Issue Focus:
Production Performance & Feed Costs

Market Report
Feed Preservatives and Global Market Status

Thierry Aubert, Cargill
Feed costs, production performance, and power of phytogenics

Patrick Gloudemans, Fancom
Reduce feed costs with farm automation

Laura Nobel, GFLI
Sustainability in animal feed production
As we enter the complex world of animal production, the interaction between productivity and animal nutrition becomes ever more important. Feed is a critical factor that significantly impacts animal health and performance, as well as farm profitability. Supplying agricultural raw materials that make up feed is becoming extremely difficult with climate change, while their costs are rising significantly. When the safety and hygiene issues faced by these raw materials are added to the supply challenges, the issue of profitability for farmers becomes an even more complex equation.

This complexity limits farmers’ ability to provide their animals with a healthy and balanced ration, and can sometimes lead them to switch to less nutritious, lower quality alternatives or to use less feed per animal. In both cases, the overall health and performance of the animals is negatively affected, putting the profitability and sustainability of the farm at risk.

This situation causes farmers and other stakeholders across the animal nutrition sector to re-evaluate their strategies to manage costs and optimize animal performance and feed utilization.

Today, experts recommend several ways to manage feed costs without sacrificing animal performance. The first is the diversification of feed raw materials. Switching to different raw materials can help reduce costs. For instance, using locally available and cheaper resources. With the right feed additives, these ingredients can make up nutritious, healthy and more cost-effective feed for animals.

Optimizing feed use and precise nutrition is another important recommendation. Farmers can both monitor their animals’ feed consumption to avoid unnecessary waste and adjust the ration according to the age, gender and production stage of their animals, ensuring that each animal is fed according to its own needs.

Particular attention can also be paid to the quality of the feed when monitoring. This is because it is known that low-quality feed ingredients can often be cheaper. However, these cheaper ingredients can negatively affect the health and productivity of animals. Therefore, monitoring feed quality and finding an appropriate balance is another important recommendation.

In this month’s issue, experts from the animal nutrition industry discuss many other strategies on how to optimize animal performance, feed quality and feed costs to maintain farm profitability in today’s challenging conditions.

Enjoy your reading!
Hope to meet you in the next issue…
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The Canadian feed industry has faced an unprecedented number of challenges over the past five years. Through their dedication to feeding livestock, industry members rose to and overcame each one with strength and resiliency. Supporting our industry’s continued adaptability as we approach the rapidly evolving landscape of the future is an area of great focus for the Animal Nutrition Association of Canada (ANAC), the national trade association of the Canadian livestock feed industry.

With this in mind, ANAC refreshed its strategic plan earlier this year. The new plan highlights key areas that ANAC will tackle over the next five years to safeguard the success of the feed and livestock industries in Canada. These areas include:

• Ensuring we have a regulatory system that supports innovation
• Developing tools to support industry resiliency in times of crisis
• Fostering an environment that continues to raise the bar for feed safety
• Nurturing environmental sustainability initiatives

PROMOTING INNOVATION WITHIN CANADA’S REGULATORY SYSTEM
Since 2011, ANAC has been working with government and stakeholders throughout the feed value chain to modernize the primary regulations that govern the Canadian feed industry. Seeking to modernize the Feeds Regulations, our collective efforts over the past 13-some years have aimed to align legislation with the realities of modern-day animal nutrition and industry practice.

With work on updating the regulations now nearing the finish line, our industry is eagerly anticipating the upcoming changes. The updated regulatory system will allow more efficient access to new and innovative ingredients and support quicker changes to regulatory requirements when new scientific advancements are made.

What’s more, these changes represent a shift in focus towards identification and control of feed and food safety risks, enabling industry and government oversight efforts to hone in on the key priorities for feed and food systems. This contrasts with mandating nutrient content standards for feeds, which is an antiquated focal point of the current regulations.

While work was underway on the new regulations, progress continued in other important areas of policy. One of the most significant successes was the approval of select gut modifying ingredients as feeds. This change has been instrumental in bringing new and innovative products to the marketplace to support producers in reducing the use of antimicrobials and improving the environmental sustainability of animal food products.

Looking ahead, we are optimistic that continued collaboration with our regulators will further reduce unnecessary regulatory burden and support a healthy business environment for all players within the Canadian feed space.

FOSTERING RESILIENCY IN TIMES OF CRISIS
From floods, fires and droughts to railway strