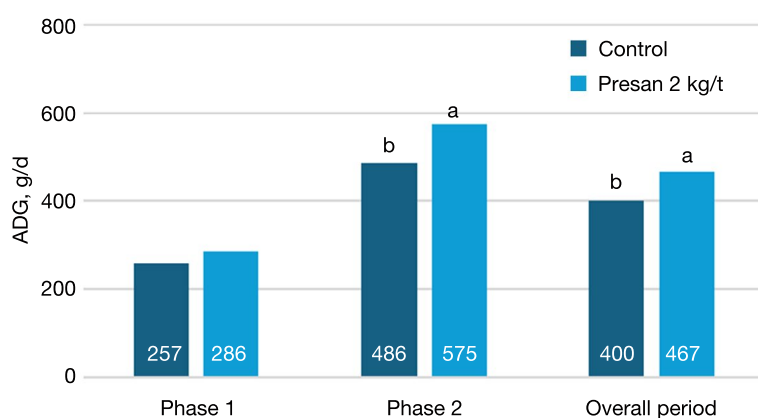


Figure 7. Average daily gain of weaned piglets that received Presan®-FX partially replacing high zinc oxide. Columns with different superscripts indicate significant differences ($p < 0.05$).

improvements in final body weight (+830 g), ADG (+21.0 g/day) (Figure 3), and ADFI (+21.5 g/day) (Figure 4), along with improved FCR (-4 points) (Figure 5).

Another study demonstrated a clear dose-response effect: At an inclusion level of 2 kg per tonne, Presan-FX delivered the largest improvements in ADG (+89 g) and FCR (-10 points). Even when statistical significance wasn't reached, the consistent numerical improvements translated into tangible economic value, generating between €0.40 and €0.55 more per piglet compared to control groups (Figure 6).

For producers, these results suggest that Presan-FX not only supports animal health but also enhances profitability, particularly when used during the critical nursery phase.

REPLACING ZnO WITH A SYNERGISTIC BLEND

Building on these findings, researchers explored whether Presan-FX could reduce or eliminate the need for high levels of ZnO to support piglets' growth and performance.

In comparative trials, piglets fed a diet where high ZnO was partially replaced with Presan-FX showed comparable performance metrics, including final body weight, ADG, and ADFI along with a better FCR (Figure 7-8).

Another trial investigated whether Presan-FX could eliminate the

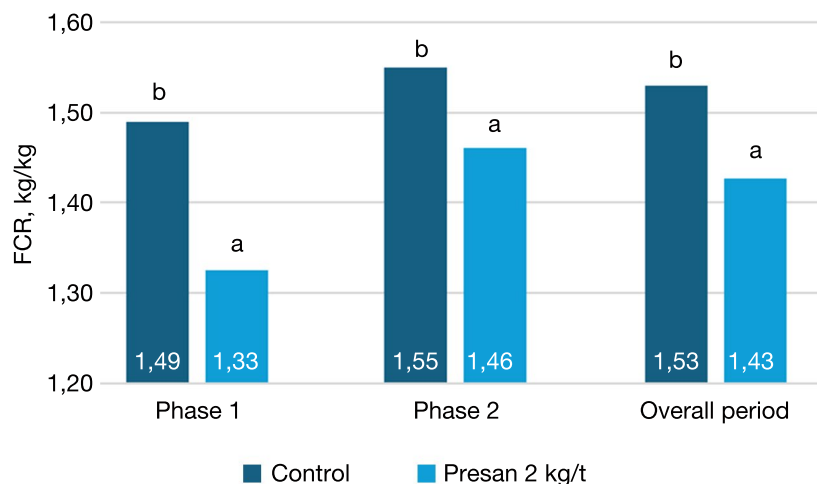


Figure 8. Feed conversion ratio of weaned piglets that received Presan®-FX in place of zinc oxide. Columns with different superscripts indicate significant differences ($p < 0.05$).



Photo: Freepik

Table 2. Zootechnical performance for day 0-12 and day 0-33 of weaned piglets fed high ZnO or Presan®-FX starter diet (day 0-12)

	Day 0-12		Day 0-33	
	ZnO 3,000 ppm	Presan®-FX 2 kg/t	ZnO 3,000 ppm	Presan®-FX 2 kg/t
Average daily feed intake, g/d	290.9	277.3	593.6	586.9
Average daily gain, g/d	226.2	224.2	435.9	438.9
Feed conversion Ratio, kg/kg	1.32	1.30	1.36	1.34
Body weight, kg	10.9	10.9	22.7	22.8
Mortality, %	–	–	2.64	2.99

need for a ZnO supplement entirely. The results, as shown in Table 2, were comparatively similar for both treatments.

While there was a slightly higher mortality rate in the Presan-FX group, the added value per piglet was €0.40 higher than the high-ZnO group at the end of the 33-day trial. These findings suggest that Presan-FX presents a reliable and economically vi-

able solution for ZnO-free feeding strategies, while also supporting a more sustainable approach to pig production.

SUPPORTING PERFORMANCE IN AGP-FREE DIETS

With growing concern over antibiotic resistance, the push to eliminate AGPs from animal feed has intensified. While such efforts support public health,

Table 3. Growth performance of weaned piglets in three treatment groups

	Negative control	Positive control (AGP)	Presan®-FX
Body weight, kg	23.95	24.02	24.14
Average daily gain, g/d	400	406	407
Average daily feed intake, g/d	639	661	659
Feed conversion ratio, kg/kg	1.60	1.63	1.62



Photo: Thammachak Sotiya | Shutterstock

reducing AGPs on the swine farm presents new challenges for producers striving to maintain performance in young piglets. That's where Presan-FX shows strong potential.

A 42-day study conducted in China compared piglets fed AGP-supplemented diets, those receiving Presan-FX, and a negative control group, all under reduced-zinc conditions. While no significant differences were found in final body weight, feed intake, or growth rate across the groups (Table 3), Presan-FX stood out in its effect on gut fermentation.

It significantly increased the concentrations of VFAs, such as acetic and propionic acid, in both the caecum and colon. Butyrate levels were also higher in the Presan-FX group, supporting better gut lining health and nutrient absorption (Figure 2).

Stress is a recognised part of swine production, particularly around weaning, when gut health is

most vulnerable. Presan-FX stabilizes microbial populations and may boost gut wall integrity during this critical period.

PROVEN TO ENHANCE PIG PERFORMANCE

By increasing VFA production and supporting nutrient absorption, Presan-FX supports growth while reducing the need for antibiotic interventions. These benefits contribute to improved pig production, regardless of climate zone or regulatory landscape.

Data from 23 trials representing five countries and covering every phase of pig production shows that Presan-FX has demonstrated consistent improvements in key production metrics including faecal consistency, energy metabolism, and economic return. For producers seeking science-backed, antibiotic-free solutions, Presan-FX is a smart investment in sustainable piglet performance.

About Giseli Heim

As a veterinarian, Giseli Heim holds a master's degree in Veterinary Science (Swine Reproduction – Brazil) and a PhD in Animal Science (Swine Nutrition – Ireland). She has been working for Trouw Nutrition for almost six years, starting from Global Marketing Swine, joining Nutreco Africa as Swine Specialist and finally finding her passion in the Selko Feed Additives, Gut Health Team, as Global Product Manager Gut Health. She has worked at Cargill (Spain), Orffa (Netherlands) and IDEXX (Netherlands). She is originally from Brazil and lived in Ireland, Spain and finally The Netherlands.



Raspberry Flavour Benefits: A FRUITY SOLUTION FOR PIGLET WEANING SUCCESS

Dr. Anne Winkler

*Global Product Manager Flavours & Sweeteners
Phytobiotics Futterzusatzstoffe GmbH*

“Red fruit flavours, with their fruity and appealing taste profile, have shown promising effects on improving feed intake in piglets. This article explores the benefits and underlying mechanisms of incorporating a raspberry flavour into piglets’ diets. Based on recent field study results, it explains how this approach can ease the challenges associated with weaning and improve the health and well-being of piglets during this vulnerable critical developmental stage. “

The transition from sow’s milk to solid feed during weaning is a critical period in piglet rearing, essential for optimal growth and development. This phase can be particularly challenging due to the separation from their mothers and littermates, exposure to new environments, and the introduction of unfamiliar feed. These changes can induce stress, reduce feed intake, and increase susceptibility to diseases.

To address these challenges and ensure a smoother transition, it is crucial to maintain consistent feed intake. The use of well-formulated flavours and sweeteners can be a beneficial approach to significantly enhance feed palatability and acceptance, thereby reducing stress and promoting stabilized feed intake.

Taste plays a crucial role in feed selection during weaning by signaling feed composition and nutritional value. The five primary tastes - sweet, salty, bitter, sour, and umami - provide important information: sweet indicates carbohydrates (energy), salty signals essential minerals, umami denotes pro-

teins and amino acids, while bitter and sour can indicate potential toxins. This taste-information feed-back loop helps animals associate feed flavours with their health and nutritional effects. Positive taste associations encourage feed intake when nutritional needs are met, whereas negative associations lead to avoidance if the feed causes adverse effects.

THE KEY TO OVERCOMING CHALLENGES

Red fruit flavours, with their fruity and appealing taste profile, have shown promising effects on improving feed intake in piglets. This article explores the benefits and underlying mechanisms of incorporating a raspberry flavour into piglets’ diets. Based on recent field study results, it explains how this approach can ease the challenges associated with weaning and improve the health and well-being of piglets during this vulnerable critical developmental stage.

OVERCOMING WEANING CHALLENGES: STRATEGIES FOR A SMOOTH TRANSITION

In piglet nutrition, flavour profiles such as milky, creamy, and vanillary are commonly used because

they evoke comforting associations with mother's milk, which helps to stabilize feed intake during the weaning period. Similarly, incorporating red fruit flavours into piglets' diets can be beneficial for enhancing performance and welfare. Many animals, including piglets, have a natural preference for sweet tastes, making red fruit flavours - being both sweet and fruity - inherently appealing. These flavours mimic the taste of ripe, nutrient-rich fruits, which are attractive to piglets and associated with providing essential energy and nutrients.

Considering piglets' instinctive behavior and nutritional requirements, adding red fruit flavours offers a distinct and appealing option that has the potential to effectively enhance feed intake and support overall well-being. Improving feed acceptance during weaning is crucial, as this period represents a significant dietary transition from a milk-based diet to solid feed. The use of flavours that align with piglets' natural preferences can facilitate this transition and contribute to more stable and efficient feeding patterns.

USE OF PHYTOBIOTICS' RASPBERRY FLAVOUR IN PIGLET FEEDING

A field study conducted in Germany investigated the impact of varying concentrations of Phytobiot-

ics' raspberry flavour on piglet performance during weaning. The study aimed to evaluate how different levels of Bigarol Raspberry P influence piglets' feed intake and growth.

Study Design

The study involved 256 piglets, each 3 weeks old, with an average body weight of 7.6 kg. These piglets were sourced from a commercial farm and housed at the research facility Haus Düsse in Bad Sassendorf, Germany. The piglets were randomly assigned to four groups, with each group receiving a different dietary treatment: Treatment 1 (Control): no raspberry flavour added; Treatment 2: 100 g of Bigarol Raspberry P per ton of feed; Treatment 3: 200 g of Bigarol Raspberry P per ton of feed, and Treatment 4: 400 g of Bigarol Raspberry P per ton of feed.

Bigarol Raspberry P was incorporated into the feed prior to the pelleting process. Its formulation is specifically designed to be heat-stable, maintaining its flavour profile and effectiveness throughout the feed processing. Each group consisted of 8 piglets per pen, and performance data, including body weight, feed intake, and weight gain, were monitored and recorded weekly over a 5-week trial period.



Photo: Phytobiotics

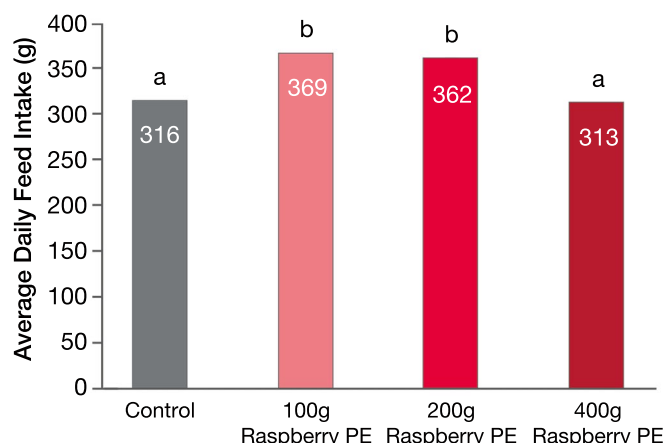


Figure 1. Effect of Bigarol Raspberry PE on ADFI in weaning piglets

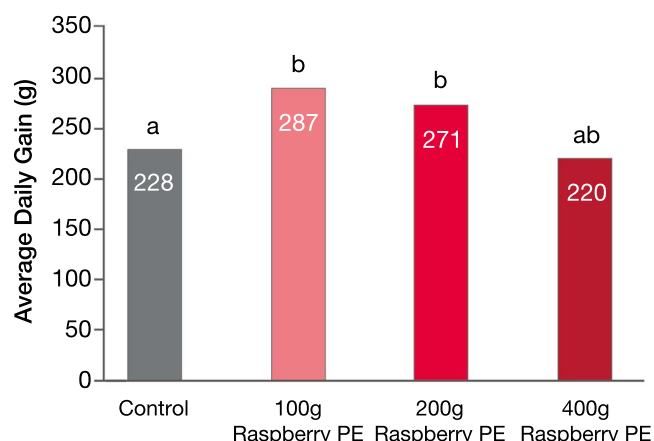


Figure 2. Effect of Bigarol Raspberry PE on ADG in weaning piglets

Promising Results

Piglets fed with Bigarol Raspberry P showed a significant increase in average daily feed intake and average daily gain compared to those which received the control diet. Specifically, treatment 2, which included 100 g of Bigarol Raspberry P per ton of feed, achieved the best enhancements in daily feed intake and average daily gain compared to the control, treatment 3 (200 g Bigarol Raspberry P per ton of feed), and treatment 4 (400 g Bigarol Raspberry P per ton of feed).

CONCLUSION

The inclusion of Bigarol Raspberry P in piglet diets significantly enhances feed acceptance, with higher concentrations leading to greater improvements in feed intake and growth. This raspberry flavour effectively supports a smooth transition from sow's milk to solid feed by increasing feed palatability, which is crucial for maintaining optimal growth rates during weaning.

The application of raspberry flavour addresses weaning challenges by boosting feed acceptance, reducing stress, and stimulating appetite, thereby con-

tributing to better growth and overall well-being of piglets. These positive outcomes from field studies underscore the value of incorporating well-formulated flavours into animal nutrition, highlighting their role in improving animal welfare and performance.

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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.

SUPPORTING CALF GUT HEALTH TO PREVENT SCOUR

HoloRuminant unites scientists, industry and farmers to uncover how ruminant-associated microbiomes interact with their host across early life, weaning, diet shifts and lactation. By combining genomics, metabolomics and other multi-omics tools, the project links microbial connectivity and heritability to animal health, welfare, productivity and environmental efficiency. One of its key insights concerns early-life health: Calf scour remains one of the most persistent and costly diseases in dairy production. By understanding and supporting the calf gut microbiome during this critical stage, we can strengthen immune responses, reduce disease risk and build the foundation for healthier, more resilient herds.

■ By Sabine Scully, *Teagasc Walsh* & Geena Cartick, *European Forum of Farm Animal Breeders*

THE CHALLENGE OF CALF SCOUR

Diarrhoea, commonly known as scour, is one of the most frequent and costly diseases in young calves. It can affect up to half of all dairy calves, often leading to dehydration, loss of appetite, and stunted growth. In severe cases, scour is the leading cause of death during the first month of life. Even when calves recover, the long-term impact can be substantial, including lower growth rates, delayed fertility, and reduced milk yields later in life.

The complexity of the disease makes treatment difficult. Scour is often caused by multiple pathogens at once—such as rotavirus, coronavirus, and *Cryptosporidium*—and not by bacteria, meaning that antibiotics are ineffective. Prevention, rather than treatment, is therefore the key to controlling scour.

Early-Life Immunity: A Vulnerable Window

Newborn calves enter the world with an under developed immune system. They rely entirely on antibodies from colostrum to protect them against infection in the first weeks of life. However, this passive immunity declines sharply after two weeks, while the calf's own immune system only begins to function effectively around three to four weeks of age (Image 1).



Sabine Scully



Geena Cartick

This creates a vulnerable gap where the calf's defenses are at their lowest—just when exposure to



Photo: Sabine Scully March 2022

Image 1. Calf with scour, resting after receiving oral rehydration solution

environmental pathogens is high. During this period, any stress, nutritional imbalance, or microbial disturbance can tip the balance toward disease.

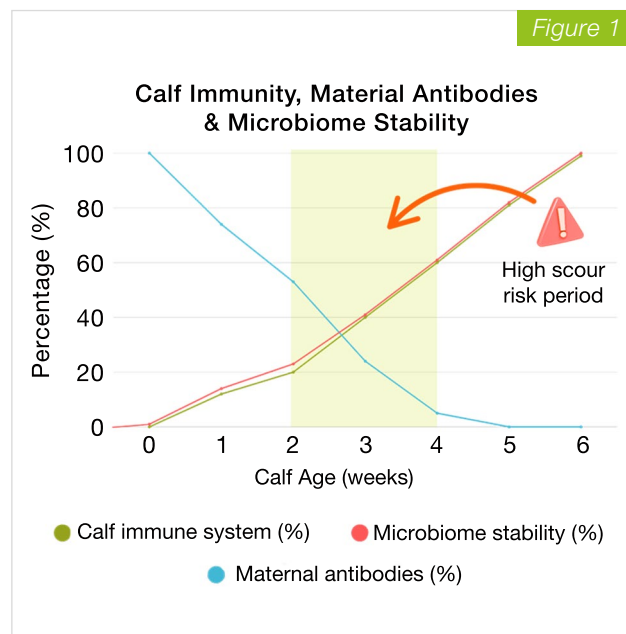
The Gut Microbiome: A Key Player in Health

In parallel with immune development, the calf's gut microbiome—composed of bacteria, viruses, fungi, and other microorganisms—is still taking shape. In early life, this microbial community is unstable and sensitive to change. When it is disrupted (a condition known as dysbiosis), harmful microbes can overgrow, compromising digestion and immune function.

Recent research by Teagasc within the HoloRuminant project found that dysbiosis in the hindgut microbiome can occur *before* clinical scour appears. In this study, more than half of the calves developed scour even though they had received sufficient colostrum and antibodies (called adequate passive transfer of immunity). This shows that immune protection alone is not enough; supporting microbiome development is equally vital (Figure 1).

PREVENTING DYSDIOSIS: WHAT WORKS

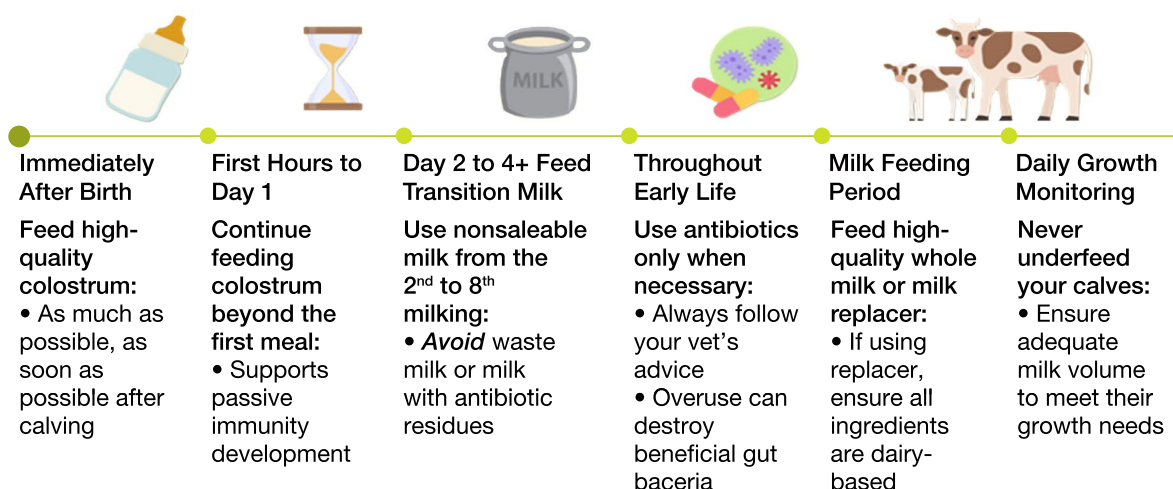
The good news is that the microbiome can recover if the calf is properly supported. Management practices that protect microbial community balance can help reduce the risk of scour and



improve overall calf performance. Key strategies include:

- **Colostrum management:** Feed clean, high-quality colostrum (>50g/L IgG; BRIX ≥22%) as soon as possible after birth—ideally within two hours. Continue feeding transition milk for the first few days to extend immune protection. Transition milk is the nonsaleable milk produced by the cow between the 2nd and 8th milking.
- **Nutritional consistency:** Provide high-quality whole milk or a milk replacer made with dairy-based ingredients. Maintain consistent feeding schedules, feed adequate volumes of milk and avoid sudden changes in diet.
- **Hygiene and housing:** Keep pens dry, clean, and well-ventilated to reduce exposure to pathogens. Separate sick calves and clean and disinfect feeding equipment regularly.
- **Judicious antibiotic use:** Use antibiotics only under veterinary guidance. Overuse can harm beneficial gut bacteria, delaying microbiome recovery.
- **Hydration support:** During any signs of diarrhoea, maintain fluid balance with oral electrolytes between milk feedings and never skip milk meals.

Figure 2

To Support Microbiome Development **Before** Scour Occurs:

• **Monitoring and growth tracking:** Regular weight and health checks allow early detection of problems before they escalate (Figure 2).

THE LINK BETWEEN THE MICROBIOME AND IMMUNITY

The developing microbiome and the immune system are tightly linked. Microbes in the gut train the immune system to distinguish between harmful and beneficial organisms. When the microbiome is disrupted, this balance is lost, making calves more prone to infection.

Supporting microbial development early in life therefore strengthens the animal's ability to resist disease—not only in the first weeks but also throughout adulthood.

TOWARDS HEALTHIER, MORE RESILIENT CALVES

By focusing on microbiome-friendly management from birth, producers can reduce disease incidence, antibiotic dependence, and economic losses. The insights gained from HoloRuminant research help bridge scientific understanding with practical recommendations for on-farm use.

Healthy microbiome development is not a luxury—it is a cornerstone of sustainable dairy produc-

tion. Supporting it means healthier calves, stronger immune systems, and improved lifetime productivity.

The HoloRuminant project has received funding from European Union's Horizon 2020 research and innovation program under Grant Agreement No 101000213. This publication reflects the views only of the author, and not the European Commission (EC). The EC is not liable for any use that may be made of them information contained herein.

About Sabine Scully

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About Geena Cartick

The Breeding & Genetics Advisor of EFFAB, Geena Cartick co-authored the 7th Code EFABAR, leads WP6 in HoloRuminant, and supports EU research knowledge exchange. Her background spans EMABG (BOKU), GENOSTAR (Fleckvieh sperm phenomics), LIVINFARM (insect breeding), and Avipro/Eclasia (broiler operations).



RETHINKING TRANSITION COW MANAGEMENT

Marie-Valentine Glica

*Global Marketing Manager Ruminant Feed Additives
Lallemand Animal Nutrition*

Up to 75% of cow diseases occur within the first month post-calving — making this phase critical for long-term health and productivity. While transition management traditionally focused on metabolic disorders such as ketosis and hypocalcemia, new research invites us to take a more holistic and preventive approach, placing inflammation as a cornerstone of transition disorders.

INFLAMMATION: THE MISSING LINK

Beyond metabolic issues like ketosis and hypocalcemia, inflammation is emerging as a central factor in transition cow health.

A shift to lactating rations (higher energy and protein) during the transition period changes the microbiota balance in the rumen: There is a decrease in fibrolytic microbiota (bacteria and fungi) and an increase in rapidly fermentable carbohydrate degraders. This switch decreases rumen pH and can

lead to a higher risk for subacute ruminal acidosis (SARA) that damages the rumen wall epithelium.

On the other hand, tight junctions, which are a key component of the rumen epithelial barrier, are also disrupted, leading to increased permeability of the rumen epithelium. A compromised epithelial barrier, or leaky epithelium, of either the rumen or lower gut, results in bacteria translocation leading to excessive immune activation and inflammation (Figure 1).

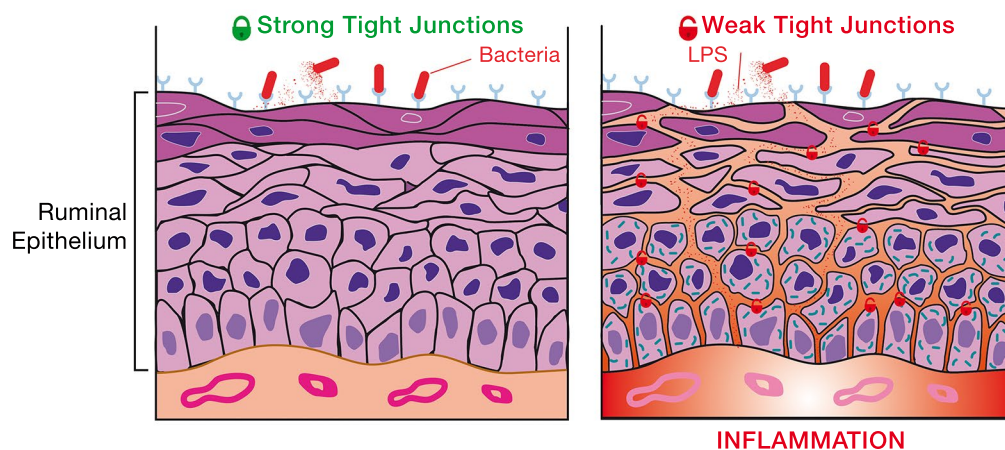


Figure 1. The disruption of tight junctions (right) in the rumen epithelium triggers inflammation through the passage of LPS and potentially pathogen bacteria

From calving stress to oxidative stress, other factors converge to activate the immune system and divert energy from milk production.

First of all, the increased metabolic demand, along with the demands of the developing calf, can lead to an elevated production of reactive oxygen species (ROS) as byproducts of metabolism. A disruption in the balance between ROS and antioxidants is the definition of **oxidative stress**, which can also contribute to inflammation and immune dysregulation.

Moreover, **stress**, common around calving, activates the hypothalamic pituitary-adrenal axis, leading to the release of corticotropin-releasing factor (CRF), which can disrupt the intestinal barrier and contribute to systemic inflammation.

The increased energy demand of the immune system causes the animal to shift its metabolic priorities, negatively affecting growth, reproduction and productivity.

THE TRUE COST OF INFLAMMATION

Inflammation redirects energy from milk synthesis to immune defense — costing up to 26 kg of milk every day!

During immune activation associated with increased intestinal barrier permeability, metabolism normally dedicated to milk synthesis, that normally requires 25-30% of basal metabolism in a healthy animal, is redirected towards the immune system. The immune system requires a great deal of energy. Once under pressure, this requirement increases, which consumes nutrients.

The cow will find energy sources including glucose as precursor of lactose, which are intermediaries as the cow mobilizes fat stores as a source of energy. If the inflammation becomes pathological, it reduces feed intake and may result in metabolic syndromes such as hypocalcemia.

The use of glucose by the immune system and

THE COST OF INFLAMMATION



2Kg sugar/day

=



Equivalent to

26Kg potential milk loss/day

the reduction in feed intake are responsible for the increase in NEFA (non-esterified fatty acids) and ketones, explaining a decline in overall health, production, and reproduction outcomes.

Recent studies show that the energy to fight against inflammation (modeled by LPS-induced infection) costs the equivalent of 2 kg of sugar every day and approximately 26 kg of milk loss.

POST-PARTUM DISORDERS: INFLAMMATION'S RIPPLE EFFECT

Inflammation can also cause post-partum disorders in dairy cows, such as ketosis, milk fever (hypocalcemia), reproductive tract infections such as retained fetal membranes, metritis, and endometritis. All of these can negatively impact the cow's health, fertility, and milk production.

For example, ketosis, which occurs when the cow mobilizes excessive fat for energy, leads to an accumulation of ketone bodies, resulting in a decrease in milk quality and fertility. Research shows that inflammation during the transition period negatively

impacts cow reproductive performance as it decreases ovarian activity (Figure 2).

EXPERT TIPS TO REDUCE INFLAMMATION

As Professor Mike Steele, a specialist in physiology and metabolism of dairy calves and transition cows, at the University of Guelph, explains during [an interview](#): “We want to do everything we can to minimize inflammation in early lactation. Inflammation comes from stress. It can be gastrointestinal disorders or abrupt dietary changes. But it can also be an important change in the cow’s environment, or a really rough calving or mastitis.”

When asked how a dairy farmer can decrease inflammation, Steele shares his own approach, focusing on nutrition and beyond: “Decreasing inflammation can come from many different areas. Personally, I focus on the gastrointestinal tract. We look at ways of adapting the diet from a dry cow diet to an early lactation diet to minimize leaky gut.” However, he adds that, while nutrition is important, we also should focus on overall management practices and the animal environment, since “inflammation can come from everywhere”.

DIGESTIVE WELFARE STARTS WITH MICROBIOTA MANAGEMENT

Supporting optimal microbiota balance is essential

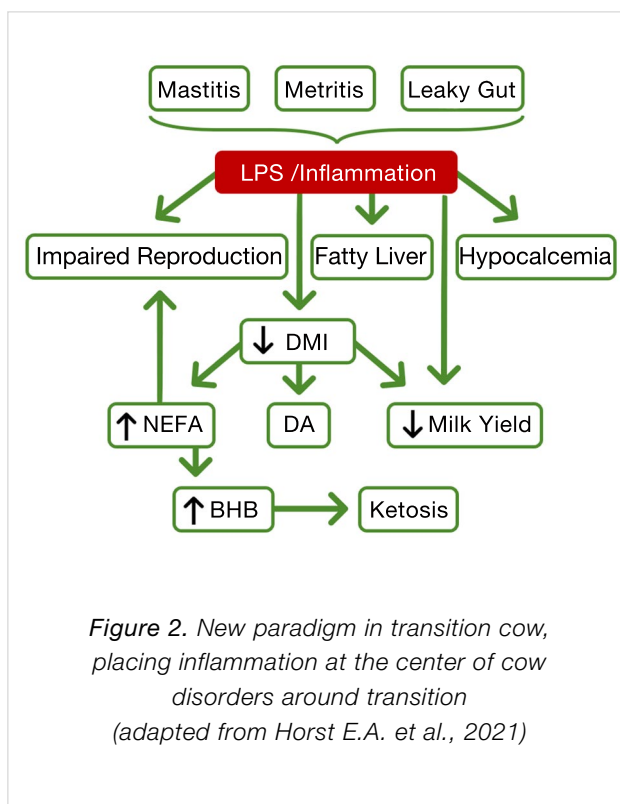


Figure 2. New paradigm in transition cow, placing inflammation at the center of cow disorders around transition (adapted from Horst E.A. et al., 2021)

to prevent leaky epitheliums as gut barrier disruption leads to increased permeability and inflammation. Reducing leaky rumen epithelium by maintaining a balanced microflora can be achieved by supplementing a probiotic live yeast, the rumen-specific yeast strain *S. cerevisiae* CNCM I-1077 (Levucell SC, Lallemant Animal Nutrition). Research has shown that *S. cerevisiae* CNCM I-1077 limits inflammation at

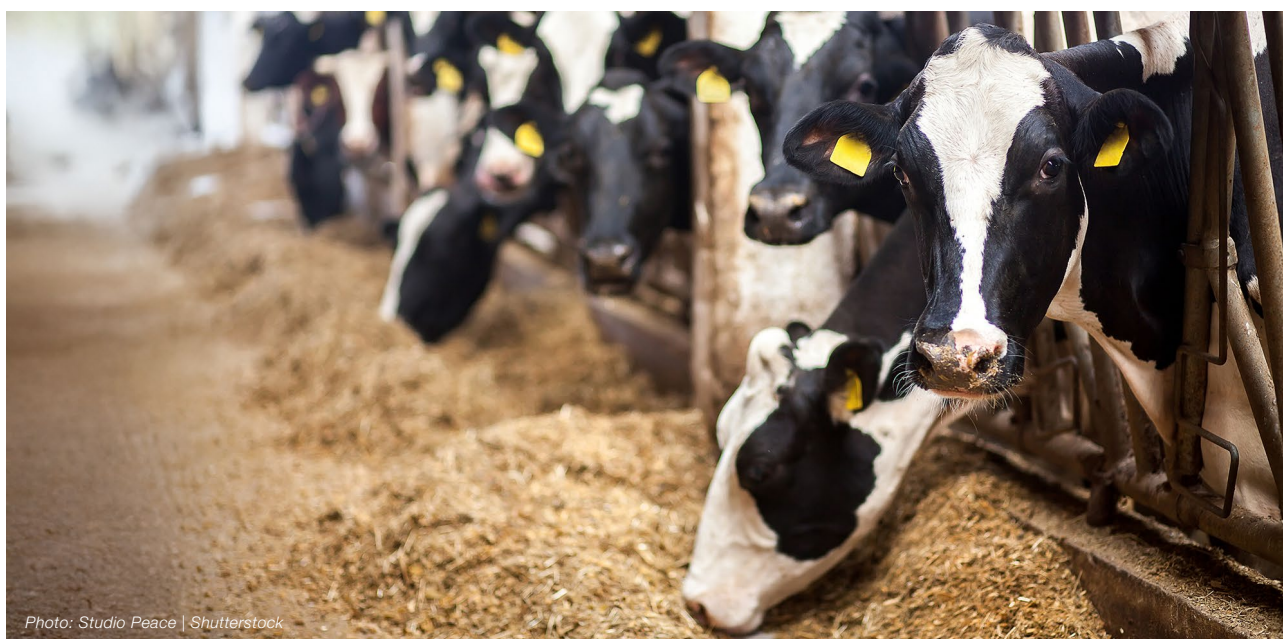


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the epithelium level (strengthens rumen post-calving), boosting DMI post-calving and milk production. When supplemented before calving, the live yeast strain helps the rumen wall better prepare for the stress encountered around calving by improving rumen wall integrity (tight junctions) and resistance to rumen wall inflammation through its effects on cytokines.

In a trial performed during early lactation (IRTA, Spain, 2019), Levucell SC fed cows were shown to produce 6 liters of extra milk, partly explained by a higher DMI of 2.5 kg/head/day. This higher DMI was equivalent to a higher non-fiber carbohydrate (NFC) intake in the Levucell SC group of 1.21 kg, equivalent to an extra 20%, corresponding to a higher energy supply.

In another commercial trial with Holstein transition cows, Poland (2015), the same **rumen-specific live yeast** combined with specific yeast product from Lallemand, reduced the number of ketotic cows by 26.4% compared to the control group (Figure 3).

CONCLUSION

Leaky epitheliums are the central cause of inflammation and immune activation during the transition period; with consequences on health and productivity. Nutritional strategies that support gut integrity and reduce inflammation are essential for a smooth and successful transition period.

Among other animal management practices not detailed in this article, pro and postbiotic feed additives that can help maintain balanced rumen microbiota and epithelial integrity during the transition period can support cow health and high perfor-

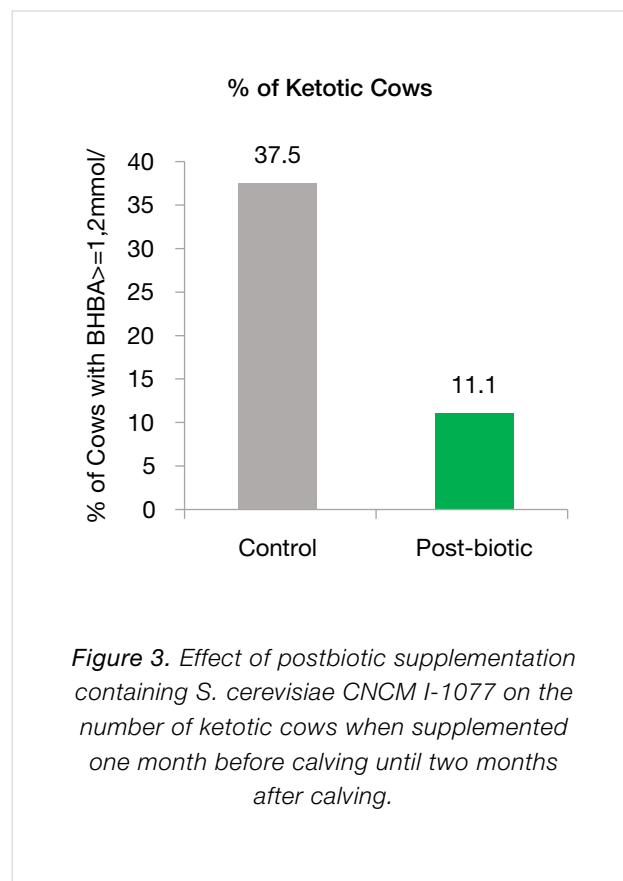


Figure 3. Effect of postbiotic supplementation containing *S. cerevisiae* CNCM I-1077 on the number of ketotic cows when supplemented one month before calving until two months after calving.

mance under such challenging conditions, yielding high economic outcomes.

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About Marie-Valentine Glica

An agronomist Marie-Valentine Glica has been working for Lallemand Animal Nutrition for 5 years as global ruminant marketing manager. Glica is in charge of marketing and communication for the feed additives range (trial valorization, on-farm services and training tools development). She has previous experience in technico-marketing in healthcare for large and young ruminants.



POLYPHENOLS ON THE EARLY WEANING OF PIGLETS

Juan Javierre
Senior Nutrition Scientist
Layn Natural Ingredients

“Producers try to overcome the low voluntary intake immediately after weaning by enhancing feed palatability. While this strategy may effectively increase feed consumption, the status of the intestine prevents an effective nutrient digestion, and contribute to exacerbating oxidative stress. This is worrisome because weight gain is a direct consequence of intake, and low gains at this stage may either cause lower weight at the end of fattening, or unnecessarily lengthening the time required to reach market weight. In both cases economic losses are incurred by the producer.”

It is customary in modern intensive swine production the use of early weaning techniques to improve productivity. This, however, causes an intense oxidative stress to the piglet due to the sudden separation from the sow, the rapid change in the diet, and the change of physical and social environment. Affecting chiefly the intestine, it results in perturbations of physiological and biochemical functions, nutrient digestion and absorption, mucosal immune function, the onset of intestinal inflammation, and changes in intestinal microbiota. The ultimate consequences are decreased feed intake, occurrence of postweaning diarrhea (PWD), and growth rate restriction.

The main characteristics of a healthy gut include: a healthy proliferation of epithelial cells lining the intestinal wall; proper gut barrier function; a beneficial and balanced gut microbiota; and a well-developed intestinal mucosa immunity, which is not the case in early weaned piglets.

That is because the piglet's intestine at this stage is not mature and its digestive and immune systems have not had enough time to evolve, causing the piglets to poorly adapt to the complex weaning environment. Physiological immaturity also means insufficient secretion of digestive enzymes, which makes solid feed digestion difficult and reduces voluntary feed intake.

Poor nutrient flow leads to oxidative stress by exhausting the antioxidant enzyme equipment and increasing production of Reactive Oxygen Species (ROS – superoxide and hydrogen peroxide). When combined with hydrogen peroxide and iron through Haber-Weiss and Fenton reactions, superoxide generates the hydroxyl radical. This free radical oxidizes the enterocyte membrane phospholipids, and may directly damage DNA, creating the conditions required for early cell death, and additionally stimulate specific cell pathways within the enterocyte, leading to processes detrimental to gut health and overall performance.

ROS build-up activates the Nuclear Factor kappa-light-chain-enhancer of activated B cells (NF- κ B) pathway. This translocates to the cell's nucleus and changes protein transcription. One effect is impairing the synthesis of tight junction proteins, altering the function of the intestinal barrier. This increases gut permeability and causes microbiota imbalances that favor intestinal colonization by entero-toxicogenic *Escherichia coli*, leading to diarrhea. Bacterial lipopolysaccharide enhances ROS production by the mitochondrion, increasing oxidative status. Another effect is the synthesis of pro-inflammatory cytokines, such as tumor necrosis factor-alpha (TNF- α) and interleukins (IL-1 β , IL-6, and IL-8), causing intestinal inflammation and altering local innate immunity.

The diagram contained in Figure 1 schematically summarizes the implications of the enhanced oxidative status in intestinal cells.

Producers try to overcome the low voluntary intake immediately after weaning by enhancing feed

palatability. While this strategy may effectively increase feed consumption, the status of the intestine prevents an effective nutrient digestion, and contribute to exacerbating oxidative stress. This is worrisome because weight gain is a direct consequence of intake, and low gains at this stage may either cause lower weight at the end of fattening, or unnecessarily lengthening the time required to reach market weight. In both cases economic losses are incurred by the producer.

So, the use of additives to enhance daily feed intake may have the intended consequence of aggravating the intestinal physio-metabolic status. It is in this complex technical and economic environment that polyphenol-rich botanical extracts find their role of restoring piglet's homeostasis and functional balance.

There is extensive published research showcasing the ability of polyphenols to reduce the oxidative status of production animals, recovering the usual productive parameters as the outcome of their

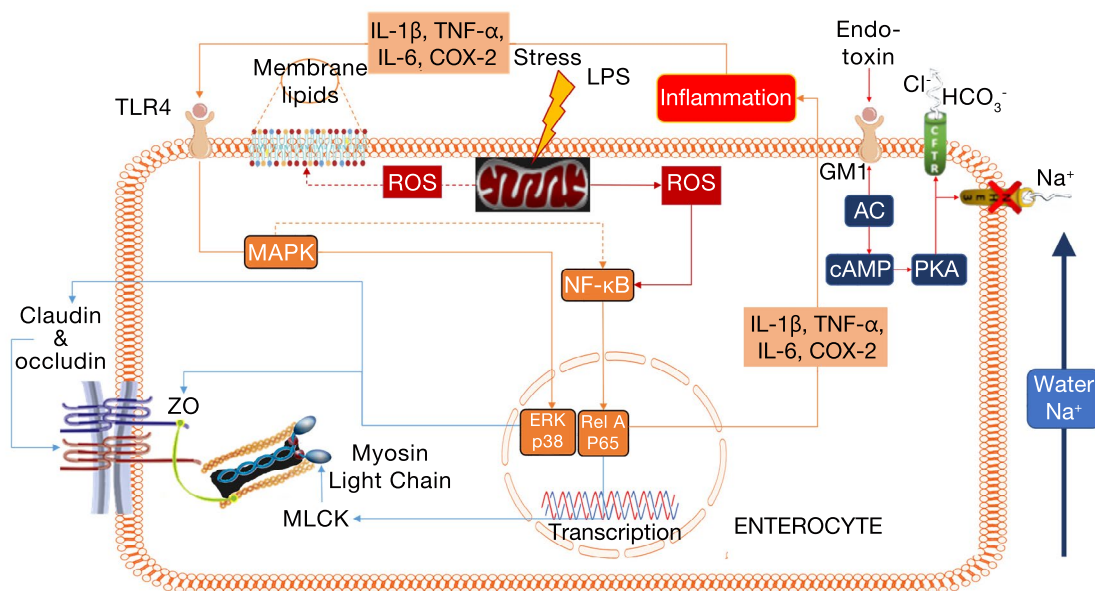


Figure 1. Pathways, effectors and consequences of weaning stress on the enterocyte, leading to compromised growth rate.

TLR4: toll-like receptor 4; NF- κ B: Nuclear Factor kappa-light-chain-enhancer of activated B cells pathway; MAPK: Mitogen Activated Protein Kinase pathway; ERK, Rel A: nucleus-translocated components of pathways modifying protein transcription; MLCK: Myosin Light Chain Kinase; ROS: Reactive Oxygen Species; IL-1 β , TNF- α , IL-6, COX-2: pro-inflammatory cytokines; GM1: ganglioside receptor of ETEC LT toxin; LPS: bacterial lipopolysaccharide.



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use. This is achieved because polyphenols operate at several levels within the cell of the target organ. In the present case, the target is the intestine and more specifically the enterocyte. The following paragraphs contain a descriptive mode of action of polyphenols in the intestinal environment.

Initially, polyphenols quench Reactive Oxygen Species (free radicals). If ROS build-up is the originating step of the issues involved in post-weaning stress, reducing the amount of radicals will diminish their impact on some cell components. The quenching of radicals preserves the antioxidant enzymatic system. There is less need of using catalase, superoxide dismutase or glutathione peroxidase to control free radicals, and less risk of exhausting them in highly oxidative situations.

Quenching of ROS also inhibit the activation of NF- κ B and MAPK pathways, thus protecting the intestinal barrier function, and decreasing the encoding of inflammatory cytokines.

In addition, polyphenols activate an oxidation protective pathway named Nfr2, that encodes new

antioxidant enzymes such as heme oxygenase-1. These enzymes block the synthesis of inflammatory cytokines and help reducing the immunity disruption caused by them.

Other polyphenols collectively act upon *E. coli* associated diarrhea, either by preventing fimbriae adhesion to the enterocyte, or disrupting the adhesion of LT toxin to its ganglioside receptor in the cell membrane of the enterocyte. In both instances, the outcome is reduced intestine colonization by *Escherichia coli*, and substantial decrease of post-weaning diarrhea.

As a global leader of botanical extracts, Layn supplies the swine industry with high quality, polyphenol-rich extracts targeted to the specific issues that arise immediately after weaning. TruGro CGA is a powerful metabolic antioxidant recommended for high health swine units, where microbial diarrhea is not a pressing issue. Its focus is on reduction of oxidative stress and inflammation, modulating the local immunity and reinforcing the intestinal barrier. It favors the acceptance and digestion of early weaning feed, resulting in faster body weight gain.

On the other hand, TruGro PW targets *E. coli* diarrhea. While also reducing the oxidative stress, it prevents the adhesion of LT toxin to its receptor, avoiding water influx into the intestinal lumen, a major cause of diarrhea. Other polyphenols in its composition capture water, increasing the dry matter content of intestinal digesta and contributing to reducing diarrhea cases. Experimentation with TruGro PW has shown 60% to 80% reduction of diarrhea rate for the three first weeks of weaning.

TruGro CGA and PW are useful tools intended for an efficient and profitable piglet rearing.

About Juan Javierre

Senior Nutrition Scientist at Layn Natural Ingredients, Juan Javierre is a Doctor of Veterinary Medicine, as well as a nutritionist and researcher. Javierre has over 30 years of experience in animal production in Europe, the Americas, Southeast Asia, and China.



NATURAL INNOVATION FOR SMARTER COCCIDIOSIS CONTROL

Dr. Kyu-Yeol Son
Veterinarian and Pathologist
CJ BIO

The poultry industry stands at a turning point where disease control meets sustainability. As producers strive to maintain performance without relying solely on synthetic drugs, the search for validated natural solutions has gained momentum. By integrating scientific precision with nature's diversity, science-validated natural feed innovations are redefining how intestinal health and productivity can coexist in modern poultry farming.

Coccidiosis may not always make headlines, but in poultry houses worldwide it quietly erodes productivity every single day. This intestinal disease, caused by resilient *Eimeria* parasites, costs the industry billions of dollars annually through impaired growth, poor feed efficiency, and higher mortality. For producers, the challenge is not only the disease itself but also the growing limitations of conventional tools—drug resistance, vaccine costs, and consumer demand for residue-free meat. The question is no longer whether coccidiosis matters. It is how the industry can manage it smarter. And here, natural innovation guided by science is emerging as a promising answer.

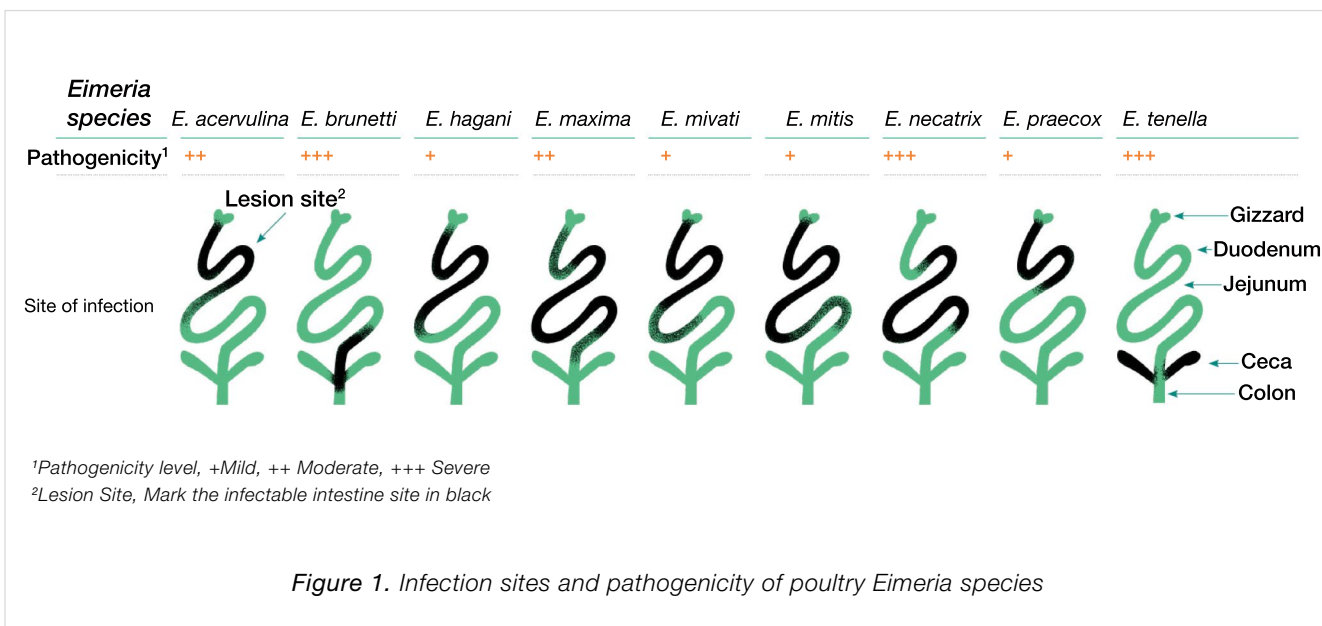
1. COCCIDIOSIS: THE PERSISTENT THREAT

Coccidiosis remains one of the most persistent and costly challenges in global poultry production. Caused by protozoa of the genus *Eimeria*, the disease damages the intestinal lining, reduces feed efficiency, and increases mortality, leading to economic losses estimated at more than **USD 10 billion**

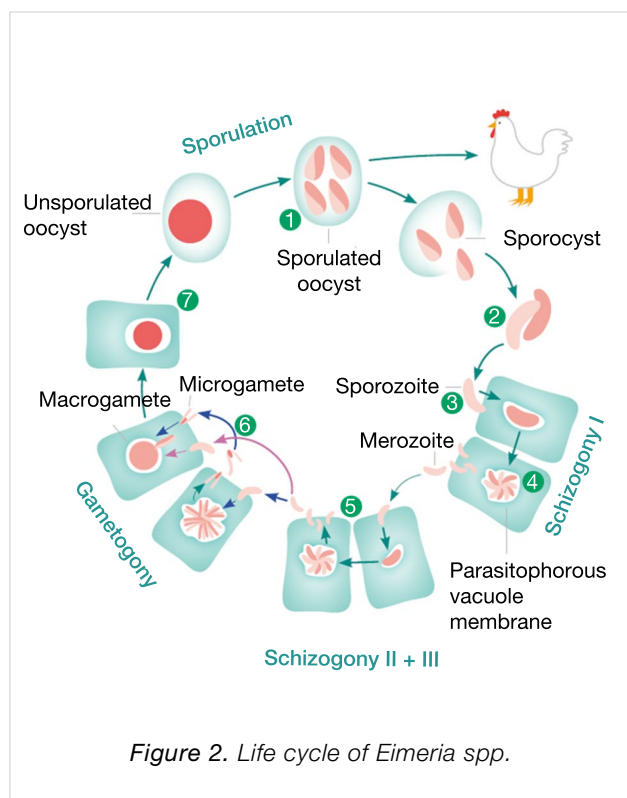
annually—equivalent to approximately **USD 0.17 per bird produced** (Blake et al., 2020).

Coccidial parasites are highly host-specific. In poultry, nine *Eimeria* species are recognized, each with distinct intestinal localization and varying levels of pathogenicity. Some, like *E. acervulina* and *E. mitis*, tend to cause milder lesions in the upper intestine, while *E. maxima* and *E. necatrix* induce more severe damage in the mid-intestine. *E. tenella* is considered the most pathogenic, attacking the ceca and often leading to hemorrhage and higher mortality (Shirley et al., 2005).

Because there is no cross-protective immunity among species, birds are vulnerable to multiple infections within the same production cycle. Transmission occurs when birds ingest sporulated oocysts from contaminated litter, feed, or water. Once ingested, these oocysts release sporozoites that invade the intestinal epithelium, multiply within cells, and eventually release millions of new oocysts. Because sporulated oocysts can persist in the environment for over a year, reinfection is a constant risk (Burrell, 2020).



While severe outbreaks can lead to mortality, even subclinical infections reduce nutrient absorption, slow growth, and impair feed conversion. They also predispose birds to secondary conditions such as necrotic enteritis (Blake et al., 2020). This economic burden extends across the poultry value chain—from farmers to processors—making effective prevention a priority (Figure 1 and 2).



2. LIMITS OF DRUGS AND VACCINES

Coccidiosis management has traditionally relied on four approaches: farm management, synthetic drugs, vaccines, and natural products. Each has its merits but also significant limitations.

- **Farm management:** Litter replacement and disinfection reduce contamination but cannot fully eliminate resilient oocysts.

- **Synthetic drugs:** Once reliable, these now face widespread resistance and regulatory withdrawal constraints (Chapman, 2014).

- **Vaccines:** Effective in principle but costly, and require repeated reinfections to build protection, making them less practical for short-cycle broilers.

- **Natural products:** Attractive for their safety and residue-free profile, but historically inconsistent in performance when not scientifically validated.

The industry's reliance on these approaches is no longer sufficient. A new generation of solutions is needed—both as **natural alternatives** to conventional drugs and as **complementary tools** that fit into existing management programs (Figure 3).

	Management	Anticoccidial Drugs		Vaccination	Natural Compounds
		Chemical	Ionophore		
					
Pros	Preventive	- Relatively inexpensive - Excellent effect	- Slow onset of tolerance - Low price	- High immunogenicity - No resistance/residual issues	- Safe - No withdrawal period
Cons	- Corrosion of facilities when applying drugs - A lot of labor required	- Rapid onset of tolerance - Long drug withdrawal period - Immunosuppression	- Weak antibiotics - Toxicity	- Efficacy appears late - High cost - Early pathogenicity - No cross-protection	- Differences in efficacy by product - Unclear mechanism of action

Figure 3. Main coccidiosis control strategies

3. A NEXT-GENERATION NATURAL SOLUTION

CJ BIO launched a program to create a natural anticoccidial that balances efficacy with safety. Using its Application Platform, the team screened more than 600 plant-derived compounds through a stepwise process: initial in vitro evaluation, cell-based models, and animal trials.

Two compounds emerged as promising candidates. These were then optimized through Response Surface Methodology (RSM), a statistical tool that identifies ideal ratios and concentrations to ensure synergy and stability. The outcome was Coxiield™, a feed additive that blends natural ingredients with scientific rigor—bridging the gap between traditional phytochemicals and modern, validated solutions.

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TRIPLE-STAGE SUPPORTIVE ACTIVITIES

Laboratory studies indicate that Coxield™ supports coccidiosis management through three complementary biological activities:

1. Direct sporozoite viability reduction

Coxield's natural compounds weakened parasite viability, inducing necrosis and structural damage at concentrations as low as 10 ppm.

2. Limiting attachment and penetration

In cell culture models, Coxield reduced parasite adhesion and penetration into intestinal epithelial cells by approximately 60% when evaluated at 7 ppm.

3. Restricting intracellular development

Coxield treatment curtailed intracellular asexual development, specifically reducing merozoite formation from invading sporozoites by about 66% at 7 ppm.

These three supportive activities work in concert, providing broad coverage across critical stages of the coccidial cycle. Rather than acting like a single-target chemical, Coxield™ offers a multifaceted, natural solution that helps reduce lesion severity and oocyst shedding while promoting intestinal health (Figure 4).

4. VALIDATED IN SCIENCE, PROVEN IN FARMS

Academic research confirmed Coxield™'s role in coccidiosis management. Challenge trials with virulent *E. tenella* strains showed lower lesion scores and reduced oocyst shedding in supplemented groups compared with standard controls such as salinomycin.

Product optimization using RSM further confirmed that the final formulation offered consistent performance. In vivo trials demonstrated reduced lesion scores

(1.87 vs. 2.7 for salinomycin and 3.3 for challenge controls) and a 27% reduction in oocyst shedding.

Farm validation provided further evidence:

- In Korea, broiler farms experiencing productivity decline due to reduced diclazuril efficacy—linked to resistance—incorporated Coxield™ into feed programs. Over five flocks, the average Production Index improved from 343 to 380 after 32 days of supplementation, with clear signs of healthier intestinal conditions. This suggests Coxield™ can provide supportive benefits where conventional products face resistance challenges—functioning as a complementary solution rather than a direct replacement.

- In Indonesia, high-challenge trials with four *Eimeria* species showed that Coxield™ performed on par with synthetic drugs under conditions where resistance had reduced the efficacy of diclazuril, while also outperforming other natural products. Importantly, when Coxield™ was combined with diclazuril, the program delivered the best outcome, improving

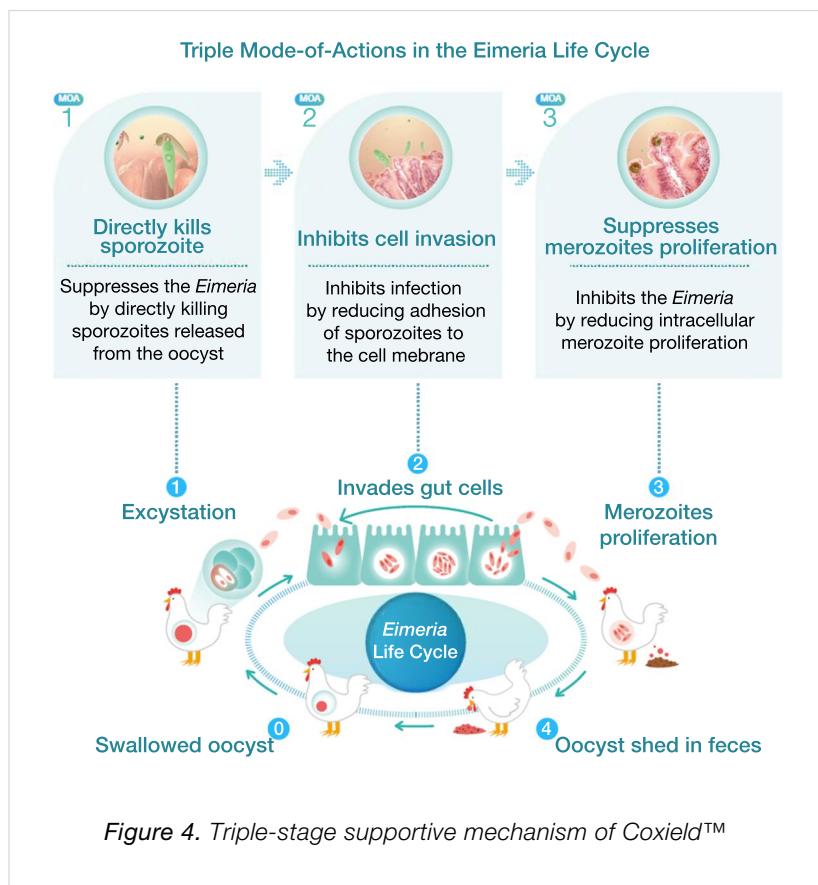


Figure 4. Triple-stage supportive mechanism of Coxield™

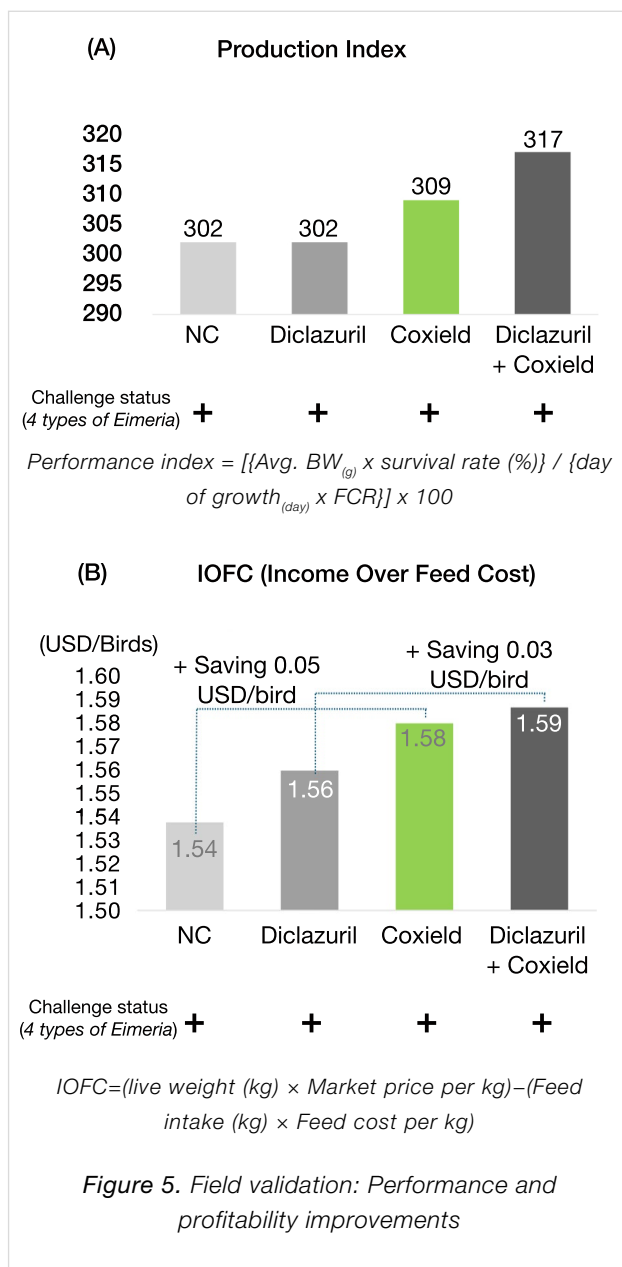
feed conversion ratio from 1.48 to 1.44 and generating an estimated additional profit of ~USD 5,600 per 200,000 birds. These findings highlight its dual role as both a natural alternative and a complementary partner for existing anticoccidials (Figure 5).

5. A SAFER, SMARTER WAY FORWARD

Coxield™ represents more than a product; it reflects a shift toward sustainable poultry production. Its residue-free profile and absence of withdrawal period align with consumer and regulatory expectations. Its validated supportive activities provide scientific credibility, and its compatibility with shuttle and rotation programs helps producers manage resistance risks over time.

By safeguarding intestinal health and supporting productivity without reliance on synthetic drugs, Coxield™ offers poultry producers a practical, science-based tool that contributes to profitability and sustainability. Importantly, Coxield™ can be positioned flexibly—either as a natural alternative to synthetic anticoccidials or as a complementary solution integrated into broader coccidiosis control programs.

Coccidiosis will remain a challenge for poultry worldwide. But as the industry faces rising resistance, regulatory changes, and consumer demand, the need for validated natural solutions has never been greater. Coxield™ shows how innovation from nature—when guided by rigorous science—can deliver dependable results for modern poultry production.





NOT ALL ENCAPSULATED NUTRIENTS ARE CREATED EQUAL

Kari Estes, M.S.
Research Manager
Balchem Animal Nutrition and Health

“Encapsulated nutrients can provide consistent, reliable and cost-effective alternatives to traditional feedstuffs. However, how well these products perform in terms of durability, rumen stability, intestinal release and, ultimately, cow performance vary depending on the encapsulation and manufacturing process utilized. Thus, it is critical that *in situ*, *in vitro* and *in vivo* research be used to evaluate an encapsulate’s performance in each of these metrics.”

Lipid encapsulation is a valuable tool to protect nutrients from ruminal and environmental degradation, with the goal of making the nutrients available for small intestine absorption. With many encapsulated products in the market today, it can be confusing and difficult to choose a product that will perform as expected at a cost-effective price point. These products, and the processes that create them, differ greatly in design, technology, and, unfortunately, performance.

High-quality encapsulated nutrients can provide nutritionists with a great deal of flexibility to improve rations and performance while reducing costs. However, not all encapsulated products are created equal. To make the most of the ingredient investment, nutritionists, veterinarians, and producers need to recognize differences between the various encapsulation technologies. This allows informed decisions about which product(s) will be most cost-effective in the rations fed.

LIPID ENCAPSULATION

Lipid encapsulation is an effective rumen pro-

tection technology utilized across a wide range of nutrients. However, lipid encapsulation is a generic term, and differences exist due to:

1. The starting form and inclusion rate of the nutrient
2. The coating system utilized
3. The manufacturing process used to produce the lipid encapsulate

There are two main types of lipid encapsulation technology: true encapsulation and matrix encapsulation. Matrix encapsulation suspends the active nutrient within a fatty acid matrix while true encapsulation contains a layered coating of fatty acids applied around the outside of the nutrient to form a protective barrier (Figure 1), fully encapsulating the active nutrient in layers of lipid.

To be effective, an encapsulate must provide:

1. Durability (feed and mixing stability, freeze/thaw stability and shelf-life)
2. Rumen protection
3. Intestinal digestibility
4. Biological Performance

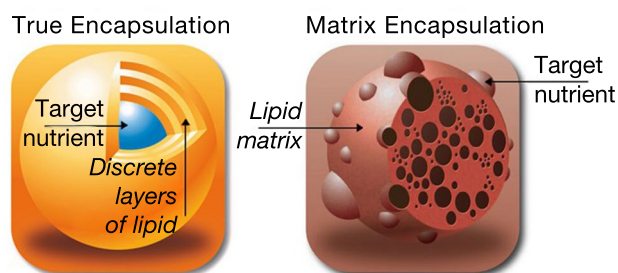


Figure 1. Illustration showing the differences between matrix encapsulation and a true encapsulation

DURABILITY

Durability is the ability of an encapsulated nutrient to withstand the rigors of mixing, transportation and storage, as well as the moisture and acidity of total mixed rations (TMR). Abrasion of the protective coating, cracking, fracturing or particle size reduction can all reduce the amount of nutrient delivered to the animal and even render a product ineffective.

Mix Stability

Minerals are one of the most physically abrasive environments for an encapsulate to be mixed in due

to the rough particle shape and hardness of key minerals such as limestone and salt. Excessive mixing can crack, fracture and otherwise damage the coating of the encapsulate. Limiting mixing time and adding encapsulates as late as possible into the mixer (as one of the final ingredients) can help to minimize unnecessary abrasion.

Feed Stability

Research evaluating the TMR stability of both rumen protected lysine and choline products show vast differences in stability across several commercially available products with differing encapsulation technologies (Figures 2 & 3). The significant loss in TMR stability of some of these products illustrates that not all encapsulation technologies are able to sufficiently protect the nutrient from moisture, acidity and microbes in the TMR. These findings highlight that TMR stability must be accounted for as damage to the protective coating of these products may occur prior to consumption by the cow, potentially reducing the efficacy of the encapsulates.

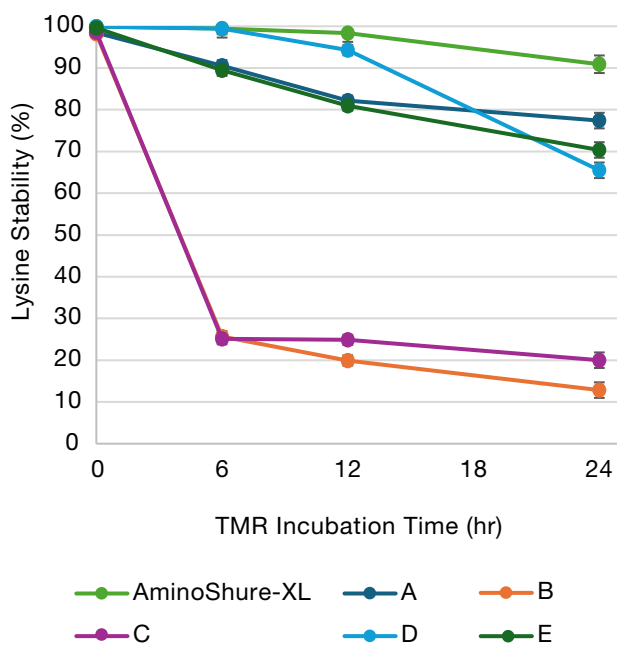


Figure 2. TMR stability of commercially available rumen protected lysine products

Estes et al., 2024a

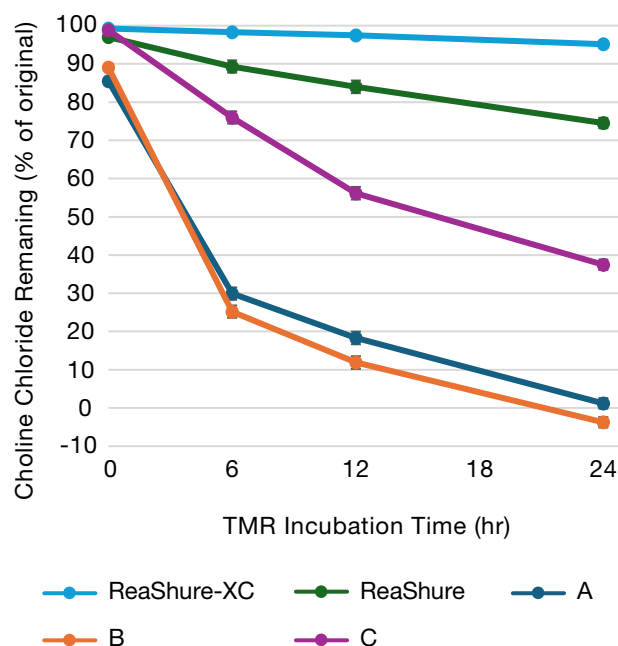


Figure 3. TMR stability of commercially available rumen protected choline products

Estes et al., 2024b

Freeze/thaw Stability

A less obvious and often overlooked issue is freeze-thaw stability of lipid encapsulates. When lipid encapsulates are frozen and then thawed, the coating can expand and contract. This allows water to penetrate during storage or in the rumen, resulting in a loss of nutrient protection. Some lipid encapsulates are not freeze/thaw stable.

Temperature

Another often-overlooked factor that can affect coating integrity is temperature. Feed encapsulates are not robust enough to withstand the temperatures and pressures associated with pelleting. High temperatures designed to gelatinize starch and deliver a harder pellet will damage encapsulates, adversely affecting nutrient payload protection. In addition, the pressure associated with pelleting can crack or fracture encapsulates, further degrading nutrient protection.

RUMEN PROTECTION

Nutrients in unprotected form such as choline, niacin, lysine and methionine are almost completely degraded in the rumen via microbial fermentation (>87%), potentially leaving very little nutrient available for intestinal digestion and absorption. Rumen protection refers to the encapsulation system's ability to protect a nutrient from degradation in the rumen so that it can pass into the abomasum and small intestine for utilization by the animal. Ruminal degradation is often determined *in situ* or *in vitro*. *In situ* studies suspend dacron bags containing the rumen protected products inside the rumen of a cannulated cow to measure stability of the encapsulate. *In vitro* studies use lab-based procedures with either collected rumen fluid or solutions that mimic the rumen environment to determine degradation. In either case, digestibility of the encapsulates can be measured at a single time point or at multiple points in time.

INTESTINAL RELEASE/BIOAVAILABILITY

The key to making an efficacious encapsulate is to create a product that not only resists ruminal and environmental degradation, but can then be released

and digested in the abomasum and small intestine. Developing an encapsulated product with a high level of durability and resists microbial degradation in the rumen may come at the expense of intestinal digestibility. Depending on the nutrient of interest, *in vivo* and *in vitro* methodologies can be utilized to test an encapsulate for intestinal release. In general, *in vitro* methodologies that mimic the digestive system of an animal are relatively quick and inexpensive but only provide relative rankings in terms of bioavailability. However, *in vivo* methodologies performed within the animal, such as stable isotope and selenomethionine, provide more accurate and precise bioavailability estimates for encapsulated nutrients.

BIOLOGICAL PERFORMANCE

Biological performance observed in the animal once the encapsulate is fed becomes the ultimate and final test of efficacy. Responses observed may be related, but not limited, to milk and components, health and reproduction as well as offspring health and growth. These responses will also vary depending on the nutrient that was encapsulated. Positive biological responses are observed when all three components of a well-made encapsulate are met (durability, rumen stability and intestinal release).

SUMMARY

Encapsulated nutrients can provide consistent, reliable and cost-effective alternatives to traditional feedstuffs. However, how well these products perform in terms of durability, rumen stability, intestinal release and, ultimately, cow performance vary depending on the encapsulation and manufacturing process utilized. Thus, it is critical that *in situ*, *in vitro* and *in vivo* research be used to evaluate an encapsulate's performance in each of these metrics.

The ultimate measure of an encapsulated nutrient is the cost per unit of bioavailable nutrient. This is a function of the cost, durability, rumen protection and intestinal digestibility. To get the best value, just ask a few simple questions:

- Is the product durable enough to withstand feed/mineral mixing, time in a TMR, manufacturing and

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storage, including freeze-thaw cycles, so that it maintains its ability to protect the nutrient in the rumen?

- Does the product deliver adequate rumen protection over time to ensure a high percentage of the nutrient reaches the intestine for absorption?
- Has the product been tested *in vivo* to have a bioavailability value that reflects the durability, rumen protection and intestinal absorption supported by the manufacturer's research?
- Is the bioavailability data backed by *in vivo* performance results i.e. production or health responses?

Ask to see the research and quality specifications to ensure the product considered will deliver the ex-

pected levels of bioavailable nutrient to the cow.

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About Kari Estes

Holding a Bachelor of Science in Animal Science and a Master of Science in Dairy Science, both from Virginia Tech, Kari Estes, in both her undergraduate and graduate work, evaluated the bioavailability of rumen protected amino acids utilizing a variety of different *in vivo* methodologies. Her Master's work specifically focused on further developing a stable isotope-based approach to determine the amino acid bioavailability of protein feedstuffs and rumen protected amino acids. Since joining Balchem in 2017, she began as a Research Associate and is currently a Research Manager in the Animal Nutrition and Health division. In her current position, Estes is involved in nutrition research for both monogastric and ruminant species. She resides in the United States in Virginia.



NUTRITION AS A KEY TOOL FOR LOWERING *E. COLI* RISK IN POULTRY

Louise Vigier

Poultry Technical Deployer

Lallemand Animal Nutrition

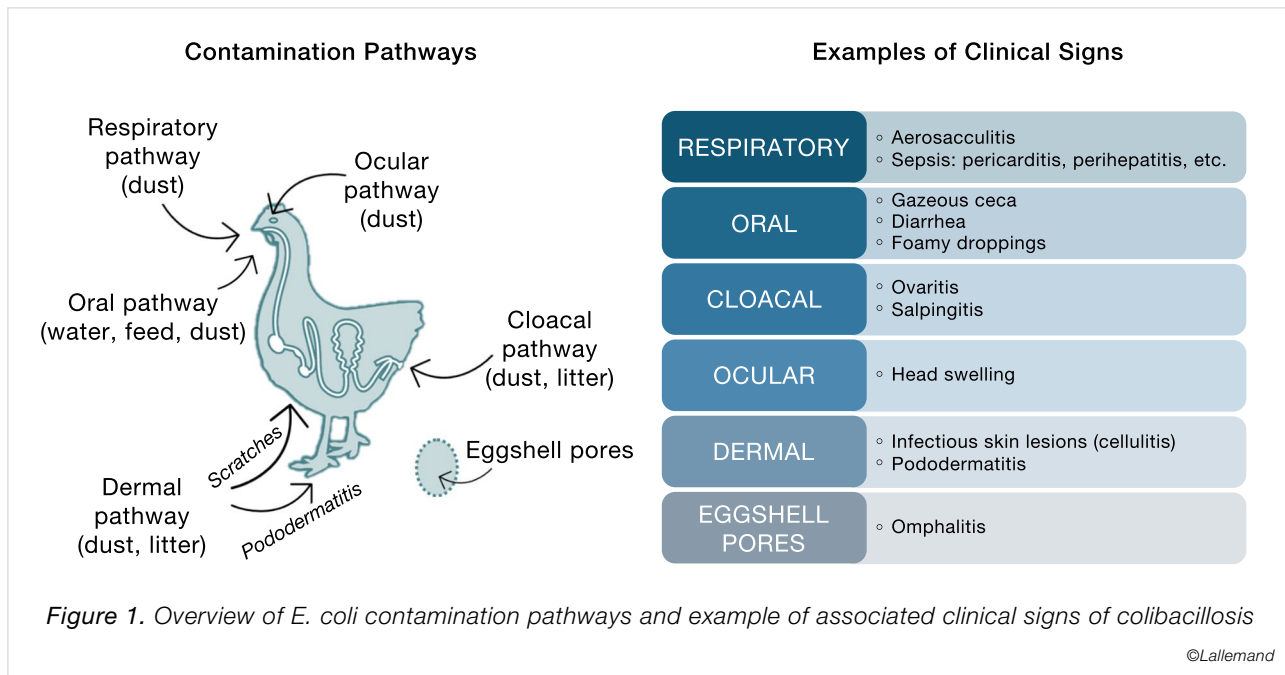
“Typical symptoms of pathogenic *E. coli* infection include diarrhea, omphalitis, pericarditis, aerosacculitis, as well as infected skin lesions (cellulitis) in broilers or genital tract infections in breeders, occurring by contiguity. These clinical signs not only impair bird welfare but also result in considerable performance losses in broiler, layer and breeder production. Environmental stressors, inadequate biosecurity, and compromised mucosal integrity or immune function further increase birds’ susceptibility to colibacillosis.”

In modern poultry production systems, birds are particularly sensitive to inflammation caused by a late and inconsistent establishment of the microbiota, as well as numerous danger signals (e.g., high stocking density, genetics, vaccination, handling or transport). Chronic inflammation creates favorable conditions for the growth of opportunistic pathogens (i.e. *E. coli*), leading to bird morbidity and performance losses. Bird infection, whether bacterial, viral, or triggered by environmental stress, can occur unpredictably and is often triggered by inflammation. That’s why it is essential to adopt a broad proactive approach, applied to all flocks, one that mitigates risks before they develop into problems.

Colibacillosis remains one of the most impactful bacterial diseases in poultry farming worldwide, silently driving high mortality rates and major economic losses. Beyond its financial impact, colibacillosis raises serious concerns for animal welfare, making it a critical issue that poultry professionals cannot overlook.

Escherichia coli, a Gram-negative bacterium, is among the first enterobacteria to colonize the digestive tract within a few hours after hatching. As such, it is considered a commensal microorganism in the poultry gut. While most of *Escherichia coli* strains are harmless commensals, some strains such as Avian Pathogenic *Escherichia coli* (APEC) have acquired virulence factors that confer pathogenicity, leading to colibacillosis in chicks, broilers, laying hens, and breeders.

Typical symptoms of pathogenic *E. coli* infection include diarrhea, omphalitis, pericarditis, aerosacculitis, as well as infected skin lesions (cellulitis) in broilers or genital tract infections in breeders, occurring by contiguity. These clinical signs not only impair bird welfare but also result in considerable performance losses in broiler, layer and breeder production. Environmental stressors, inadequate biosecurity, and compromised mucosal integrity or immune function further increase birds’ susceptibility to colibacillosis.



E. coli contamination can occur at a very early stage, even during the egg phase. If breeding birds are infected, vertical transmission may occur either through the genital tract during egg formation, or via eggshell contamination, eggshell's pores (30 µm) being permeable to bacteria such as *E. coli* (≈ 2–3 µm). In adult birds, contamination most commonly occurs via the respiratory route, through inhalation of contaminated dust. Water for drinking or feed can also serve as vectors of contamination. *E. coli* can cause localized infections, or may lead to septicemia after adhering to mucosal surfaces and entering the bloodstream. Within the intestinal tract, APEC initially adhere to enterocytes using their pili, then release exotoxins that trigger a strong inflammatory

response, resulting in the symptoms previously described. However, even after death, APEC continue to release endotoxins, which are responsible for the symptoms of colibacillosis (Figure 1).

The infection spreads rapidly within a poultry flock and its housing environment, as birds act as effective *E. coli* “fermenters”. Infected birds excrete large quantities of *E. coli* in their feces, where the bacteria can multiply quickly. In confined environment, dust is mostly composed of suspended fecal particles (up to 95% of dust particles). As a result, pathogens excreted in droppings are dispersed throughout the environment (air, floors, walls, farming equipment) via dust, leading to widespread contamination of

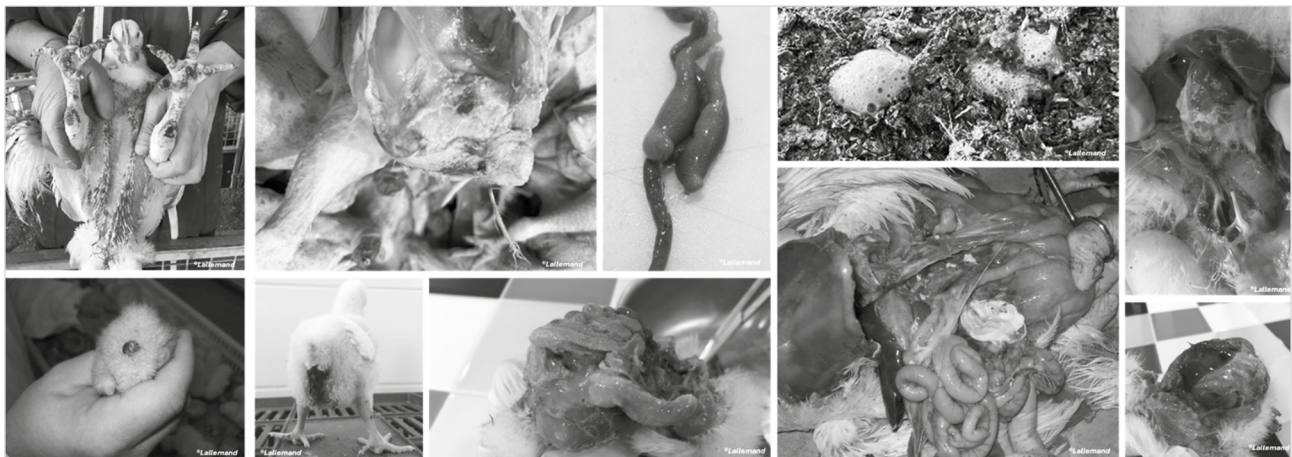
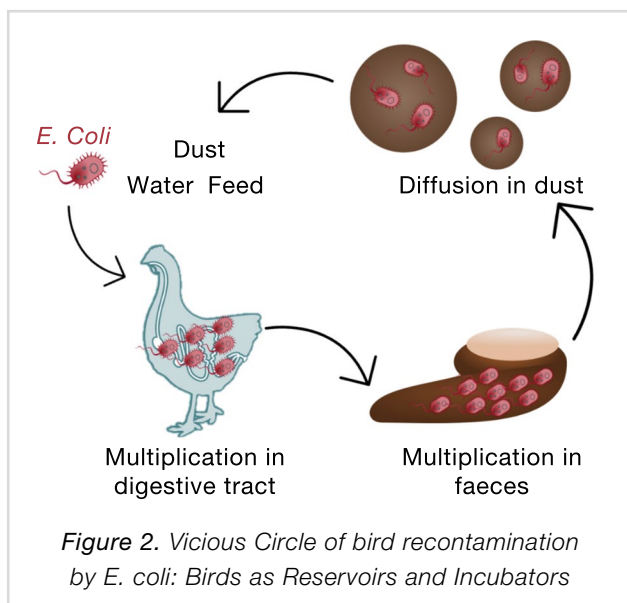


Illustration of some clinical signs of colibacillosis in poultry

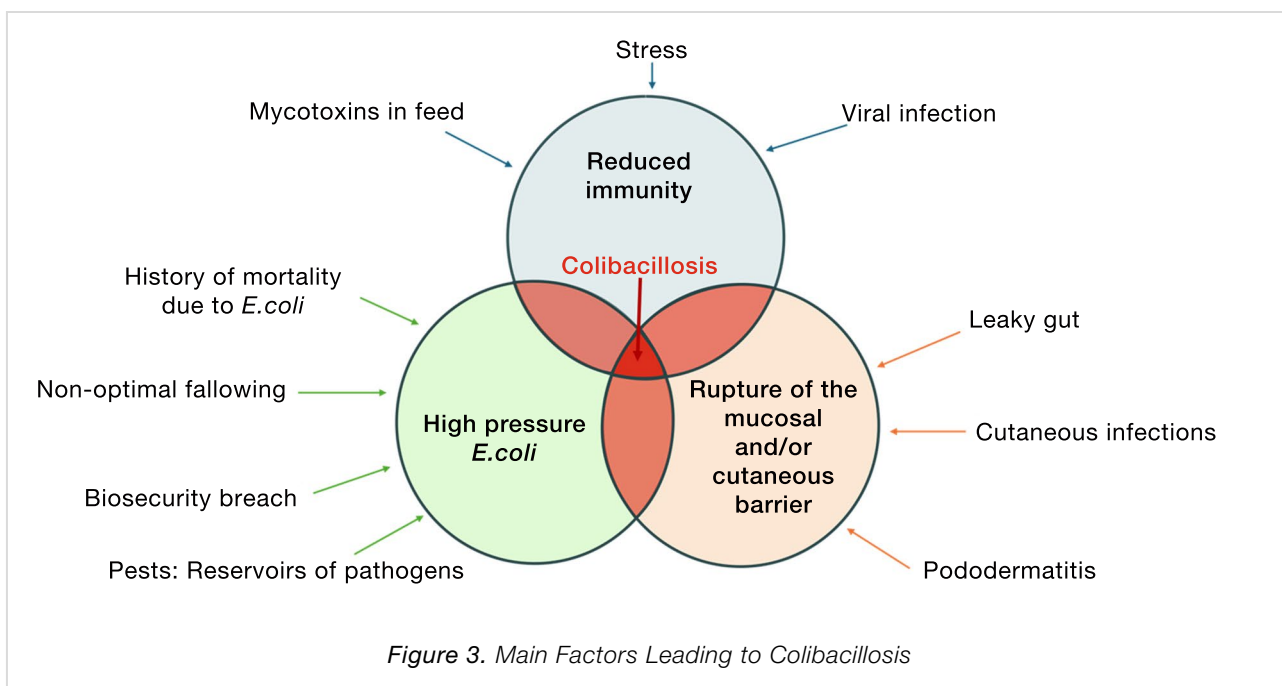


the flock through the gut, the respiratory tract, or even the cloaca (Figure 2).

Contamination with *E. coli* does not always lead to colibacillosis. However, the risk of serious disease increases when birds experience a drop in immunity—due to stress, viral infections, mycotoxins in feed, or other factors—combined with a weakened mucosal barrier (e.g., leaky gut, skin lesions, dusty environment, etc.) or excessive environmental pressure (e.g., inadequate sanitation, history of *E. coli*-related mortality, biosecurity breaches, poor drinking water quality, presence of pests,

etc.). Stress triggers the amount of *E. coli* excreted in birds' feces, resulting in a higher bacterial load. At the same time, weakened immunity creates favorable conditions for the development of colibacillosis. In modern poultry, which are particularly sensitive, each farming challenge can result in a colibacillosis outbreak within the flock, resulting in reduced performance and, in severe cases, mortality (Figure 3).

Mainstream approaches to managing colibacillosis in poultry - vaccines and antibiotics - face growing limitations. Autogenous vaccines require strain-specific formulations, with usually a combination of several valences tailored to the farm, and frequent updates to address emerging new *E. coli* strains within the flock. This strategy involves high direct costs and requires additional handling when vaccines are administered by injection. Antibiotic treatments typically result in a rapid drop in mortality, but these effects are often short-lived. Once treatment ends, the environment remains heavily contaminated, facilitating recontamination, and a rebound in mortality is often observed within a few days. Furthermore, repeated use of antibiotics promotes bacterial resistance to the active molecules used, limiting future treatment options. The range of available medication has been significantly reduced due to regulatory constraints on the use of colistin and some newer-generation antibiotics. The remaining options



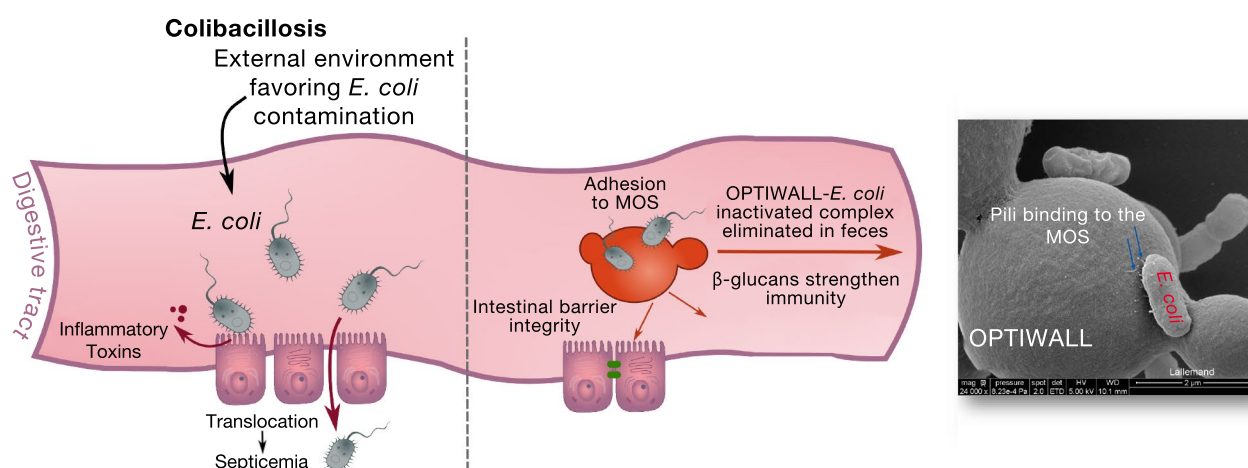


Figure 4. Illustration of the mode of action of OPTIWALL against *E. coli*-induced colibacillosis in poultry (left) and scanning electron microscopy of OPTIWALL binding *E. coli* (right)

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are less specific to *E. coli*, and the withdrawal period for egg marketing (sometimes up to 3 weeks post-treatment) makes their use economically challenging.

Nutrition has always been part of the toolbox to maintain animal health and welfare. This challenging context has accelerated the search for nutritional solutions that can help support animal health. As such, they can be complementary to the use of vaccines and/or antibiotics. Among them, feeding OPTIWALL, a yeast cell wall-based postbiotic, developed by Lallemand Animal Nutrition, has emerged as a promising option. OPTIWALL has a guaranteed composition in β -glucans and mannan-oligosaccharides (MOS) that work synergistically.

Pathogenic *E. coli* present in the intestinal lumen must first adhere to the intestinal mucosa to initiate the production of the toxins responsible for both local and systemic damage. This adhesion is a critical and necessary step in the infection process. The MOS receptors of OPTIWALL exhibit high pathogen-binding properties targeting strains commonly found in poultry farms, including *E. coli* and other pathogenic bacteria like *Salmonella* spp. The irreversible adhesion of these pathogens to OPTIWALL's MOS receptors help reduce their concentration within the gut before they adhere to enterocytes, and ensures their excretion via the feces. This mechanism contributes to limiting bird

contamination through inhalation or ingestion. It also helps lower bacterial pressure and spread caused by dust in the poultry environment, as previously illustrated in Figure 4, titled: "Vicious Circle of bird recontamination by *E. coli*".

This pathogen-binding capacity has been measured using flow cytometry, a new analytical method developed by the R&D team at Lallemand Animal Nutrition, published and peer-reviewed. Depending on the *E. coli* strains tested, up to 10–12 bacteria can be durably bound to each OPTIWALL particle. This binding ability is mainly enabled by the length of the MOS chains present in this specifically selected yeast cell wall.

When added to the feed throughout the poultry production cycles, OPTIWALL can help reduce the risk of colibacillosis outbreaks in poultry farms. Supplementing birds with this specific yeast cell wall also improves zootechnical performance, as supported by findings from both academic and field trials. The dose can be tailored to farm-specific pathogenic pressure and help maintain animal health.

OPTIWALL represents a valuable solution to enhance bird resilience and reduce pathogen pressure, ultimately supporting better productivity. By maintaining bird health, the need for antimicrobial interventions is reduced.



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Muhammad Umar
Technical Sales Manager
Dr. Eckel Animal Nutrition



Dr. Bernhard Eckel
Vice President
Dr. Eckel Animal Nutrition

Hidden Threats in the Henhouse: **HOW CONTROLLING ENDOTOXINS KEEPS BREEDERS PRODUCTIVE**

“Once inside, endotoxins trigger inflammation and disrupt vital metabolic functions. In laying hens, this may impair nutrient absorption and calcium utilisation and cause systemic stress. The visible effects include weaker eggshells, smaller eggs and higher mortality. Because endotoxins remain invisible, farmers only see the consequences — poorer chick viability and declining profitability.”

Success in poultry farming is not measured solely by how many eggs are laid, but rather by their quality, hatchability and the welfare of the hens that lay them. In breeder operations, this significance is even greater. Every egg counts, because each egg holds the flock’s genetic potential and represents an investment in the next generation. Any loss therefore affects both current results and future performance.

Still, on many farms, trouble develops quietly — cracked shells, small eggs, unexpected mortality — and the real cause remains hidden. Often, an

underestimated threat is at work, silently eroding performance and profitability: Endotoxins.

INSIDE THE GUT: THE DANGER YOU CAN’T SEE

Endotoxins are fragments of the cell wall of gram-negative bacteria such as *E. coli*. They are naturally present in the gut, but when animals face stress — from heat, feed changes, infections or antibiotic treatments — their levels can rise sharply. At high concentrations, endotoxins can pass through a weakened intestinal barrier and enter the bloodstream.

Once inside, they trigger inflammation and disrupt vital metabolic functions. In laying hens, this may impair nutrient absorption and calcium utilisation and cause systemic stress. The visible effects include weaker eggshells, smaller eggs and higher mortality. Because endotoxins remain invisible, farmers only see the consequences — poorer chick viability and declining profitability.

Endotoxin stress means far more than a few sick birds. It lowers hatchability, disrupts genetic continuity and leads to losses that should be avoidable. Each cracked or undersized egg is a loss in productivity.

Beyond the birds themselves, the impact reaches farm staff, who must spend more time caring for weak animals. Costs rise through wasted feed, veterinary treatment and additional labour. And in a production system where margins are already tight, such preventable losses are a serious concern.

THE HOLISTIC ANSWER TO ENDOTOXIN STRESS

Managing endotoxins effectively requires more than a single feed additive — it calls for a holistic approach. Anta®Catch was designed specifically to help animals defend themselves against these hidden enemies.

Unlike standard binders or general toxin management products, Anta®Catch works on several fronts. Its activated surfaces reduce the endotoxin load in the digestive tract, its prebiotic components strengthen the intestinal barrier and its phyto-genic complex supports liver function and reduces inflammation. Together, this triple protection helps breeder hens maintain egg quality and health even under stressful farm conditions.

In a commercial field trial in Taiwan involving more than 4,000 broiler breeder hens, Anta®Catch was tested under real production conditions. Two

The ultimate defence against endotoxins

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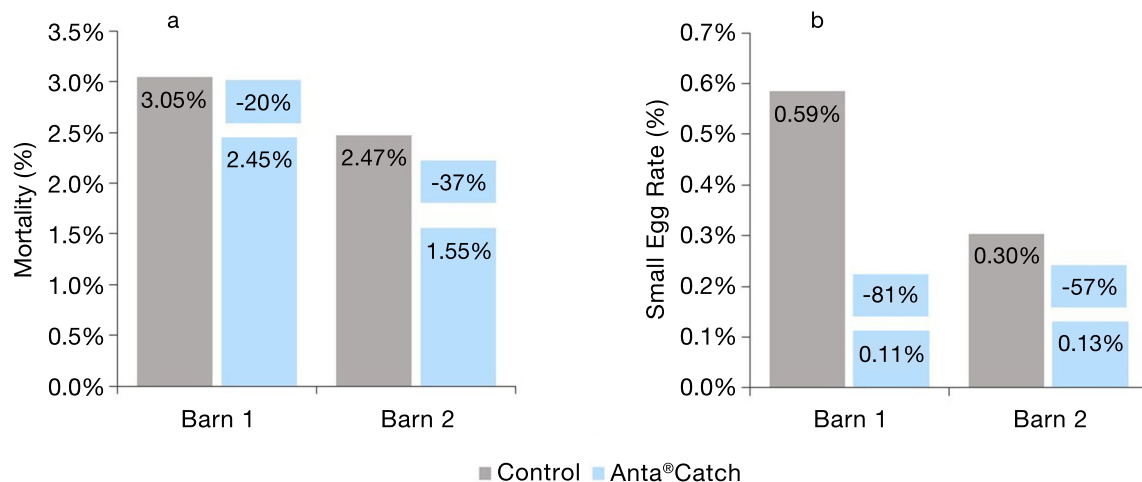


Figure 1. Mortality (a) and small egg rate (b) before vs. after Anta®Catch supplementation

barns were included, both following a sequential off-on design.

During the control phase (barn 1: 32–39 weeks; barn 2: 34–42 weeks), hens received a standard diet. In the subsequent treatment phase (barn 1: 39–45 weeks; barn 2: 42–47 weeks), the same diet was supplemented with Anta®Catch at 1 kg per tonne of feed. Environmental and management factors remained comparable.

The results were impressive (Figure 1). Mortality dropped by up to 37 %, and the occurrence of small eggs fell dramatically — by 81 % in barn 1 and 57 % in barn 2. Eggshell quality improved significantly: Soft-shelled eggs decreased by 23 % and 34 %, while broken eggs were reduced by up to 11 % (Figure 2).

For farmers, these figures translate directly into better results: Fewer downgraded eggs, fewer han-

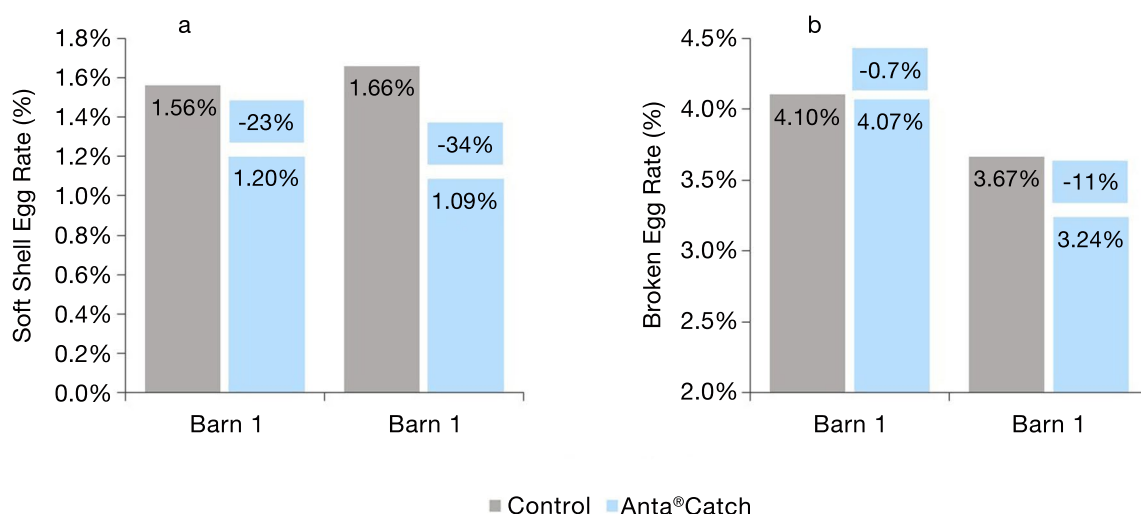


Figure 2. Soft-shelled (a) and broken eggs (b) before vs. after Anta®Catch supplementation



dling losses and more eggs suitable for hatching. With fewer weak birds and less variation in egg size, overall flock performance became more stable and efficient.

DON'T LET HIDDEN LOSSES STEAL YOUR SUCCESS

In an increasingly competitive market, hidden losses are unaffordable. Each bird and each gram of feed is an investment — one that endotoxins quietly undermine.

They lead to fragile eggs, smaller eggs and high-

er mortality — and thus to fewer chicks and more stress for farmers. Field experience shows that effective endotoxin control makes a visible difference: Flocks are healthier, easier to manage and more resilient.

With its holistic triple-action approach, Anta®Catch reduces endotoxin damage and delivers visible results: More viable eggs, healthier hens and a stronger flock. For breeder farmers, where every egg truly matters, Anta®Catch provides reliability, peace of mind and a path to sustainable success.

About Muhammad Umar

With a degree in veterinary medicine and a master in dairy science, Muhammad Umar has already several years of experience in the field of animal nutrition. His special expertise are ruminants and the use of phytogenic feed additives to improve performance and sustainability.

As Technical Sales Manager at Dr. Eckel, Muhammad Umar focusses on supporting the company's customers with the best phytogenic solutions for their needs.

About Dr. Bernhard Eckel

An agronomist holding a doctorate in animal nutrition, Dr. Bernhard Eckel knows the industry from scratch. He established Dr. Eckel with Antje Eckel and was the first employee. As Vice President and Chief Technical Officer, he is responsible for technical sales, product development and animal welfare, and thus plays a major role in the success of the company.



ROLE OF SPICES IN OPTIMIZING GROWTH AND FEED EFFICIENCY IN BROILER CHICKENS

Dr. Alberto Viñado
Poultry Innovation Manager
 Lucta

Spices are widely used for culinary reasons; however, due to their high concentration in bioactive compounds with several beneficial effects may also be used as functional additives with a positive impact on poultry performance. The synergistic combination of spices increases nutrients digestibility by stimulating digestive enzymes and bile salts release, improving growth performance and feed conversion.

Broiler chicken production is characterized by its high level of intensification. In fact, broiler chickens are capable to increase their own body weight by more than 6,000% since the hatching day until the 42 days of life (Aviagen, 2022). Genetic selection has played a major role in this sense; however, other aspects such health-and-biosecurity management and nutrition programs are essential too.

To achieve this efficiency in body weight gain in such a short period, broiler chickens have high energy requirements, and this is why the inclusion of added fats/oils in broiler feeds is a widespread strategy to increase their energetic density, besides providing essential nutrients (vitamins, essential fatty acids, carotenoids). However, it is well described in literature that young broiler chickens present difficulties to efficiently absorb the nutrients present in the diet due to an immature gastrointestinal tract, with inadequate digestive enzymes and bile salts production (Ravindran et al., 2016).

Considering that feed formulation still represents more than 60-70% of broiler chicken productions

costs, the development of feed additives with a positive effect on nutrients and energy utilization represents a tool to reduce formulation costs. This beneficial impact on the cost may be achieved by different pathways, such as allowing the replacement expensive raw materials with cheaper alternatives (e.g. unsaturated fats vs. saturated fats).

On the other hand, spices are substances derived from non-leaf parts of plants (seeds, fruits, roots, barks) with a strong flavour as well as containing a high concentration in bioactive substances, with many health-beneficial effects. Within these health improving effects, scientific literature indicates a positive action of spices on bile salts and digestive enzymes (amylase, lipase, trypsin) production and stimulation-release in many animal species (Prakash and Srinivasan, 2012; Ruiz et al., 2023).

SPICES AS DIGESTIBILITY ENHANCERS OF NUTRIENTS

A feed additive based on a Synergistic Combination of Spices (Spicy), containing red pepper, ginger and black pepper oleoresins as sources of capsaicin, gin-

gerol, and piperine, respectively, as main bioactive compounds, has been associated to positive effects on nutrients and energy utilization.

The positive impact of Spicy on fat digestibility has been demonstrated in a broiler chicken trial with two different sources of added fats (Figure 1; Ipharraguerre et al., 2009). A total of 96 newly hatched male broiler chickens were distributed in cages and fed diets containing an inert marker to assess fat digestibility between 18 to 21 days of life. The basal diet was based on wheat, barley and soybean meal while a factorial design of the treatments considered the use of two different added fats, soybean oil and pork lard at 4% (unsaturated fatty acid vs. saturated fatty acid source, respectively) and either the addition “on top” or not of Spicy (Spicy vs. Control, respectively).

The inclusion of Spicy increased fat digestibility in the animals fed diets with lard as added fat regarding the control treatment (+7%; $P < 0.05$), whereas in the case of the chickens fed diets with soybean oil, the improvement was numerical (+3%; $P > 0.05$). Thus, the magnitude of the beneficial effects of the

additive were influenced by the source and chemical composition of the added fat. In fact, the animals fed diets containing lard plus Spicy achieved the same level of fat digestibility as the animals fed diets containing soybean oil, demonstrating the positive effect of the additive on saturated fatty acids absorption in the intestine.

In accordance with these findings a study published by Herrero-Encinas et al. (2022) confirmed the consistency of the beneficial effects of Spicy on nutrients digestibility and energy utilization (Figure 2). In this experiment, 480 newly hatched broiler chickens were distributed in two dietary treatments: a control diet based on corn, soybean meal and lard as main fat source (at 4%); and then, the same basal diet with Spicy added “on top”. Furthermore, both diets contained an inert marker to assess the ileal digestibility of nutrients and energy utilization.

The authors stated that the use of Spicy increases the ileal digestibility of dry matter and crude protein, and the utilization of gross energy ($P < 0.05$). It is well established that improvements in fat digestion and absorption make the digestive process more

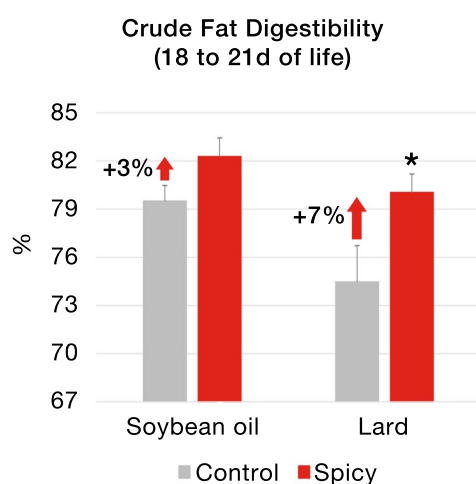


Figure 1. Effect of including Spicy on fat apparent total tract digestibility in fecal samples collected between day 18 to 21 of life (* $P < 0.05$). Results expressed as mean average values $\pm$ SEM.

Extracted from Ipharraguerre et al. (2009).

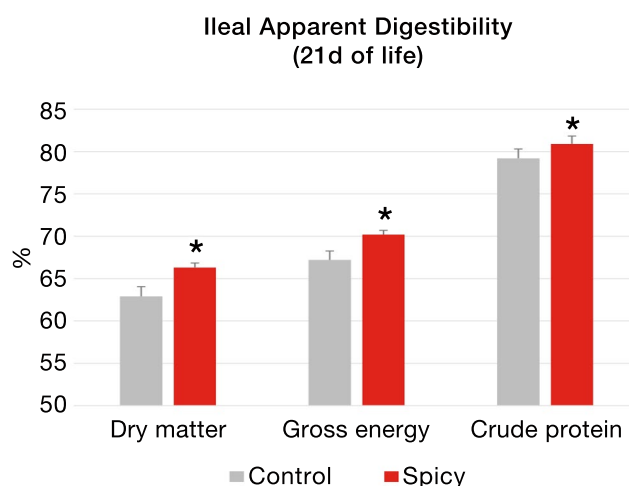


Figure 2. Effect of including Spicy on dry matter, gross energy and crude protein ileal digestibility on day 21 of life (* $P < 0.05$). Results expressed as mean average values $\pm$ SEM.

Extracted from Herrero-Encinas et al. (2022)

efficient, allowing a better absorption of the other nutrients in the diet; Therefore, considering the results reported by Ipharraguerre et al. (2009; Figure 1), the enhancements reported by Herrero-Encinas et al. (2022) might be attributed to this fact.

IMPROVING NUTRIENT DIGESTIBILITY HAS AN IMPACT ON PERFORMANCE

These beneficial effects on nutrients digestibility have an obvious and positive impact on the growth performance of the animals. A work published by Menoyo et al. (2021) compiled, in a meta-analysis, 8 experimental trials in broilers chickens in which the inclusion of Spicy was assessed on performance parameters in two different phases of the rearing cycle: starter phase (from day 0 to 21 of life) and grower-finished phase (from day 22 of life until day of slaughter) (Table 1).

The results of the meta-analysis clearly indicate that the dietary inclusion of Spicy has a positive influence on growth performance, justified by its effects

as nutrients digestibility enhancer, increasing the average daily gain of the animals during the entire rearing cycle and improving the feed conversion; thus, increasing the feed efficiency of the animals, particularly during the starting phase.

CONCLUSIONS

The combination of specific spices, present in Spicy, has functional properties as digestibility enhancer, increasing the absorption efficiency of the poultry gastrointestinal tract of lipids (fats and oils), as well as other nutrients and energy. This fact has a direct and a positive impact on broiler chicken's growth performance, translated into higher body weight gain and better feed conversion.

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Table 1. Effects of including Spicy on broiler chicken's performance, data from meta-analysis including 8 different trials.

	Treatment		SEM	P value
	Control	Spicy		
Starter phase (0-21 d)				
ADG (g/d)	45.5	45.9	0.20	0.05
ADFI (g/d)	54.7	54.7	0.28	0.80
FCR (g/g)	1.431	1.418	0.005	<0.01
Mortality (%)	0.94	1.35	0.34	0.25
Grower-Finisher phase (22 d-end)				
ADG (g/d)	95.1	96.3	0.50	0.03
ADFI (g/d)	164.1	163.4	0.90	0.45
FCR (g/g)	1.759	1.744	0.008	0.07
Mortality (%)	2.37	2.66	0.37	0.46

ADG: Average daily gain; ADFI: Average daily feed intake;
FCR: Feed conversion ratio; SEM: Standard error of the mean.

Extracted from Menoyo et al. (2021)

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About Dr. Alberto Viñado

Holding a Bachelor's Degree in Veterinary Medicine (2015) and a PhD in Animal Production (2019) at Universitat Autònoma de Barcelona, Dr. Alberto Viñado has been involved during almost 10 years in projects related to livestock nutrition in both Academia and Industry. Viñado is currently enrolled in Lucta as Poultry Innovation Manager, involved in the process of research and development of feed additives for poultry production.

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ENHANCING COMPETITIVENESS IN PIG PRODUCTION

Tristan Brehelin

Pig Nutritionist

Techna

Enhancing the competitiveness of the swine sector requires the optimization of farming practices. Precision nutrition enables producers to align nutrient supply with the animals' actual requirements, while effective stress management promotes welfare and performance. Combined, these approaches contribute to more efficient, sustainable, and ethically responsible pig production systems.

Amid growing economic and environmental pressures, the swine industry must strengthen its competitiveness while addressing societal expectations concerning sustainability and animal welfare. Competitiveness depends on the ability of farms to produce efficiently, to innovate, and to adapt to economic and regulatory constraints, while meeting quality and sustainability standards. Feed costs represent more than 60% of the total production cost of finisher pigs in Europe, making nutrition a key lever for improving competitiveness. Although often viewed as a charge, feed should also be regarded as an investment to enhance technical performance and margin over feed costs.

Precision nutrition is a crucial means of optimizing feed efficiency, reducing nitrogen emissions, and improving techno-economic performance. Simultaneously, stress management plays a vital role in regulating behavior, maintaining physiological health, and enhancing product quality. At Techna, we have developed an integrated approach combining both precision nutrition and animal welfare to boost the techno-economic performance of fattening pigs.

NUTRITIONAL QUALIFICATION OF RAW MATERIALS

A detailed characterization of raw materials used in animal feeding is the first step toward implementing precision nutrition in pig production. At Techna, fecal digestibility trials are conducted on finisher pigs to determine specific nutrient values, enabling more efficient utilization of raw materials in feed formulation. A recent example is the development of a predictive equation for the net energy value of finishing diets.

This equation is based on improved nutrient digestibility—particularly of fibers and amino acids—as pigs grow. Recent studies have demonstrated a 2.6% increase in energy digestibility between pigs weighing 35 kg and 75 kg, attributed to better utilization of fibers (NDF, hemicellulose, cellulose) and nitrogen. This allows for a more accurate description of the energy value of raw materials according to fiber content and pig weight. The difference between growth (7–75 kg) and finishing (75–130 kg) net energy values depend on the nutritional characteristics of raw materials—whether

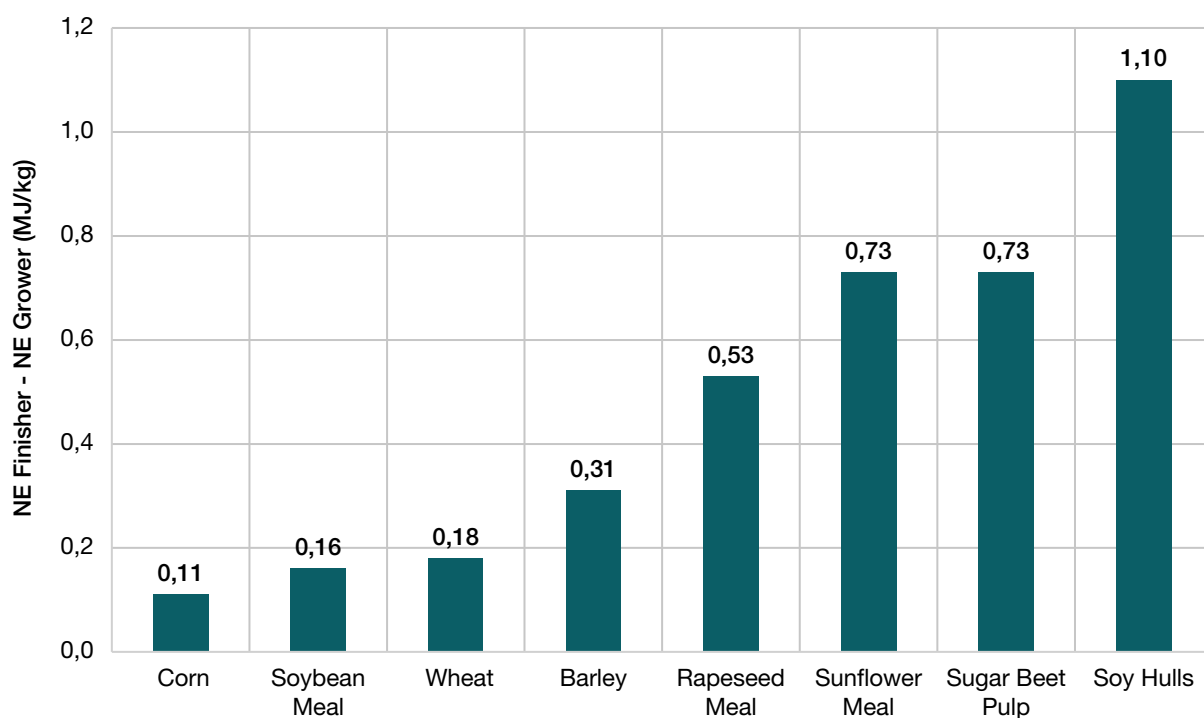


Figure 1. Energy differences according to raw materials

rich in starch or fat (corn, sorghum, soybean) compared with fiber-rich ingredients (sunflower meal, beet pulp, soybean hulls).

Formulating based on this criterion allows better utilization of fiber-rich coproducts during the finishing phase, yielding an economic advantage of €0.80–1.00 per ton of feed, depending on the diet's net energy level. It also helps reduce the environmental footprint of feed, cutting greenhouse gas emissions by about 1.4% (kg CO₂ equivalent).

PRECISE DETERMINATION OF PIGS' NUTRITIONAL REQUIREMENTS

Accurately estimating the nutritional requirements of fattening pigs is a cornerstone of precision feeding, ensuring an optimal match between nutrient supply and animal needs. This estimation can be achieved through performance analysis to identify feed intake patterns and growth potential. Significant variability exists between genetic lines, as well as within populations. At Techna, experimental trials are conducted to determine performance potential according to genotype and to assess the impact

of nutritional modulation on zootechnical responses. The goal is to precisely understand the interaction between genetics potential and nutrition.

For instance, pigs from two genetic lines were fed three different lysine digestible levels (high, medium, low) *ad libitum* from 30 to 120 kg. Genetics had a major influence on performance, with differences of 86 g/day in average daily gain (ADG) and 0.15 points in feed conversion ratio (FCR), and different lysine-to-net energy ratios to achieve optimal efficiency depending on genotype. Conse-



Table 1. Determine animal potential & nutritional requirements

	Genetic		SID Lysine		
	Genetic 1	Genetic 2	Lys --	Lys =	Lys ++
Live weight at 69d (kg)	29,0a	32,1b	30,5	30,5	30,6
ADFI (g/d)	2331a	2212b	2202	2287	2337
ADG (g/D)	954a	868b	806a	931b	981c
FCR	2,45a	2,56b	2,74a	2,46b	2,39c
Live weight at 166d (kg)	120,5a	115,5b	107,9a	120,1b	124,9c
Carcass weight (kg)	91,2a	89,5b	85,2a	92,1b	92,6b
Lean meat (%)	59,6a	61,4b	60,2	60,4	60,7

*Effect of genetics: Duroc (Genetic 1) vs Pietrain (Genetic 2)
Differences in performances → differences in nutritional requirements*

quently, these variations in performance potential imply strong variability in nutritional requirements, highlighting the need to adapt nutritional recommendations according to genetics.

The feeding program also had a clear independent effect: the high-lysine program yielded +175 g/day higher ADG and -0.35 points lower FCR compared with the low-lysine program. However, reducing lysine levels lowered feed costs by €11 per pig through a €35/ton cheaper diet but resulted in a €24/pig loss in feed margin. These findings show that cutting investment in feed does not improve competitiveness but only reduces overall feed cost due to negative impacts on performance and margin.

MAXIMIZE MARGIN WITH OPTIMAL FEEDING STRATEGIES

Identifying the best techno-economic strategy based on the animal's genetic potential is essential to maximize feed margin. To this end, Techna has developed digital solutions such as the Wefeed platform, composed of three modules:

- Wefeed Check – analyzes improvement levers on the farm.
- Wefeed Nutri – optimizes feeding strategies for finisher pigs.

- Wefeed Carcass – maximizes farmer income by optimizing slaughter strategy.

Wefeed Nutri predicts pig performance at the individual level based on feeding strategy (feed composition and feeding program) and the techno-economic context (pig price, feed cost), allowing identification of the optimal feeding strategy.

Techna also invests in on-farm data collection and analysis through its joint-venture Kumulus. The objective is to refine performance prediction equations and promote dynamic, real-time data use. Pilot farms are equipped with precision-feeding systems that monitor consumption and growth while enabling individualized daily feed distribution. Performance data analysis allows prediction of pigs' daily nutritional needs to fine-tune feeding and avoid both deficiencies and excesses. Techna has quantified the benefits of precision feeding: compared with a two-phase strategy, it increased feed margin by 8% and reduced nitrogen excretion by 23%.

REDUCE AGGRESSIVE BEHAVIOR

In modern production systems, pigs are exposed to multiple stress factors such as heat, stocking density, competition for feed or water, and transport.

Frequency of Positive & Aggressive Behaviours

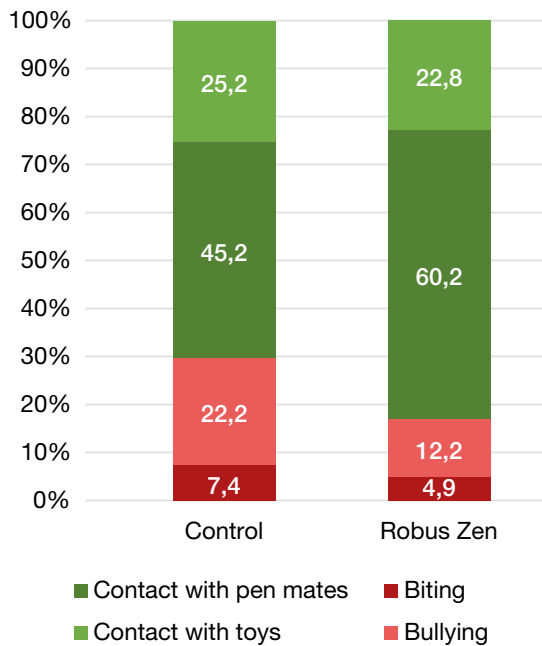


Figure 2. Less physical activity and aggressive behaviour

These challenges significantly affect animal welfare and productivity, leading to major economic losses. Stress alters pig behavior, increasing the frequency of aggressive interactions, which can cause injuries, infections, and higher medication use, while reducing growth and carcass quality. The associated losses are estimated at more than €1.60 per pig, and when mortality increases by 1–2%, losses may rise to €90–120 per pig. Overall, economic losses due to stress—including its effects on growth, feed efficiency, health, behavior, and carcass quality—are estimated to exceed €6 per pig on average.

To mitigate aggressive behavior and improve profitability, Techna developed Robus Zen, a natural solution based on plant extracts and aromatic compounds. Robus Zen composition exerts calming effects by modulating neurotransmitters. It also supports digestive, antioxidant, and immune functions, thereby reducing the negative impact of aggressive behavior on performance. Field trials demonstrated that pigs receiving Robus Zen at 1 kg/t showed

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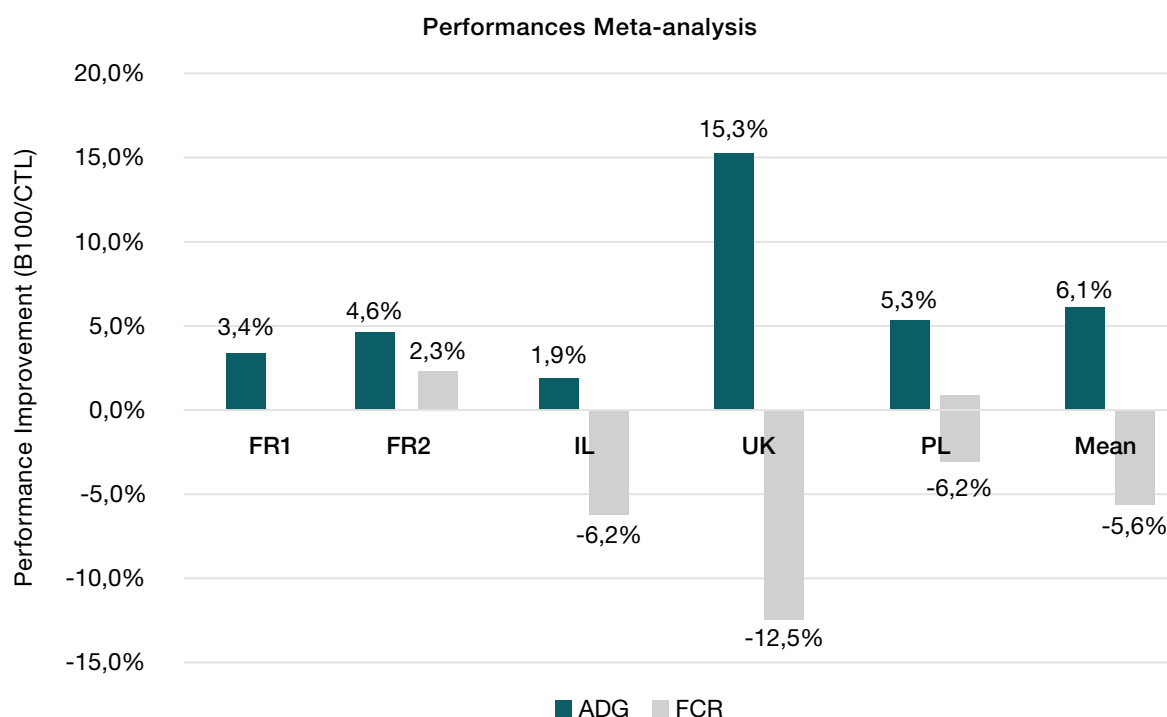


Figure 3. Performances synthesis

reduced physical activity throughout the finishing period and 42% fewer aggressive behaviors (such as tail and ear biting). Mortality and culling due to severe lesions or digestive disorders were also reduced.

By promoting more positive social interactions, Robus Zen enhances feed efficiency and growth performance. Recent trials reported an average improvement of 6.1% in growth rate and a 5.6% better feed conversion ratio. The average return on investment was 1:4, corresponding to an improvement of €5.7 per pig in feed margin.

In sows, it has been shown that cortisol and adrenaline—stress hormones—act antagonistically to oxytocin and prolactin, which are involved in farrowing and milk production. Recent data revealed

reduced salivary cortisol levels during farrowing in sows supplemented with Robus Zen, resulting in fewer stillbirths (from 7.0% to 4.6%) and a 1.9 kg improvement in litter weaning weight.

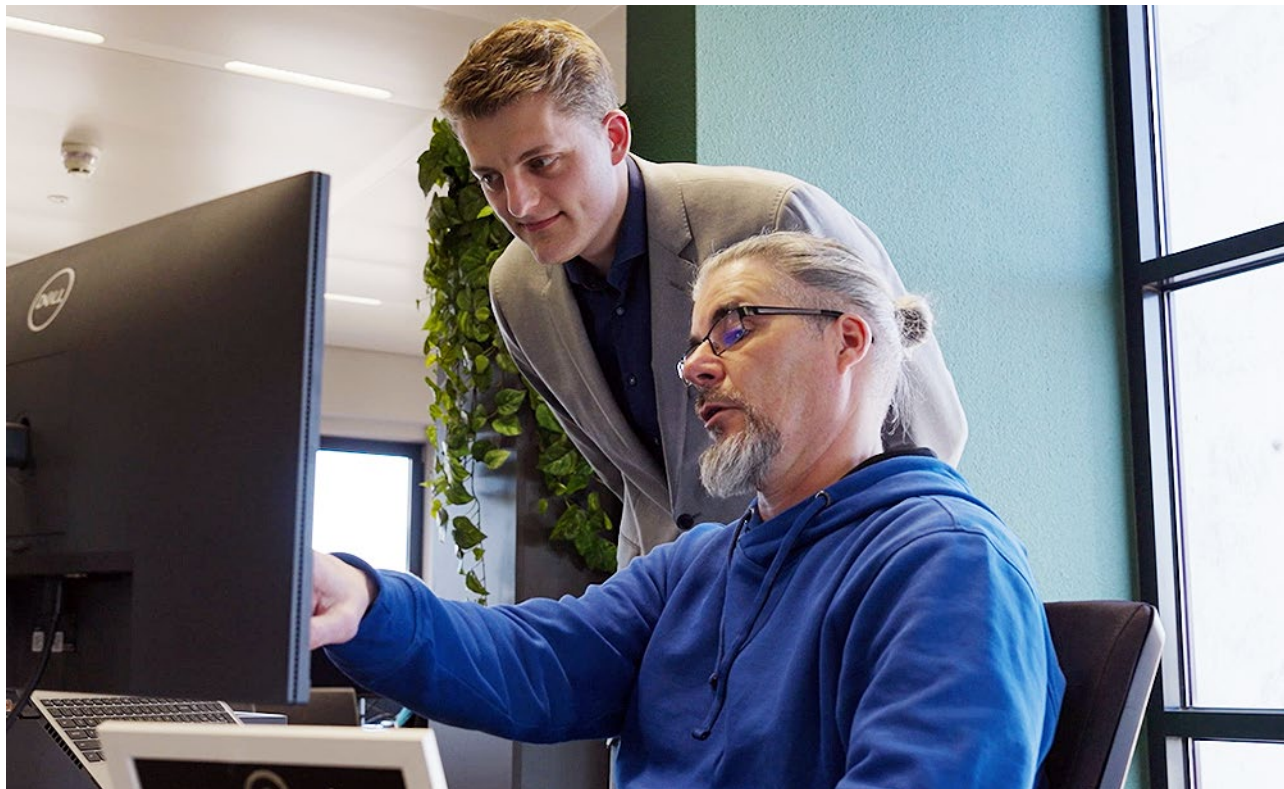
Techna experts provide tailored support to optimize the use of Robus Zen according to farm conditions and feeding strategies, with objectives such as:

- Calmer animals during high-risk periods.
- Reduced aggressive behaviors and improved social interactions.
- Enhanced fattening performance (ADG, FCR).
- Calmer animals during periods of risk during farrowing and lactation (fewer stillbirths, higher litter weights).
- Nutritional support for Animal Welfare-certified production systems (intact tails, entire males, etc.).

About Tristan Brehelin

Holder of a Master's degree in Animal Production, Tristan Brehelin has worked as a swine nutritionist for over a decade at Techna. His career includes leading R&D for the swine business, providing technical support for key accounts, and developing a range of swine additives and decision-support tools to predict technical and economic performance trends.

DATA-DRIVEN DECISIONS: INSIGHTS FROM DAIRY DATA WAREHOUSE



JP Dorgan, Key Account Manager, Europe, at Dairy Data Warehouse: “Big data and AI will underpin the next era of dairy farming enabling faster, smarter decisions around herd health, feeding, and productivity. But none of this works without high-quality, consistent data at the cow and herd level. That’s where DDW comes in, providing the trusted data infrastructure that powers predictive tools, dashboards, and insights used by nutrition and feeding companies. “

Dairy consultants who harness high quality herd data and embrace new technologies will be essential to the future of dairy farming. From feeding and health to genetics and cow monitoring, consultants play a vital role in helping farmers make the right decisions. To do this effectively, they need access to accurate, real-time data and meaningful KPI tools that enable them to drive efficiency, profitability, and long-term sustainability across the dairy farms they support. We talked

with JP Dorgan, Key Account Manager, Europe, at Dairy Data Warehouse, for more details.

Mr. Dorgan, for readers who may not be familiar, could you briefly introduce Dairy Data Warehouse? What is your company’s core mission, and which solutions make it stand out?

Dairy Data Warehouse (DDW) is a Dutch-based company with over 12 years of experience helping the global dairy industry unlock the full potential of farm data.

We turn complex dairy data into actionable insights that drive more sustainable and profitable farming.

We connect directly to herd management and on-farm systems, processing and standardising millions of data points daily into a consistent, high-quality dataset. This allows dairy professionals whether in nutrition, genetics, animal health, or cow monitoring to work with accurate, comparable information across all their herds.

In practice, if a consultant supports 20+ herds using different software systems, DDW removes the complexity by collecting, cleaning, and harmonising all that data in the cloud. The result is a seamless data flow into the consultant's own tools, enabling faster, smarter decision-making on farm.

The term “big data” might not yet be fully understood in the agriculture sector. Could you explain what big data means in the context of DDW and what it signifies for farm management?

At DDW, big data means turning millions of individual cow records collected across 50+ countries into actionable insights. This includes data on feeding, reproduction, health, milk production, and more, gathered and harmonised across different systems and platforms.

We don't just collect the data, we standardise it, validate it, and transform it into over 130 meaningful KPIs that dairy consultants can use to support their clients, whether remotely or on farm.

In practical terms, big data enables:

- Comparing performance across herds, regions, and time,
- Generating predictive alerts for disease risk or underperformance,
- Supporting prescriptive actions, like ration adjustments or breeding strategy,



JP Dorgan
Dairy Data Warehouse

- Making data-driven decisions that improve farm profitability and sustainability.

Big data isn't just about volume, it's about consistency, context, and confidence in every decision. That's what DDW delivers.

Increasing efficiency is one of the biggest goals in the dairy and livestock sector. How do DDW's data analysis solutions

concretely improve farm profitability and operational efficiency? For example, what improvements do you provide in areas such as feeding?

At DDW, we work with leading companies in nutrition, genetics, monitoring, and advisory services to provide their consultants with accurate, up to date herd insights. Our solutions help them make better, faster decisions that improve both efficiency and sustainability on farm.

For example, in nutrition and feeding:

- We combine individual cow data with TMR information to support ration formulation tools.
- We enable direct integration of herd inventory, group, and production data with mixer wagons to automatically adjust feed loads.
- We deliver milk yield and feeding efficiency metrics per cow, helping nutritionists fine tune diets to optimise milk output and cost.

By connecting and standardising these data streams, DDW turns information into measurable performance gains across feeding.

Dairy farmers are often faced with an intense flow of data. How does your system collect data from different sources and interpret/visualize this complex data in a way that facilitates decision-making processes?

Dairy farmers increasingly rely on their trusted consultants to interpret complex data. DDW supports this by providing clean, standardised herd and



cow data directly into the tools used by nutrition, genetics, and service companies.

In simple terms, DDW powers the systems consultants already use, supplying the herd data and KPIs, while they handle visualisation and advisory support.

For customers who prefer a ready-made solution, our product Optiherd offers a clear dashboard view of all herds, highlighting key KPIs and automatically flagging which herds need attention. It makes complex data simple, actionable, and focused on results.

What kind of hardware or software investments does a feeding company need to make initially to start working with DDW? How long does the integration process take, and how complex is it?

We have developed our own plug-and-play platform called Herdnet. With Herdnet, it is super easy for our customers to connect their dairy clients herd software in a matter of minutes and collect data directly from multiple dairy/feeding software. There is no software or hardware purchase required.

How important are data privacy and security in DDW's data collection and analysis processes? What measures do you take in this regard?

We take the security of data very seriously. We have numerous policies in place to make sure that the data is stored safely and securely. Dairy Data Warehouse works on the principle that the data provider (in most cases this will be the farm owner) remains the owner of the data. As a consequence, the owner exclusively decides whether we are allowed to transfer and store their farm data on our dairy data platform and who has the right to view them. We will never display individual, non-anonymized farm data to anyone who has not been authorized by the farmer. All our terms and conditions are available to review on our [website](#).

In your opinion, how will big data and artificial intelligence technologies transform the dairy and livestock sector in the next 5–10 years? What role does DDW aim to play in this transformation?

Big data and AI will underpin the next era of dairy farming enabling faster, smarter decisions around herd health, feeding, and productivity. But none of this works without high-quality, consistent data at the cow and herd level. That's where DDW comes in, providing the trusted data and artificial intelligence infrastructure that powers predictive tools, dashboards, and insights used by nutrition and feeding companies.

Still, even the best data and technology won't replace people. We'll need the next generation of skilled consultants who can interpret these insights and turn them into action on farm. That's what will truly drive efficient, sustainable dairy systems.

About JP Dorgan

Coming from a farming background in Cork, Ireland, JP Dorgan has over 25 years' experience across the food and farming sector, including roles at Tate & Lyle, Tesco, GEA, and Map of Ag. He brings deep expertise in agriculture, dairy, and data, with a strong focus on turning complex technology into practical, commercial value for businesses. Passionate about innovation, Dorgan helps companies harness data and AI to drive better outcomes in feeding, animal health, sustainable production, and supply chain performance.



Rumen Stabilization without Formaldehyde: **HYDROTHERMAL PROCESSES FOR STABLE PROTEINS**

Felix Tometten

Animal Feeder

Amandus Kahl

High-yielding cows and beef cattle require large amounts of high-quality protein.

Since the microbial proteins in the rumen are not enough to meet this demand, rumen-protected components must be added to their feed. Following the EU-wide ban on formaldehyde, there is a need for sustainable, animal-friendly alternatives.

Hydrothermal processes offer one solution.

Cows cover a large part of their protein requirements from rumen microbes. However, this supply of protein reaches its limit as the animal's performance increases. In order to supplement this supply, high-quality feed components that are not pre-digested in the rumen must be fed to the animal. These components are directly available for resorption in the small intestine. For many years, treating feed with formaldehyde has been an effective way to increase rumen stability. Following the EU Commission's Implementing Regulation (EU) 2022/1104 banning formaldehyde, new solutions have emerged: hydrothermal and pressure hydrothermal processes. These processes offer a promising alternative that is completely free of critical additives for modern, healthy animal nutrition.

TECHNICAL PROCESSES FOR INCREASING RUMEN STABILITY

Hydrothermal and pressure hydrothermal processes protect proteins from premature degradation using physical processes such as heat, pressure, and moisture. These processes do not use chemical additives and meet the key requirements of modern

feeding concepts. They are energy-efficient, sustainable, and economical.

A key benchmark for evaluating these processes is the UDP value (UnDegradeable Protein). The UDP value describes the proportion of rumen-stable protein in total crude protein (CP) and indicates the percentage of proteins that are rumen-stable and directly available for digestion in the small intestine. The rumen stability of feed must be calculated by taking into account a specific retention time in the rumen. For high-yielding cows, about 8% of rumen contents are estimated to enter the intestine per hour. The UDP content of feed is typically calculated based on an 8% passage rate and expressed as UDP_8 .

The efficiency of technical feed processing, or rumen stability, is assessed using various testing and estimation methods. These results are then used to evaluate the relative effectiveness of different processes or treatments compared to the initial product. Since the results vary, it is necessary to continuously sample the raw material and finished product to generate a stable and reliable database.

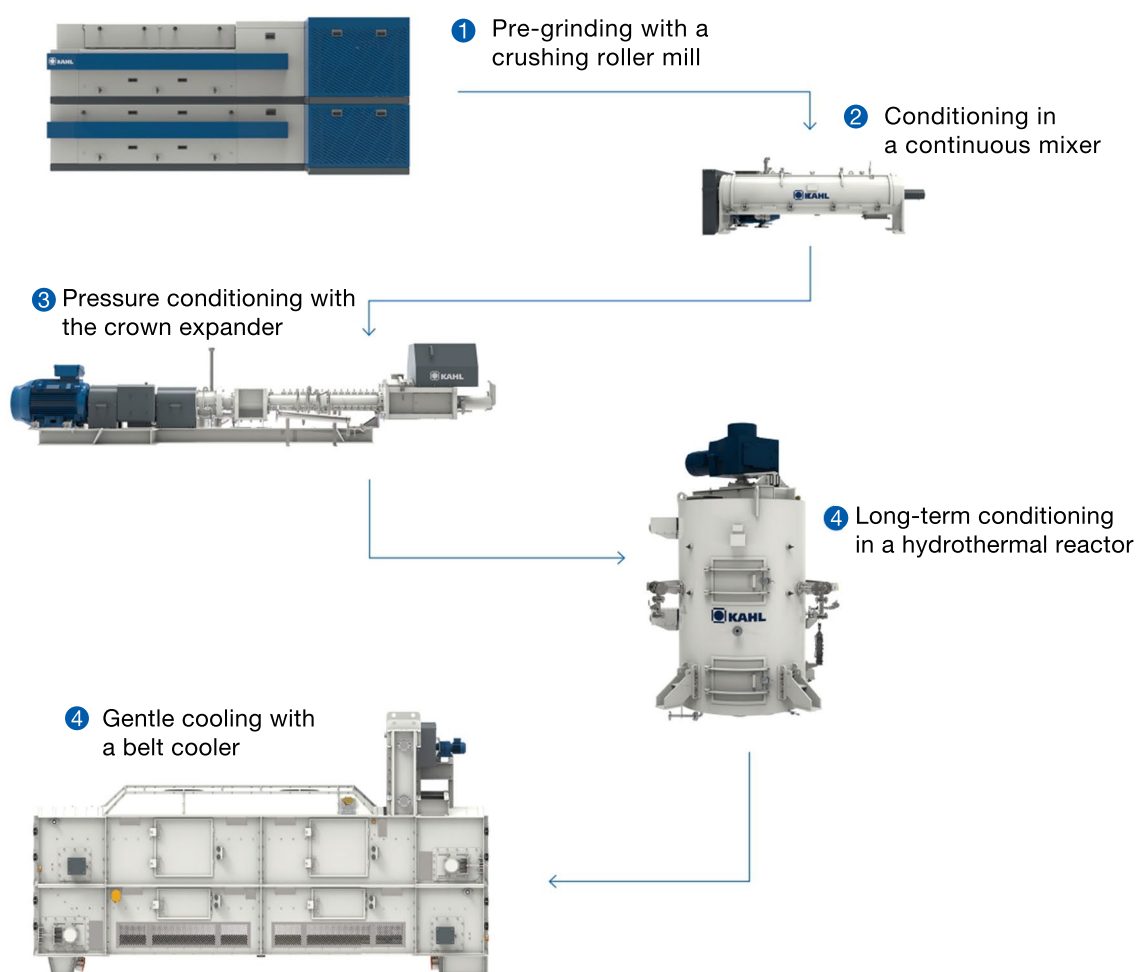
The pressure-hydrothermal expander process, developed by the Reinbek-based mechanical engineering company Amandus Kahl, is a proven method for increasing the UDP value. In this process, the feed protein undergoes treatment with steam, pressure, and temperature to specifically alter its structure and increase rumen stability. After preliminary grinding with a crushing roller mill and steam pre-conditioning in a continuous mixer, the process material is briefly heated to high temperatures under high pressure using the Kahl crown expander (High Temperature Short Time or HTST).

The hot, expanded product is then fed into the

long-term conditioner, also known as a hydrothermal reactor. This machine maintains the product's temperature near the boiling point for approximately 20 minutes, significantly increasing the UDP value. At the same time, digestibility in the small intestine improves. Finally, the expanded product, or expandate, is cooled in the belt cooler, resulting in a stable and nutrient-rich end product.

Thanks to its uniform particle structure, the expanded product is particularly resistant to segregation in total mixed rations (TMRs), which largely prevents selective feed intake. Alternatively, the expanded product can be pelleted with minimal extra energy.

Main machines of a UDP expander line for increasing the rumen stability of feed protein



Technology for maximizing protein utilization: Machines in a UDP expander line that increase rumen stability in a sustainable way

A comparison of the effects of the Amandus Kahl UDP process and conventional HTST expansion on the UDP₈ value and protein fractions of rapeseed meal with an initial high value

Treatment	UDP ₈ [% of CP]	CNCPS protein fractions [% of CP]				
		A	B1	B2	B3	C
Control (untreated)	59	5,0	11,6	65,3	11,4	6,7
Expansion	71	9,3	2,9	69,1	11	7,8
Expansion + long-term conditioning	81	7,6	0,1	69,4	14,3	8,6

SUSTAINABILITY AND ECONOMIC ADVANTAGES

In addition to improved rumen stability, sustainability is a key factor in feed production. The pressure-hydrothermal expander process offers several advantages in this regard. Targeted control of heat, pressure, and moisture minimizes electrical energy consumption. Unlike purely hydrothermal processes, which require energy-intensive hot air drying, the final product only needs to be cooled by ambient air in the belt cooler. This saves con-

siderable energy and reduces the carbon footprint of feed production.

Furthermore, treatment in the Kahl expander line changes the protein structure, improving the digestibility of the nutrients it contains. Expansion increases the bypass protein digestibility in the intestine, especially with rapeseed meal and other mono-components. This increases overall feed conversion and improves feed efficiency. From an economic perspective, improved protein utilization allows for a reduction in feed consumption while maintaining milk and fattening yields.

CONCLUSION

The growing demand for sustainable and efficient animal nutrition makes it clear that innovative solutions are needed - not just as a substitute for formaldehyde, but also as a sustainable, resource-efficient feeding strategy. Pressure hydrothermal processes are a promising approach that shows modern feed production can be free of chemical additives without sacrificing efficiency or sustainability. The expander technology from Amandus Kahl is a good example of this. Many feed producers worldwide already use it successfully.



Photo: Amandus Kahl

About Felix Tometten

As an animal feeding specialist at German engineering company Amandus Kahl in Reinbek, Felix Tometten works in research, development, and internal as well as external consulting. At Amandus Kahl, he acts as a link between technology and animal nutrition.

After completing his Master of Science in Agribusiness and Animal Feeding at the University of Göttingen, he gained experience in poultry consulting at ATR Landhandel and as a district manager at Stader Saatzzucht eG.



STABILIZATION OF SENSITIVE POULTRY PROCESSED ANIMAL PROTEINS

Frank Clement
Principal Technical Service Manager
Kemin Nutrisurance Europe

“Poultry Processed Animal Proteins (PAP) and fat are mainly used in pet food recipes for their nutritional value. However, their high linoleic acid content makes them particularly vulnerable to oxidation. To counteract this, the rendering industry applies antioxidant solutions both before and after the cooking and separation phases, at multiple points throughout the process. This is the only way to achieve 3, 6, or even 12 months PAP shelf life as required by the pet food industry to accommodate long storage periods or overseas shipments.”

The pet food industry is providing more sophisticated end products to our pets with more complex formulations containing many sensitive ingredients which support different stressful processes.

To ensure healthy and palatable pet food products, manufacturers must use safe and non-oxidized ingredients. Even a single oxidized or poorly stabilized ingredient will generate fat pro-oxidation chain rapidly affecting the quality and stability of the final product.¹ The pet food industry is significantly using high amounts of Processed Animal Proteins (PAP) and fats which can represent 20% to more than 50% of total formulations. However, these raw materials are highly susceptible to fat oxidation due to their fatty acids profile and the pro-oxidation stress of the rendering processes.

The rendering industry transforms slaughterhouse by-products into high quality PAPs and fats, each with a distinctive fatty acid profile depending on the animal species. Animal by-products with higher levels

of unsaturated fatty acids, such as those from poultry or fish, are more susceptible to oxidation.² This is because unsaturated fatty acids, especially polyunsaturated ones, have double bonds that are more reactive, leading to faster degradation and rancidity. Fat oxidation degrades nutritional value, reduces palatability³ shortens shelf life and can generate diseases in pets.⁴

Poultry PAP and fat are mainly used in pet food recipes for their nutritional value. However, their high linoleic acid content makes them particularly vulnerable to oxidation. To counteract this, the rendering industry applies antioxidant solutions both before and after the cooking and separation phases, at multiple points throughout the process. This is the only way to achieve 3, 6, or even 12 months PAP shelf life as required by the pet food industry to accommodate long storage periods or overseas shipments. Until now, the rendering industry in the EU has primarily used synthetic antioxidant molecules applied both before and after the cooking process. Occasionally, synthetic antioxidants are

applied pre-cooking, while natural origin antioxidants are used post-cooking for cost-effectiveness.

As pet food manufacturers increasingly highlight natural claims on their packaging, the use of ingredients stabilized with synthetic molecules appears inconsistent and illogical. The biggest pet food manufacturers have requested Kemin Nutrisurance to develop efficient cost-effective natural origin antioxidant solutions for all ingredient stabilizations.

THE CHALLENGES

Trials' Capabilities

The poultry rendering industry is engaging in the processing of huge crude raw materials through continuous or batch dry rendering processes from 10 to more than 300t/day.

Antioxidant molecules used before the cooking phase are mainly oil soluble. During the cooking phase, some of these molecules migrate into the extracted poultry fat. In certain processes, this fat —now containing synthetic molecules— is reused in the cooker to speed up the cooking process. As a result of this carryover effect, synthetic antioxidant molecules can contaminate subsequent batches of poultry PAP and fat.

The two main rendering technologies are based on dry rendering (with protein and fat separation after water removal) and wet rendering (with water removal after protein and fat separation). The dry rendering process is more stressful for PAP and fat.

To enable testing of multiple antioxidant molecules—individually, in combination, at various dose rates, in duplicate or triplicate, and across both dry and wet rendering processes while avoiding cross-contamination – Kemin Nutrisurance developed its own pilot rendering facility. Final selected solutions were tested afterward under dry rendering industrial conditions. Over the last 4 years, we conducted 203 cooking trials, tested 50 different molecules, treated more than 15 tons of crude raw materials, and carried out more than 17,500 wet chemical analyses.

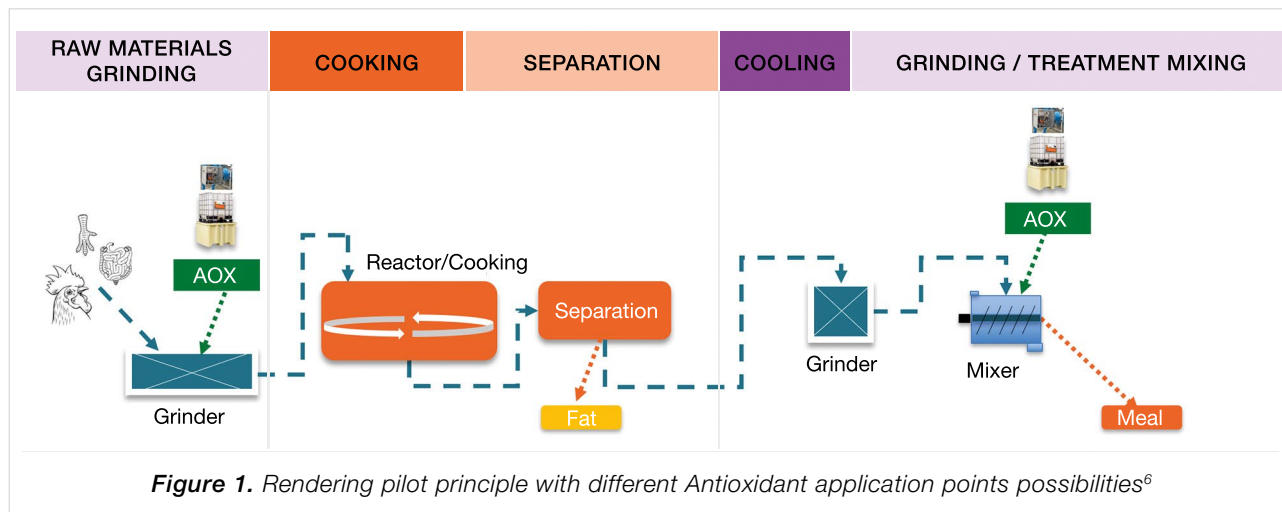
Cost in Use

As mentioned, it's crucial to protect the fat before it undergoes thermal stress. Applying antioxidants to crude raw materials significantly impacts cost-in-use due to the effect on protein yield, which typically ranges from 18% to 20%. For instance, if we don't consider antioxidant migration into fat part, the cost factor for crude raw materials can range from 5 to 5.5, compared to a meal cost factor of just 1 when antioxidants are applied to dry PAP. The target is to reduce the stabilization cost of poultry crude raw materials by using the most cost-effective solution of natural origin.

THE DEVELOPMENTS

Pilot Trials

The first phase was dedicated to the mixed raw material validation, targeting standard poultry PAP (3.5 % Moisture, 64.8% Protein, 14.6 % Fat, 17.5% Ashes) before standardizing the dry rendering process in Figure 1.





For fat oxidation follow-up we systematically analyzed:

- Peroxide Value (PV) using AOCS method which measures the primary compounds of the auto-oxidation reaction, PV target <10 meqO₂/Kg of fat till the end of shelf-life,
- Hexanal, as a marker for secondary compounds of fat oxidation deriving from different linoleic acid pathways, hexanal target <10ppm till the end of shelf-life,

- The recoveries of antioxidant molecules like Tocopherols and Carnosic acid from rosemary extract.

During the development of antioxidant blends, each molecule was tested individually and in combination to optimize the ideal ratio. The evaluation focused on identifying any lack of synergistic effects or potential pro-oxidative interactions, while minimizing cost-in-use.

Another part of the research was dedicated to enhancing the activity of antioxidant molecules in the different phases such as the emulsion and final meal. In the last part of the pilot evaluation, we studied the impact of the overstress during the different rendering pilot phases such as the cooking phase and the press effect. It supported the final formulation and especially the antioxidant molecule balance in the Verafyt™ LR-35 Liquid formula.

Industrial Trials' Validation

To confirm the pilot trials' results shown in Figure 2, we scheduled industrial trials using a discontinuous dry rendering process. First, the process was cleaned with Verafyt LR-35 Liquid to avoid synthetic molecules cross-contamination

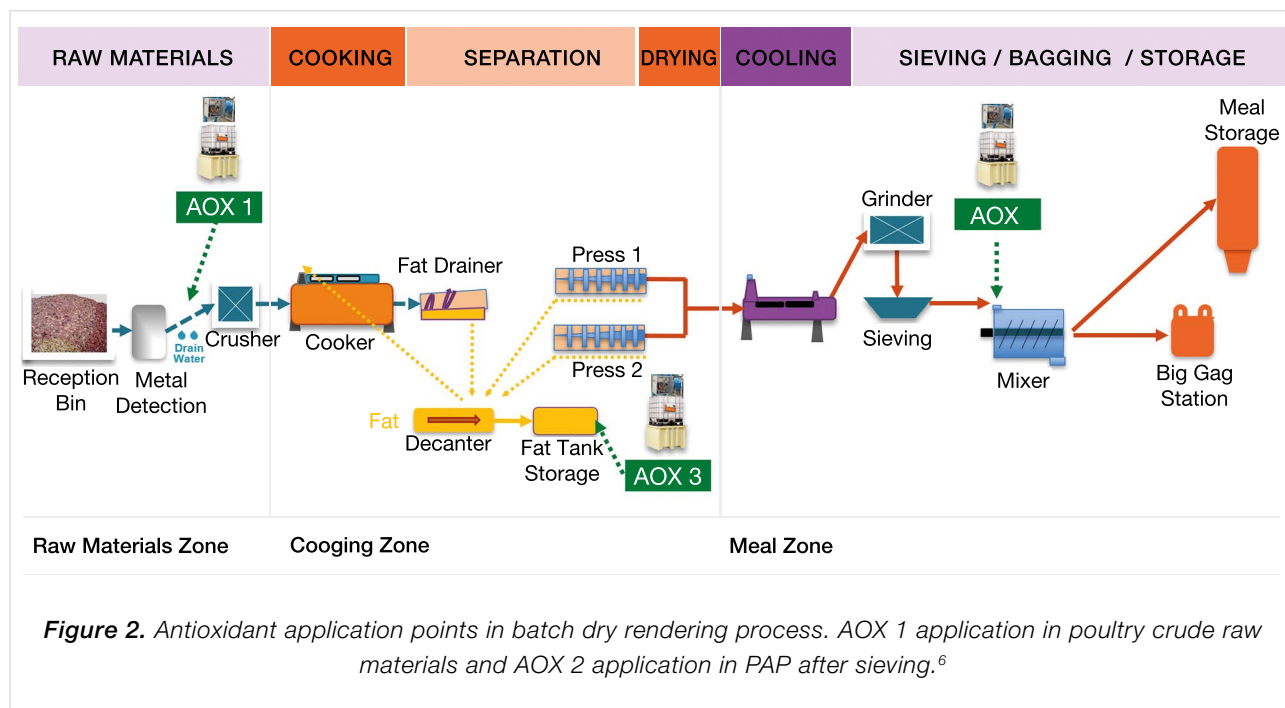


Table 1

Antioxidant Treatment

	Crude Raw Materials AOX 1		PAP AOX 2	
Sampling	Blend	Rates	Blend	Rates
		ppm		ppm
M_A	Verafyt LR 35 Liquid	700	-	-
M_B			Verafyt LR 35 Liquid	2200
M_C				990

like BHA, BHT and Propyl gallate in the fat and the cooker.

Antioxidants were applied as per Figure 2: AOX 1 in crude raw materials and AOX 2 in PAP.

We treated the crude raw materials with 700 ppm of Verafyt LR-35 Liquid. The PAP were either treated or left untreated with different Verafyt LR-35 Liquid dosages as in Table 1.

We monitored the primary and secondary compounds of oxidation in PAP over 12 months at ambient temperature with no UV exposure. The peroxide values shown in Figure 2 remain un-

der control after a 12 -month stability study in both samples (M-B and M-C) which were treated in poultry crude raw materials and PAP. Sample (M-A) with only crude raw materials treatment achieved almost 4 months of stability when PV curb crossed the 10 meq O₂/kg fat max limit.

Complementary antioxidant treatment in the PAP at the AOX 2 application point increase drastically the PAP shelf life which confirms the absolute needs of the PAP treatment at the end of the dry rendering process. PAP complementary treatment by Verafyt LR 35 Liquid in the meal multiply more than 3 times the final meal shelf-life versus the PAP only treated on crude ABP.

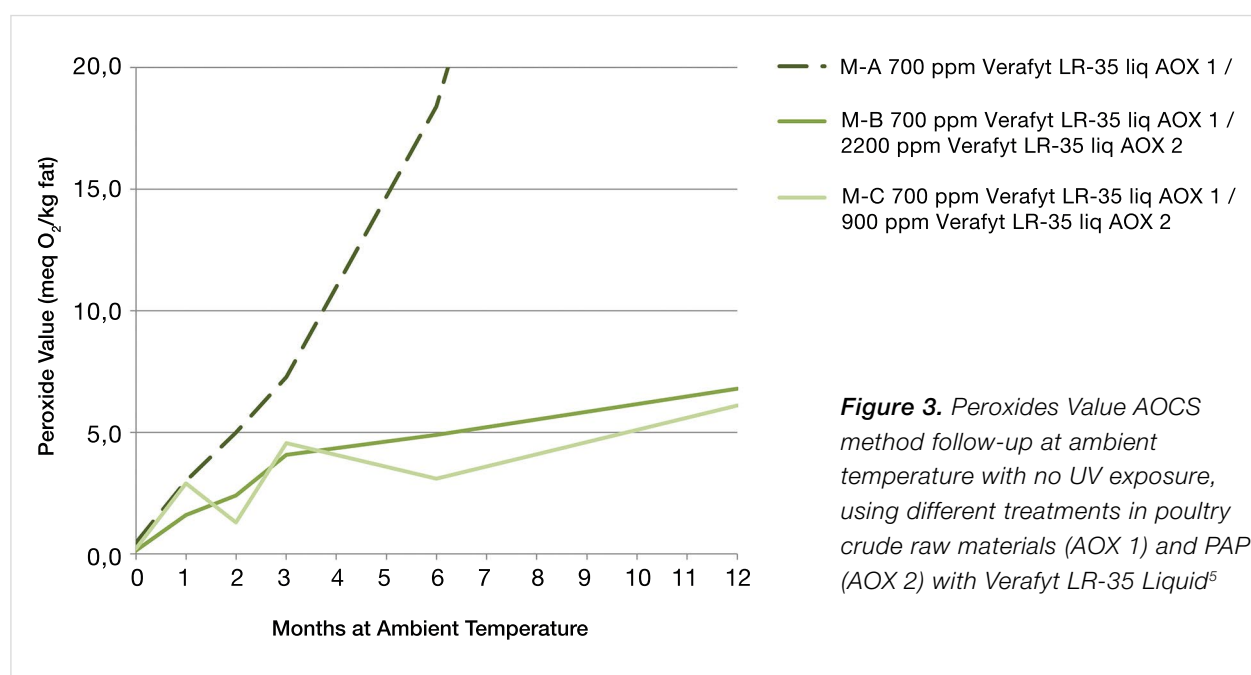


Figure 3. Peroxides Value AOCS method follow-up at ambient temperature with no UV exposure, using different treatments in poultry crude raw materials (AOX 1) and PAP (AOX 2) with Verafyt LR-35 Liquid⁵

Hexanal Internal Method (ppm)						
Months	0	1	2	3	6	12
M-A 700 ppm Verafyt LR 35 Liquid AOX 1 /	<1	3	4	4	3	369
M-B 700 ppm Verafyt LR 35 Liquid AOX 1 / 2200 ppm Verafyt LR 35 Liquid AOX 2	<1	4	3	3	1	2
M-C 700 ppm Verafyt LR 35 Liquid AOX 1 / 900 ppm Verafyt LR 35 Liquid AOX 2	<1	3	3	3	1	2

Table 2. Hexanal (internal Kemin Method) follow up at ambient temperature no UV with different treatment in poultry crude raw materials (AOX 1) and PAP (AOX 2) with Verafyt LR-35 Liquid⁵

Very low secondary compounds of oxidation like hexanal molecules resulting from linoleic acid oxidation and degradation were recovered as shown by Table 2. Above 10 ppm Hexanal Pet food manufacturer considers the fat oxidized:

CONCLUSION

The Verafyt LR 35 Liquid formulation, with its specific balance of active molecules and carrier enhancement effects, can protect sensitive poultry crude raw materials during the stressful heating dry rendering processes phases. It provides more than 3 months of poultry PAP stability when only the crude raw materials are treated and more than 12 months of PAP stability when combined with PAP treatment at the end of the process.

This is the first time in dry rendering history we have achieved similar efficacy than synthetic antioxidants molecules at so low cost in use.

The pet food industry can fully and safely stabilize their end pet food products with natural origin molecules now.



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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 lot of time in slaughterhouses and rendering plants to evaluate the best strategy to preserve the freshness of raw materials and guaranty 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.



Essential Oils in Animal Feed and the Global Market Status

Essential oils stand out as natural additives in feed that enhance flavor and performance as well as support health. According to research companies, the global feed essential oils market is projected to have been worth \$1.2–1.8 billion in 2024 and will reach \$2.5–3 billion by 2033, with a CAGR of 7–9%. Growth is supported by trends toward antibiotic-free production, digestive health, and heat stress management. Regionally, Asia-Pacific maintains its volume leadership in the market, while Europe and North America stand out with high-quality formulations.

By Derya Gulsoy Yildiz

Essential oils (EOs) are volatile and natural compounds obtained from the leaves, flowers, seeds, bark, or roots of plants. These natural extracts, which enhance feed palatability and encourage animals to consume more feed, have also emerged as performance-enhancing and health-supporting additives in animal nutrition following the restriction of antibiotic growth promoters. Unlike single-compound drugs, EOs are complex mixtures consisting of terpenes, phenols, aldehydes, and ketones. This chemical diversity allows multiple mechanisms of action to come into play.

Thanks to their antimicrobial, antioxidant, anti-inflammatory, and digestive support proper-



ties, essential oils protect intestinal health, improve feed utilization, and enhance performance. They strengthen the immune system by reducing pathogen pressure, increase resilience under stressful conditions, and encourage consumption by improving feed palatability with their pleasant aromas. With these multifaceted effects, essential oils are central to sustainable and antibiotic-free production goals; they are considered strategic functional feed additives in modern animal husbandry.

The main essential oil sources commonly used in animal nutrition today include tea tree, rosemary, thyme, cinnamon, mint, garlic, citrus, clove, eucalyptus, fennel, anise, and ginger.

As a result, essential oils offer significant potential in animal feed in terms of feed consumption, feed

efficiency, health status, heat stress management, and improved product quality.

CURRENT MARKET SIZE AND GROWTH EXPECTATIONS

Essential oils used in global feed formulations are experiencing continuous growth due to factors such as the increasing trend toward natural additives, restrictions on antibiotic growth promoters, and the importance of efficiency and feed utilization rates in animal production. Various research reports offer different estimates regarding the current size of this market and its future potential.

The lowest estimate of the current market size comes from **Mordor Intelligence**. The research firm estimates that the market for essential oils used in animal nutrition will reach approximately \$0.6 billion by 2025. Mordor analysts, who state that the market will exhibit a compound annual growth rate (CAGR) of 8.6% during the 2025–2030 period, predict that the total size will reach approximately US\$0.9 billion in 2030.

Clarity Markets Insights, based on its report on market size and trends, states that the market size was US\$1.2 billion in 2024. According to the report, the market, which is expected to grow at a CAGR of approximately 8.7% in the coming period, will reach US\$2.3 billion by 2033.

Another report supporting these figures is from **Verified Market Reports**. The company's analysts state that the essential oils used in animal nutrition market size is US\$1.2 billion in 2024 and predict that the market will grow at a CAGR of 8.5% until 2033, reaching US\$2.5 billion.

Market Research Intellect points to a higher value in its report, stating that the market was worth US\$1.85 billion in 2024. The report estimates that the market will exhibit a CAGR of 7.2% in the coming period and reach US\$3.10 billion by 2033.

Emphasizing that the market is showing strong growth due to the increasing demand for natural



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feed additives, **Growth Market Reports** states that the market size was US\$1.46 billion in 2024. Company analysts predict that the market will grow at a CAGR of 7.8% between 2025 and 2033 and reach a value of US\$2.89 billion by 2033.

FACTORS SUPPORTING MARKET GROWTH

The global feed essential oils market is experiencing rapid expansion due to restrictions on antibiotic use, a shift towards natural additives, sustainable production goals, and increasing demand for functional solutions that support animal performance. The main dynamics supporting market growth are as follows:

1. Trend Toward Antibiotic-Free, Clean Label, and Natural Products

Both consumer expectations for “antibiotic-free production” and “natural-origin additives” and the ban on antibiotic use as a growth factor in many regions have led the feed industry to seek plant-based, natural, and safe alternatives. Essential oils stand out as functional solutions that meet these demands, being environmentally friendly, residue-free, sustainable, and reducing the need for antibiotics.

2. Focus on Animal Health and Gut Integrity

Gut health is the most important determinant of feed utilization and overall performance. Essential oils improve digestive health by suppressing pathogenic microorganisms, supporting the growth of beneficial

bacteria, and strengthening the intestinal barrier. This is rapidly increasing their use as feed additives.

3. Combating Heat Stress and Environmental Pressures

Global warming and intensive production conditions are increasing stress-related performance declines in animals. Thanks to their antioxidant and anti-inflammatory properties, essential oils are considered a natural support in combating heat stress and oxidative stress.

4. Increased Performance and Productivity

Numerous studies show that essential oils increase feed utilization rates and support growth performance. This economic advantage is a strong incentive for producers.

5. Microencapsulation and Controlled Release Technologies

Microencapsulation technologies, developed to overcome volatility and stability issues, ensure the more effective and safe use of essential oils in feed formulations. These technological advances significantly increase product quality and market acceptance.

6. Increased Use in Pet Food

The pet food sector, with its high demand for natural and functional ingredients, has become a new and rapidly growing application area for essential oils. Their use in pet food is increasing, particularly

due to their antioxidant, digestive support, and deodorizing properties.

7. R&D Investments and New Product Developments

Major feed additive companies in the sector are conducting intensive R&D on plant-based blends, synergistic formulations, and species-specific formulations. These investments are increasing product diversity and the market's innovation capacity.

8. Growth of the Livestock Industry in Emerging Markets

Increased animal production and commercial feed usage in Asia-Pacific, Latin America, and Africa are rapidly expanding the use of essential oils. The transition to intensive production systems in these regions and local producers' access to functional additives are among the key drivers of market growth.

FACTORS LIMITING MARKET GROWTH

Although the global feed essential oils market has strong growth potential, various structural, technical, and regulatory barriers can limit growth. The main limiting factors are:

1. Fluctuations and High Costs in Raw Material Supply

Most essential oils are derived from plant sources. Climate conditions, harvest yields, and regional production imbalances can cause significant price fluctuations. This situation makes supply consistency difficult, especially for specific plants such as mint, thyme, and clove. Furthermore, natural essential oils are more expensive than synthetic alternatives. Feed producers operate on low profit margins, so cost pressures limit the widespread use of these additives.

2. Natural Variation in Chemical Composition and Lack of Standardization

Even oils obtained from the same type of plant can have different compositions due to geography, climate, soil structure, and extraction method. This variability makes it difficult to ensure consistency in quality and performance in feed formulations.

3. Stability Issues and Heat Sensitivity

Essential oils contain volatile and oxidation-prone components. Feed production processes involving high temperatures, such as pelleting or extrusion, may result in loss of efficacy. Solutions like micro-encapsulation improve stability but increase costs.

4. Variability in Effectiveness and Scientific Evidence Needs

The effect of essential oils on performance may vary depending on species, age, dosage, and environmental conditions. In some trials, performance increases are not clearly observed, creating uncertainty regarding return on investment (ROI).

5. Regulatory Barriers and Approval Processes

Feed additives undergo strict scrutiny in markets such as the European Union, the US, and China. Obtaining safety and efficacy approvals for essential oil blends requires lengthy and costly processes, slowing the market entry of new products.

6. Formulation Challenges Due to Taste and Odor Intensity

Some essential oils have a strong aromatic effect and can negatively impact feed intake when used excessively. Proper dosage adjustment and appropriate mixing ratios require technical expertise.

7. Competition from Alternative Additives

Alternative additives such as organic acids, phytobiotic mixtures, enzymes, and probiotics can offer similar functional benefits. The more stable and cheaper nature of these products limits the use of essential oils in some segments.

8. Lack of Awareness and Technical Knowledge

In some emerging markets, the effects of essential oils on animal health and performance are not well understood. Furthermore, producers' lack of technical knowledge regarding appropriate dosage, combinations, and carrier selection can limit the effectiveness and, consequently, the use of these products.

GLOBAL MARKET SITUATION BY SPECIES

The use of essential oils as feed additives shows sig-

nificant differences depending on the animal species. Each species' digestive system, microbial profile, feeding habits, and rearing conditions shape the composition of the essential oil blends used and their application purpose. The poultry, pig, ruminant, aquaculture, and pet segments have different dynamics in terms of both usage intensity and market growth rates.

Poultry

The poultry sector is the segment where essential oils are most commonly used as feed additives. In broiler, layer, and turkey production, the primary objectives are to support digestive health, improve feed utilization, and reduce antibiotic use. For example, active compounds derived from thyme and cinnamon (thymol, carvacrol, cinnamaldehyde) reduce pathogen load and improve nutrient absorption by modulating the gut microbiota. They also limit oxidative damage during periods of heat stress, preventing performance losses. Therefore, the poultry segment has the largest share in the global feed essential oils market. Intensive production systems, short production cycles, and increasing demand for antibiotic alternatives support the segment's growth.



Pigs

Essential oils in pig feed are used primarily for digestive health, immune support, and weaning stress reduction. Mixtures containing carvacrol, thymol, eugenol, and menthol are preferred for balancing the intestinal flora in weaned piglets, maintaining feed intake, and reducing cases of diarrhea. Furthermore, microencapsulated formulations that create a synergistic effect with fatty acids are becoming widespread in the pig sector. Strong production volumes in China, Europe, and North America have made this segment the second largest market after poultry.

Ruminants

In ruminants (dairy and beef cattle, sheep, goats), essential oils are used to optimize rumen fermentation and reduce methane production. Improving energy balance, maintaining milk yield and fat-protein ratio, especially during lactation, are the primary objectives. Peppermint, garlic, clove, and cinnamon oils reduce ammonia formation and improve feed conversion by balancing rumen microbial activity. Although market share is more limited compared to the poultry and swine segments, intensive operations in Europe and Latin America focused on milk yield are the main drivers of growth.

Aquaculture

The use of essential oils in aquafeeds is still in its early stages but has the potential for rapid growth. It is used in fish and shrimp feed to protect intestinal health, reduce oxidative stress, and increase palatability. Oils derived from mint, garlic, cloves, and citrus fruits limit microbial pressure in aquatic environments and improve feed conversion rates. In formulations using plant or insect proteins instead of fish meal, essential oils stand out as functional ingredients that compensate for loss of flavor and digestibility. Asia-Pacific is the fastest growing region in this segment.

Pets

Essential oils are valuable ingredients in pet food, both functionally and from a marketing perspective. Thanks to their antioxidant properties, they extend

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- | | | |
|----------------------|----------------------------------|-----------------------------|
| • Adisseo | • Evonik | • Nuproxa |
| • ADM | • EW Nutrition | • Nuqo Feed Additives |
| • Alltech | • Foreverest Resources | • Nutreco - Trouw Nutrition |
| • Anpario | • Global Nutrition International | • Olmix Group |
| • BASF | • Herbarom | • Orffa |
| • Bentoli | • Herbavita | • Palital Feed Additives |
| • Bordas | • Idena | • Phytobiotics |
| • Cargill | • IFF – Danisco | • Phytosynthese |
| • CCPA Group | • Kemin Industries | • Robertet Group |
| • Centafarm | • Manghebat | • Ropapharm Inteatonal |
| • Devenish Nutrition | • Martin Bauer | • Sens Nutrition |
| • Dostofarm | • Miavit | • Sensient Essential Oils |
| • DSM-Firmenich | • Novonesis | • Silvateam |
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shelf life, while their digestive and immune-supporting effects position them as a “natural feed additives”. Lavender, rosemary, peppermint, and thyme oils serve as both natural preservatives and aromatic additives. The “clean label” trend has increased the shift towards natural essential oil-based solutions instead of chemical preservatives. Growth in the premium segment indicates that the pet essential oil market will be one of the fastest growing areas in the coming period.

REGIONAL MARKET SITUATION

The regional feed essential oils market varies depending on dynamics such as economic development, regulatory structure, animal production systems, and consumption habits. In developed markets, demand is typically shaped by premium formulations, pet foods, and compliance with strict regulations; in developing regions, volume growth, industrialization of the feed industry, and cost pressures are at the forefront.

Americas (North America and Latin America)

North America — The US and Canada are leaders in both revenue and innovation for essential oils in feed applications. Large, integrated feed industries, premium pet foods, and strong market demand for antibiotic alternatives drive the region. Furthermore, the prevalence of pelletizing, extrusion, and

encapsulation technologies is accelerating the adoption of essential oil solutions produced with micro-encapsulation technology. However, consumer expectations for “clean labels” and strict regulations are driving producers toward documented and approved ingredients. North America has a high average income share in the global market and is also a region where technological innovations are rapidly implemented.

Latin America — Countries such as Brazil, Argentina, and Mexico offer large animal production volumes; however, due to high cost sensitivity, the penetration of essential oils is limited compared to North America. However, increasing intensive production, growth in the dairy and poultry sectors, and the maturation of regional supply chains have the potential to increase demand in the mid-term.

Asia-Pacific (APAC)

Asia-Pacific leads the global feed essential oils market in terms of volume. China's extensive feed production infrastructure, Southeast Asia's aquaculture intensity, and India's large ruminant population are the region's key drivers. The increasing use of plant proteins, the need for weaning practices, and the growing pet market are rapidly increasing demand for essential oils in APAC. The region



Photo: Freepik

may also face limitations in the proliferation of encapsulated, high-cost solutions due to price sensitivity and supply chain challenges; nevertheless, it continues to make the largest contribution to global demand with its high-volume growth.

Europe

Europe is a mature market subject to strict regulations and strong expectations for “naturalness.” EU regulations, documentation, and safety requirements compel producers to adhere to rigorous safety processes; this increases demand for high-quality, certified essential oil solutions while slowing the pace of new products entering the market. Dairy farming and intensive livestock operations favor the use of essential oils in line with performance and sustainability goals. The European market is showing steady but cautious growth; innovation is generally centered around quality-focused and regulation-compliant products.

Middle East and Africa (MEA)

The MEA region exhibits a heterogeneous structure. While the Gulf countries and South Africa have more sophisticated feed industries and premium segments, small-scale production and cost-focused practices prevail in large parts of sub-Saharan Africa. The region's urbanization rate, commercial poultry investments, and foreign investment flows have the potential to increase demand for essential oils in the long term. However, supply chain inadequacies, low penetration, and price sensitivity may limit growth in the short term.

MARKET COMPETITION AND SUPPLIERS

The global feed essential oils market is characterized by intense competition between multinational additive producers and regional plant extract suppliers. Competition is based on the standardization of natural ingredients, proof of biological efficacy, cost-effective formulation development, and regulatory compliance. Market leaders typically stand out with broad portfolios, strong R&D infrastructure, and global distribution networks, while regional producers maintain a presence in the market through flexible production structures, access to local raw materials, and more competitive pricing strategies.

Multinational companies mostly offer essential oils as part of their phytobiotic portfolios and differentiate themselves with technology-based solutions such as encapsulation, controlled release, and synergistic blends. For these companies, competitive advantage is shaped not only by the active ingredient content of the product, but also by supporting elements such as technology that increases bioavailability, performance data proven by field trials, and regulatory compliance documents.

Regional and local producers, on the other hand, generally focus on single-plant or species-specific formulations (e.g., poultry, ruminants, aquaculture) to maintain their market share. These companies gain an advantage through low logistics costs, local market knowledge, and flexible customer relationships. However, a lack of international recognition, consistency, and certification can limit their competitive strength against global players.



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CCPA Group targets 30% emissions cut by 2030

The CCPA Group unveiled an ambitious Corporate Social Responsibility (CSR) roadmap, reinforcing its long-standing engagement in sustainable livestock production. Building on three decades of research and innovation in animal nutrition, the French company now aims to cut its greenhouse gas emissions by 30% by 2030.

Since the 1990s, CCPA has positioned itself as a pioneer in responsible animal nutrition through initiatives such as Phyto-Expertise-based feed solutions, ISO 14001 certification, and the development of low-methane nutritional strategies like Vivactiv®. The company has also been active

in collective sustainability projects, including Duralim and Valoralim.

In 2021, CCPA officially integrated CSR into its core business strategy, and in 2024, it launched a structured roadmap to accelerate progress toward environmental and social objectives. The strategy is built around four key pillars: Reducing greenhouse gas emissions, responsible sourcing, eco-designed innovation, and employee well-being.

Recent modelling work within the company suggests that nutritional optimization alone can lower the carbon footprint of animal production by up to 15%. To support this approach, Life Cycle Assessments (LCA) are now being



systematically applied across its R&D programs, with the goal of covering 80% of its product portfolio by 2030.

CCPA's roadmap also includes collaboration with suppliers through a Responsible Purchasing Charter and the integration of environmental performance metrics in innovation and production processes.

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WOAH highlights animal health as key to global biosecurity

Amid growing concern over a fragile and conflict-prone world, the World Organisation for Animal Health (WOAH) hosted a landmark global gathering to advance inclusive dialogue and the formation of transformative alliances for a more secure, healthier future.

The Global Conference on Biological Threat Reduction took place on October 28-30 2025 in Geneva, Switzerland. Bringing together experts from a variety of fields, the event offered a platform to discuss rising security risks and strategies to bridge the biological threat reduction gap.

Animal pathogens continue

to cause devastation worldwide, with the risks associated with their misuse continuing to be real and evolving. The data paint a staggering picture: With over 75% of emerging diseases and 80% of agents with bioterrorist potential being zoonotic in nature, animal health emerges as a key pillar of global health security. Other figures show that production animals account for 40% of the global agriculture value, and nearly 1 in 5 people depend on production animals for their income.

"In our increasingly connected and complex world, global health security is also a matter of



national security, which makes veterinarians the frontline of defense. Yet, protecting against biological threats requires united action across sectors: Security, human, animal and environmental health," said Dr Emmanuelle Soubeyran, Director General at WOAH.

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ADM partnership to support Africa's animal nutrition needs

Through its ADM Cares program, ADM partnered with Conservation International to support Herding for Health (H4H)—a community-driven livestock management initiative addressing the needs of Africa's vulnerable pastoralists and rangelands.

The H4H program, a partnership between Conservation International and Peace Parks Foundation, unites pastoralists, conservationists, and governments in Southern Africa to restore degraded rangelands, enhance biodiversity, and strengthen rural livelihoods. These communities live at the critical intersection of rangelands

and wildlife, where sustainable livestock grazing is essential for preserving biodiversity and the environment.

"Partnerships are a core driver of Herding for Health's success. We're excited to welcome ADM's expertise to support our field teams, farmers, and herders in meeting animal nutrition needs," said Corlé Swart, Project Manager for H4H at Conservation International. "With ADM's continued support, Herding for Health is well-positioned to deepen its impact across seven African countries; ensuring healthier rangelands for both people and livestock, and promoting market readiness for



the communities we work with."

ADM highlights that its support extends beyond funding. In August 2025, ADM's Creative Design & Development (CD&D) team provided a train-the-trainer session for on-the-ground implementation staff, sharing expertise in livestock nutrition and management to amplify the program's impact.

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IFFO reframes sustainability in aquaculture through collaboration

IFFO (The Marine Ingredients Organisation) 2025 Annual Conference concluded on October 22 in Tokyo, Japan, after three days of information sharing about market trends, technical innovation and sustainability updates. Against a backdrop of geopolitical tensions, climate uncertainty, and shifting trade dynamics, industry leaders and scientists came together to reaffirm their commitment to evidence-based decision-making.

A central theme of the conference was the critical role of industry in supporting effective fisheries management measures. The conference also addressed the growing need for realism in how aquafeed ingredients are assessed.

"As the sector evolves and objective facts are gathered, the narrative is shifting: responsible sourcing—rather than the simplistic binary of marine



versus plant origin—is a key requirement for ingredient selection. This marks a significant turning point in how sustainability is defined and measured across the value chain," said Petter M. Johannessen, IFFO's Director General.

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BioMar expands ASC Certified feed production to France

BioMar obtained ASC Feed Certification for its production facility in Nersac, France, which is a key site producing feed for all life stages, including hatchery diets. This certification marks a significant milestone in France as the first ASC Certified aquaculture feed production facility in the country and expands BioMar's ability to supply ASC-conforming feed across species and regions in the West Mediterranean and Africa Region.

The Nersac factory plays a central role in BioMar's feed production network, supplying a wide range of aquaculture feeds. With this certification, BioMar can now provide ASC-conforming feeds to customers across West Mediterranean and Africa regions, supporting ASC-certified producers from the very beginning of the farming cycle.

"We are delighted to celebrate BioMar France's ASC Feed certification. As the first ASC certified feed production facility in France, BioMar demonstrates its strong commitments to sustainability and innovation, and sets a powerful example for oth-



ers in the region to follow. This milestone marks a major step forward for responsible aquaculture in France," says Camille Civel, ASC Regional Manager Southern Europe, France & Italy.

The ASC Feed Standard sets out rigorous requirements covering environmental responsibility, social and labour rights, health and safety, and the sustainable sourcing of raw materials. Certification of the Nersac facility demonstrates BioMar's ongoing dedication to delivering feed solutions that support both performance and responsible production, the company remarks.

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Cage-free egg production gains momentum in Indonesia

Indonesia is emerging as a regional frontrunner in setting standards for cage-free egg production. The Indonesian government is developing comprehensive animal welfare regulations that explicitly support cage-free laying hen farming systems, signaling a growing shift toward more humane and sustainable farming practices.

"These regulations serve as the legal basis for animal welfare standards in Indonesia, including animal welfare certification points that can serve as a reference for farmers developing more welfare-oriented husbandry systems, including for laying hen farms," said Dr. Puguh

Wahyudi, Head of the Animal Welfare Advocacy Working Team at the Ministry of Agriculture.

Public charity Lever Foundation has been actively supporting Indonesia's cage-free momentum, guiding companies making the transition. Sandi Dwiyanto, Lever's Sustainable Poultry Program Manager, reports that over 100 Indonesian companies have already made cage-free commitments, joining 2,000+ companies worldwide that have adopted cage-free policies since 2015. Major brands like KFC, Pizza Hut, Burger King, and The Coffee Bean & Tea Leaf are advancing their cage-free tran-



sitions alongside Nestlé's 2025 deadline, while local champion Superindo pledges 100% cage-free retail availability, joined by hospitality leaders Ismaya, Bali Budha, and Jiwa Jawi.

The government recognizes that global markets are rapidly shifting toward cage-free requirements, Lever states.

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FEFAC releases Feed Sustainability Charter 2030 Progress Report

European Feed Manufacturers' Federation (FEFAC) published the 5th edition of its Feed Sustainability Charter 2030 Progress Report, marking the halfway point in the Charter's implementation timeline since its launch in 2020. The latest report outlines how the European feed industry is advancing its five key ambitions—climate neutrality, responsible sourcing, animal health and welfare, resource efficiency, and socio-economic resilience—in the face of an evolving geopolitical and regulatory landscape.

The 2025 report comes at a time when the European feed sector is operating in a rapidly evolving geopolitical and global trade and market landscape. The arrival of the new

European Commission and Parliament, alongside sweeping geopolitical developments, is prompting a recalibration of mid- to long-term strategies to address both challenges and opportunities for the industry.

This year's progress report edition has been updated with the adjustment from the previous EU Green Deal to the new EU Competitiveness Compass, as well as the new EU Vision on Agriculture and Food, published by the European Commission in January and February 2025, which places competitiveness, resilience, innovation, decarbonisation, and food security at the centre of EU objectives. The Progress Report shows how the feed industry contributes to these goals through a range of



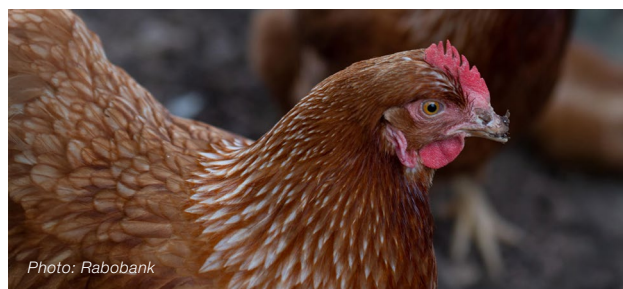
initiatives, spread out over the five Feed Sustainability Charter ambitions. Recent achievements include the endorsement of the EU Green Feed Labelling Guidelines, which establish harmonised tools for communicating the environmental performance of compound feed to livestock farmers, and the publication of the Circular Feed Platform Catalogue, calling for regulatory modernisation to unlock the use of safe, circular feed resources.

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Rabobank: Poultry market growth steady worldwide

The global poultry market outlook is expected to remain strong for the remainder of 2025 and into early 2026, according to Rabobank's Global poultry quarterly Q4 2025. "We are maintaining our growth forecast for global poultry markets at 2.5% for 2025, which is roughly in line with 2024 market growth (2.6%)," the analysts state. Poultry remains an affordable option for consumers, especially at a time when beef and eggs are expensive and pork prices have increased. Lower feed prices are currently flowing through the value chain in many markets, supporting industry profitability. Most markets in Asia, Europe, Africa, and the Americas are currently performing well.

Poultry supply growth, especially in Europe, the Middle East, Africa, and Latin America, is currently slow due to tight parent stock supply. Rabobank analysts highlight that this situation is not expect-



ed to significantly improve until at least early 2026. The fastest supply growth is currently predominantly seen in Asia. The Chinese chicken industry is currently one of the fastest-growing poultry industries worldwide, with 7% growth in 1H, benefiting from rising demand and increased restrictions on imports. Growth in Turkey (5%), the Philippines (4.5%), and Vietnam (4%) is also high. In some countries, growth has been too optimistic, leading to oversupply.

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Olmix promotes sustainable animal nutrition in Vietnam

Olmix took part in the Vietnam – France Innovation Forum held in Hanoi, on October 3, 2025. The event was organized by the National Innovation Center (NIC), the French Embassy in Vietnam, the scientific association Rencontres du Vietnam, and the International Center for Interdisciplinary Science and Education (ICISE).

This event, part of Vietnam's National Innovation Day 2025, brought together key industry and research stakeholders around the theme “Solutions for Vietnam's Future”, with a strong focus on decarbonization, smart technologies, and agricultural transition.

Among the speakers, Trinh Quang Thanh, General Manager of Olmix Asialand, shared the group's vision for smart, sustainable, and profitable agriculture in Asia.

“It is an honor to take part in this innovation workshop. Olmix represents the agri/agro sector in Vietnam. The presence of Serge Haroche, Nobel Prize in Physics, demonstrates the importance of



French innovation and encourages Vietnamese researchers to continue their efforts,” he emphasized.

During his presentation, Quang Thanh highlighted Olmix's new generation of organic trace minerals, designed to support animal nutrition while reducing environmental impact.

“Asia is a continent experiencing strong demographic and economic growth. Our organic trace mineral solutions help enhance animal performance and support our customers as they face this challenge,” he explained.

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Bezos Earth Fund supports BiomEdit's methane reduction project

In partnership with Bioversity International USA and Yale University, BiomEdit, a pioneering animal health biotechnology company, was selected as one of 15 global teams awarded funding of nearly \$2 million from the Bezos Earth Fund's AI for Climate and Nature Grand Challenge. The funding will support development of the Rumen Digital Twin, an artificial intelligence (AI) foundation model designed to identify the most effective strategies for reducing methane emissions in cattle while also optimizing animal productivity and welfare.

Together with its partners, BiomEdit highlights that it will lead

the effort to train a generative AI model on data from more than 20,000 ruminants across 25+ countries, including the Global South. The model will integrate publicly available and newly generated data, producing more than 10,000 microbiome profiles crosslinked with methane emissions, diet, host genetics and animal performance data.

The goal of the project has been revealed as to replace lengthy and expensive animal trials with AI-powered simulations that can identify the precise conditions and animal traits where specific feed additives or interventions will be most effective. These tai-



lored strategies are expected to reduce methane emissions by up to 75% compared to untargeted approaches, while maintaining or improving animal productivity.

“This project reflects the power of the microbiome and the use of AI to reduce methane and improve productivity in livestock,” said Aaron Schacht, CEO of BiomEdit.

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Nestlé and WFO join forces to strengthen dairy supply chains

Nestlé and the World Farmers' Organisation (WFO) will join efforts to help make food systems more resilient to climate change through a new, first-of-its-kind partnership. Nestlé and the WFO will advocate for fair policies and practical solutions, such as regenerative agriculture, that empower farmers and help them adapt to climate change.

Arnold Puech d'Alissac, President at the World's Farmers Organisation, commented, "Farmers are facing the challenges of climate change every day, but they are also driving the solutions. Real change demands holistic approaches and collaboration across the value chain. This partnership with Nestlé aims to lead by example, showing how farmers and industry can work together, with trust and respect, to build food systems that are fair, resilient, and sustainable for people and the planet."

The two organizations will collaborate to understand farmers' challenges, to promote awareness of regenerative agriculture, to strengthen farmers' capacities, and to co-develop viable farming models



Photo: Nestlé

that can also inspire and attract the next generation of farmers.

"Nestlé relies on 600,000 farmers globally to ensure a sustainable supply of its raw materials," said Chris Hogg, Global Head of Public Affairs at Nestlé. "Farmers, who are deeply aware of today's crop production challenges, are highly proficient at adapting and finding ways to work with the planet's natural resources to produce food. By partnering with the WFO, we want to put farmers at the center and share their insights and concerns to help inform food policies."

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BASF seeks partners for feed enzymes division

BASF is reportedly evaluating strategic options for its feed enzymes business, which is part of the company's nutrition & health division. "We are looking for partners for whom feed enzymes represent a strategic focus area to drive innovation and profitable growth," said Dr. Martin Volland, President of BASF's Nutrition & Health division.

"This attractive business brings together a highly skilled team that combines market and technical expertise with pioneering experience in feed enzymes, globally established brands, and a robust innovation pipeline – all of which

positions it for continued success."

BASF is a pioneer in the feed enzymes market and launched Natuphos® in 1991 as the world's first commercial feed enzyme (phytase). Over time, the company expanded its portfolio, which by 2021 included phytase, xylanase, glucanase and mannanase.

"Our feed enzymes business has significantly outgrown the market over the past years. We are proud of what the team has built. In our nutrition Ingredients business unit, we will continue to strengthen our core product platforms for vitamins and carotenoids as part of BASF's



Photo: BASF

key value chains. We are confident that in an alternative setup, the feed enzymes business will be able to fully unlock its potential," remarked Daniela Calleri, Head of Nutrition Ingredients at BASF. "Our priority is to ensure continuity for employees, customers and partners."

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Salmon smolts surprise scientists

In a scientific trial, researchers at Nofima studied how early-life temperatures affect the health and development of Atlantic salmon. When transferred to seawater, salmon reared at 14°C surprised the team by continuing to grow faster than fish from cooler groups.

The aim was to investigate how temperature affects the health and development of salmon throughout their lifecycle. Temperature is a master regulator in fish biology, shaping their behaviour, physiology, health, welfare, and growth. Before salmon undergo smoltification — the physiological adap-

tation for life in seawater — temperature is a highly effective tool for managing growth rates.

In recent years, concerns have grown that the temperatures used during rearing may be too high. Possible adverse outcomes include poor heart health, and it has also been claimed that fast-growing parr (juvenile salmon) may not thrive after transfer to seawater.

The Norwegian aquaculture industry demanded answers, so the scientists conducted a study to address these points. “There was a lack of long-term experiments assessing the effects of temperature



from smolt to harvest. We needed this to determine whether high temperatures early in life would impact salmon growth and health later on,” says Anja Striberny, a scientist at Nofima – the Norwegian Institute of Food, Fisheries and Aquaculture Research.

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Hendrix Genetics earns FAO recognition for sustainability

Hendrix Genetics received Technical Recognition from the Food and Agriculture Organization of the United Nations (FAO) in the category of Sustainable Livestock Transformation. The award was presented during the FAO’s 80th anniversary celebrations and the World Food Forum in Rome, held October 10-17, 2025.

The company states that the recognition highlights Hendrix Genetics’ project “Driving genetics innovation in support of the most in need: Developing resilient dual-purpose chicken breeds for rural and low-input systems in Africa”. This initiative is part of the Securing Affordability of Poultry Parent Stocks in Africa (SAPPSA) program, co-funded by Hendrix Genetics and the Gates Foundation. Since its launch in 2018, SAPPSA has enabled 31 million smallholder farmers to access resilient poultry genetics, including nearly eight million in 2025 alone.

“Receiving this recognition from the FAO is a profound moment for us,” said Richard Maatman, CEO of Hendrix Genetics. “It validates our belief



that social entrepreneurship – alongside animal welfare and climate resilience – is not just a pillar of our sustainability strategy, but a force for real-world impact.”

A key component of SAPPSA is the Recurrent Testing initiative in Burkina Faso, which evaluates poultry performance under tropical conditions. These tests are conducted in partnership with the avian selection center Coq du Faso and aim to ensure locally adapted and economically viable breeds for smallholder farmers.

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SGS and Yili partner to strengthen dairy supply chain

SGS, one of the world's leading testing, inspection and certification companies, signed a global cooperation agreement with Yili Group, one of the world's top five dairy enterprises. This partnership aims to promote full-chain mutual trust and global standardization across dairy production, safety, sustainability and innovation.

The signing took place on October 9, 2025, at Yili Modern Smart Health Valley, with Jian Wang, General Manager, Agriculture and Food, China, signing for SGS and Lyu Zhiyong, General Manager of Yili's Quality Management Department, representing Yili. Charles Ly Wa Hoi, Head of Connectivity & Products and Health & Nutrition at SGS, and Liu Dapeng, Vice President of Yili Group, attended as witnesses.

Before the ceremony, the SGS delegation toured Yili's National Dairy Technology Innovation Center, Chilechuan Ecological Smart Pasture and Yili Modern Smart Health Valley, gaining firsthand insight into how Yili integrates digitalization, low-carbon practices and intelligent systems across its value



chain – 'from a blade of grass to a glass of milk'.

During the tour, both teams discussed forage cultivation, milk supply quality, sustainable manufacturing and product innovation, strengthening SGS's understanding of China's high-quality dairy sector.

Charles Ly Wa Hoi, SGS, said, "As a globally trusted leader in quality and integrity, SGS will play a pivotal role in advancing Yili's global development strategy of 'Comprehensive Value Leadership'. We look forward to working together to build a sustainable future for healthy food."

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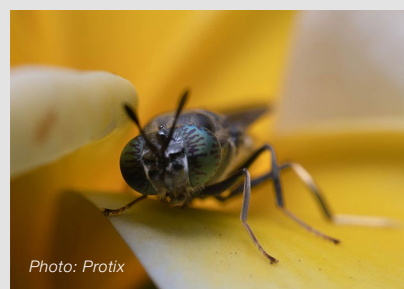
Protix insect ingredients verified for low footprint

A recent peer review published in ScienceDirect confirms Protix's Life Cycle Assessment (LCA) data, demonstrating that the company's insect ingredients have a remarkably low environmental footprint in land and water use, as well as emissions. The results are based on primary data collated directly from Protix's commercial operation, which operates 24/7 at full capacity. The figures therefore reflect real-life impact at industrial scale. The company highlights that while the data are specific to Protix's insect

ingredients, they highlight the insect industry's exciting capacity to lead sustainable change.

Protix is one of the leaders in insect ingredients for pet food, animal feed and plant care worldwide. The company describes itself as passionate about driving down the environmental impact across the feed and food system.

Piotr Postepski, Chief Commercial Officer of Protix, says: "We welcome these peer-reviewed results as independent confirmation of the capacity of our insect ingredients to significantly reduce the



environmental impact. There is still a lot of potential to lower the footprint of the black soldier fly even further, for example with government approval for the use of lower grade feedstock. This is something we continue to work tirelessly on."

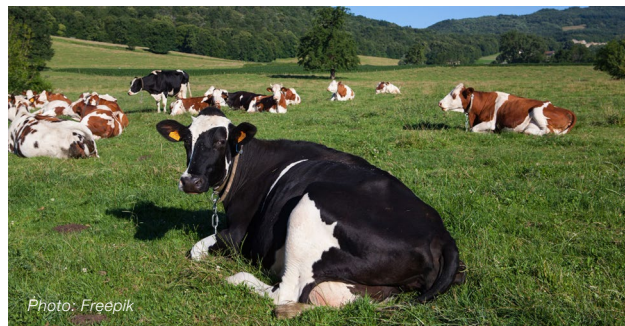
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dsm-firmenich and SFR partner for Sustell

dsm-firmenich Animal Nutrition & Health (ANH) and Schothorst Feed Research (SFR) announced a strategic partnership to drive sustainability in animal nutrition and feed production.

Through this collaboration, Schothorst Feed Research will leverage Sustell™, a platform for measuring and improving the environmental impact of farming and food production, to support its customers. Schothorst Feed Research will use Sustell™ to answer sustainability-related questions and, where relevant, integrate into Schothorst's own research trials to enable more precise environmental impact assessments and data-driven recommendations.

Hans Couwenberg, Precision Services and Sustainability Manager at dsm-firmenich, said, "We are thrilled to partner with Schothorst Feed Research and support their mission to deliver advanced sustainability insights to the feed industry. By integrating Sustell™ into their advisory and research activities, SFR will be able to help their customers navigate



the challenges of feeding the global population within planetary boundaries and identify opportunities for significant environmental improvements."

dsm-firmenich highlights Sustell™ as a software-as-a-service (SaaS) platform that delivers ISO-certified life cycle assessment using farm-level data, along with what-if analysis to plan footprint reduction. This user-friendly approach empowers stakeholders from farm-to-fork to make data-driven decisions that promote a more sustainable future for food production.

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IFEEDER highlights sustainability progress in feed and pet food

The Institute for Feed Education and Research (IFEEDER) released its 2025 annual update, summarizing its efforts to advance a sustainable animal feed and pet food supply chain through research and education. Over the past year, IFEEDER has collaborated with industry partners and stakeholders on several projects aimed at addressing the evolving needs of the animal food industry.

"Our work reflects a commitment to provide tools and knowledge that help the industry address today's challenges and prepare for tomorrow's opportunities," said Lara Moody, IFEEDER Executive Director. "We continue to grow the

number and scope of projects we can annually undertake so we may better serve the industry's needs."

Key highlights from the annual update include two major reports quantifying ingredients used in US pet food and consumed as livestock and poultry feed, including a focus on materials upcycled from other industries; advancements in life cycle assessment data through the Global Feed LCA Institute (GFLI); and on-farm research aimed at incorporating methane mitigation strategies in dairy through feed additives and ingredients. Ongoing initiatives include examining supply chain resilience for vitamins and amino acids, updating swine



nutrition requirements and continuing to expand US feed ingredient data for improved environmental impact assessments.

In addition to its research initiatives, IFEEDER points out it continues to work with the American Feed Industry Association's (AFIA) Equipment Manufacturing Committee to financially support industry education.

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MJBj expands hatchery operations in Philippines

One of the biggest and best-known companies in the Philippine poultry market, MJBj Corporation chose Royal Pas Reform's integrated hatchery solution for its new, single-stage hatchery at Lucban, Quezon, 130km south of Manila. The new facility, which is MJBj's second hatchery, will have a production capacity of one million day-old chicks per week and is due to open in January 2026.

With 24 x SmartSetPro™ 6 setters and 24 x SmartHatchPro™ hatchers, MJBj will make full use of Royal Pas Reform's single-source capabilities at Lucban. According to Royal Pas Reform's announcement, the new hatch-

ery will incorporate Adaptive Metabolic Feedback™ (AMF™), to fine-tune incubation environments to the needs of growing embryos, and Energy Saving Modules™ (ESM™) to reduce energy consumption. The hatchers will also be equipped with Smart-Watch™, which controls humidity and CO₂ levels in the hatcher to optimize the hatch window for every cycle.

The installation includes hatchery automation – for egg handing, egg candling & transfer and washing equipment. It also features climate control – with humidifiers, air handling units, a fumigation set for disinfection, an air distribution system and water chillers.



Royal Pas Reform's HVAC system is expected to provide bacterial and fungal filtration, pressure control in all hatchery production rooms, and optimized hygiene in the flow of eggs and chicks throughout the facility. Microban® hatcher baskets reportedly add a further layer of protection against contaminants.

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Zinpro opens innovation hub for animal nutrition research

Zinpro Corporation, one of the world's leading innovators and manufacturers of high-performance organic trace minerals, announced the opening of its new innovation center in Spain, a state-of-the-art facility dedicated to advancing animal nutrition through global collaboration and cutting-edge research.

The company highlights the Zinpro Innovation Center as being designed to foster cross-pollination of ideas among university partners, industry leaders and the Zinpro global team of scientists. This collaborative approach ensures that every solution is grounded in science and delivers real-world impact for customers.

"Our Spain innovation center is a direct reflection of our mission and core values," said Rob Sheffer, President and CEO of Zinpro. "We want this to be our customers' innovation center. By listening to their needs and working together, we can deliver products and services that truly make a difference. Great things happen when we partner together."



The center's primary focus is on gastrointestinal research, including intensive work on rumen digestion and the development of nutritional solutions like Zinpro® IsoFerm, which improves fiber and protein utilization in ruminants. In line with the Zinpro commitment to sustainability, the center is also developing new approaches to optimize emissions from livestock and processes in the animal nutrition industry, according to the announcement.

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JSR expands animal feed expertise

JSR Farming Group is expanding its feed and commodity expertise through the acquisition of Isuria, formerly known as Yorkshire Feedstuffs.

JSR describes Isuria, based in Hessle, East Yorkshire, UK, as a respected name in the commodities sector, bringing specialist knowledge in commodity trading, bypass protein manufacture, feedstuffs, shipping, and logistics.

The acquisition will combine JSR's strong foundation in arable farming and animal feed production with Isuria's expertise in sourcing, trading, and transporting agricultural raw materials. The two family-owned businesses

reportedly share values of reputation, integrity, innovation, and respect for their staff, clients and suppliers, making them an excellent fit.

Bernard Hoggarth, Chairman of JSR Farming Group, commented, "We've known the team at Isuria for many years and have always respected the way they do business. Their knowledge of trading, specialist feeds and logistics really complements what we're already doing at JSR. This feels like a natural fit for both sides – two family-run businesses coming together with shared values and a common goal to grow and be the industry leaders with service



and price."

All 32 Isuria employees will transfer to JSR, ensuring a smooth transition and continuity of service. JSR states that customers can expect the same trusted relationships and specialist products to continue and be further supported by the wider resources and long-term investment in developing the business by JSR.

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FAO and EU launch €20M Blue Transformation Initiative

The Food and Agriculture Organization of the United Nations (FAO) and the European Union (EU) launched an initiative to increase access to safe and nutritious aquatic foods for vulnerable populations in Africa and Latin America while strengthening local economies through innovation in aquatic value chains.

New Aquatic Food Value Chains for Sustainable Healthy Diets in Fragile Contexts (NAVAC) will run from 2025 to 2030 in Chad, Colombia, Guinea-Bissau, Mauritania and South Sudan. It will be supported through a 20 million euro contribution from the European Union and an initial \$500,000 from FAO's Technical Cooperation Programme.

"The main aim of NAVAC is to expand the supply of sustainable, affordable, safe and nutritious aquatic foods and ensure that it reaches nutritionally vulnerable populations while at the same time providing economic benefits to local communities through Blue Transformation innovations in aquat-



ic food value chains," said Godfrey Magwenzi, Deputy Director-General of FAO.

Aquatic foods represent an important source of high-quality protein and essential micronutrients to combat malnutrition, especially among at-risk groups such as children and pregnant and lactating women. They also contribute to lowering the risk of non-communicable diseases. Yet, many food security and nutrition plans overlook the potential of aquatic resources.

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University of Stirling and CAFS join forces to promote sustainable aquaculture growth

A party of scientists from the Chinese Academy of Fishery Sciences (CAFS) toured the National Aquaculture Technology and Innovation Hub (NATIH), set up to drive the UK's ambitions to become a world leader in modern aquaculture practice. The £21 million suite of research and development facilities at the University of Stirling's Institute of Aquaculture will enable a broader range of academic research and commercial trials to be undertaken, with a focus on responding to critical and emerging challenges in the aquaculture sector.

Aquaculture is one of the world's fastest growing industries, with a global growth rate of circa 8%. In China, total aquaculture production has seen consistent growth, with the country accounting for almost two thirds of global aquaculture production. However, this growth rate presents challenges for aquaculture producers in a context of climate change, disease management, and changing consumer expectations. As a scientific academy of the Chinese Ministry of Agriculture and Rural Affairs, CAFS is dedicated to promoting excellence in fisheries sciences, playing an influential strategic role in shaping China's response to this developing landscape.



Photo: University of Stirling

"China is a major player in the global aquaculture industry, and its growth trajectory is set to continue. By working collaboratively to fully utilise the combined strengths of our knowledge and facilities, we can play a critical role in ensuring that the sector is informed by the latest research and development. This will ensure that growth is sustainable and offers the best outcomes for producers, consumers and the environment," said Professor Trevor Telfer, Acting Head of the Institute of Aquaculture at the University of Stirling. "The visit from the Chinese Academy of Fishery Scientists was a valuable opportunity to explore shared areas of interest, and to highlight how the Institute of Aquaculture's new National Aquaculture Technology and Innovation Hub can help to support this thriving global marketplace."

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Onda strengthens fish health research tools

In March 2024, Onda was first to market with their Tenacibaculosis Challenge Model, providing groundbreaking research models to impact real-world outcomes. In late 2025, Onda, one of the largest aquatic containment facilities in aquaculture research, announced the launch of two new disease study models to their extensive suite of models for Tenacibaculum dicentrarchi and Tenacibaculum finnmarensis. These additions reportedly compliment Onda's challenge model offerings,

providing reliable, science-driven tools to address Tenacibaculosis, one of the most pressing bacterial challenges in global aquaculture.

Navigating fish health challenges in aquaculture is complex, with pathogens like Tenacibaculum presenting some of the toughest hurdles. Unlike single-strain disease, Tenacibaculum encompasses multiple species that impact different regions and host fish in unique ways, making prevention and treatment especially difficult. The bacteria's ability to cause se-



Photo: Onda

vere lesions, reduce welfare, and drive significant mortality underscores the need for reliable study models and innovative health solutions to protect both fish stocks and industry sustainability.

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Nutrient interactions drive salmon health and growth

It has now been documented that the interplay between nutrients in feed is crucial for salmon to achieve optimal growth, robust health, and high fillet quality. When it comes to how it works, scientists particularly point to two synergies: Between the mineral zinc and the omega-3 fatty acids EPA and DHA, and between the lipid cholesterol and saturated fat.

Saturated fat and cholesterol, which are often associated with adverse health effects in humans, are important for salmon.

Over the past decades, fish oil has been gradually replaced with vegetable oil in feed, and during this time, the salmon's requirement for saturated fat has not received sufficient attention, explains Nofima scientist Nini Sissener.

“Saturated fat has a greater impact on fillet quality than previously thought. Fishmeal and fish oil possess a unique composition of omega-3, saturated fats, and cholesterol. It is therefore important to assess what these changes mean for the quality of salmon raised



Photo: Terje Aamodt, Nofima

on today's plant-dominated feed,” says Sissener.

Sissener carried out this study while employed at the Institute of Marine Research.

The research revealed that frozen salmon fillets lost more liquid during thawing when sourced from fish that had received insufficient saturated fat during the growth phase. Additionally, low cholesterol level in the feed reduced the fillet's firmness and red coloration.

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FAO confirms Antarctic krill fishery sustainability

The Review of the State of World Marine Fishery Resources 2025, the most comprehensive global assessment of marine fish stocks to date, was released by the Food and Agriculture Organization of the United Nations (FAO). The report finds that all assessed Antarctic fisheries, including the krill fishery, are sustainably managed under robust, science-based international regulation.

The report – produced with contributions from more than 650 experts across 200 institutions and over 90 countries – highlights the critical role of science-based management and international cooperation in achieving sustainable fisheries worldwide.

“This confirmation from FAO reinforces what science has shown for years – that the Antarctic krill fishery is among the most strictly regulated and sustainably managed fisheries in the world,” said Matts Johansen, CEO of Aker BioMarine. “Sustainability has been a fundamental part of our company since before our first vessel entered the Southern Ocean. We built our entire operation on transparency, science, and long-term stewardship.”

FAO highlights that the krill fishery in the Antarctic operates under one of the world's most precautionary management systems. Catch limits established by the Commission for the Conservation of Antarctic Marine Living Resources

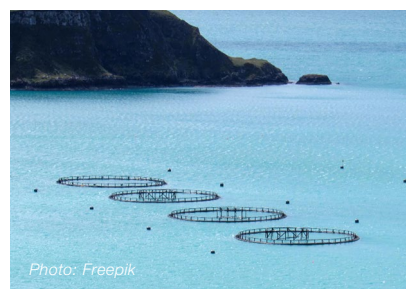


Photo: Freepik

(CCAMLR) are set at a small fraction of the estimated biomass, ensuring that the ecosystem remains healthy and resilient.

Released in 2025, the FAO's findings take on new relevance as CCAMLR members meet in Hobart, Australia in October to discuss the establishment of new Marine Protected Areas (MPAs) in the Southern Ocean.

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Hygiena awarded for pathogen detection kit

One of the global leaders in food safety and provider of One Health Diagnostics® solutions, Hygiena®'s foodproof® Salmonella plus Cronobacter Detection LyoKit received two industry innovation awards at the International Dairy Federation's World Dairy Summit 2025, held October 20-23 in Chile. The awards that Hygiena® won were the 2025 International Dairy Federation (IDF) Innovation Award and the Food Tech Summit Food Innovation Award. The company states that these recognitions underscore its role at the forefront of advancing One Health Diagnostics® and public health while delivering unparalleled efficiency and regulatory compliance.

Hygiena highlights the foodproof Salmonella plus Cronobacter Detection LyoKit as the first and only ISO-validated multiplex Real-time PCR method (ISO 16140-2) for detecting these two critical pathogens that pose serious health risks to infants. This validation ensures high accuracy across a range of matrices, including powdered infant formula (both with and without probiotics), related produc-



Photo: Hygiena

tion ingredients and environmental samples from manufacturing facilities.

Historically, laboratories conducted individual food safety tests for each pathogen, leading to increased costs and delayed results. Hygiena states that its foodproof Salmonella plus Cronobacter Detection LyoKit solves this inefficiency by enabling the detection of both pathogens in a single test, with results in less than 20 hours. This innovation streamlines workflows and accelerates the time to results for infant formula producers and ingredient suppliers, simplifying environmental monitoring programs.

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Alltech achieves dual ASC Feed Standard milestone

Alltech Coppens in Nettetal, Germany, and Alltech Fennoaqua in Raisio, Finland, became the first feed mills in their respective countries to achieve certification under the Aquaculture Stewardship Council (ASC) Feed Standard. This dual milestone is highlighted as marking a major step toward greater transparency and sustainability in the European aquaculture sector, as feed is one of the most powerful levers for reducing the environmental and social impacts of fish farming.

“Congratulations to both Alltech Coppens and Alltech Fen-

noaqua for achieving ASC Feed Certification,” said Aisla Jones, Feed Engagement and U.K. Market Manager at ASC. “This demonstrates a commitment to transparency, accountability and continuous improvement. By embedding responsibility at the very start of the aquaculture supply chain, they are helping drive the change our industry needs.”

The ASC Feed Standard is the first of its kind to set binding global requirements for all feed ingredients — from fishmeal and fish oil to plant-based ingredients such as soy, palm oil and wheat.



Photo: Alltech

To achieve certification, companies must demonstrate that these ingredients are sourced from responsibly managed fisheries or sustainable agricultural sources.

Both feed mills provided extensive evidence as part of the certification process.

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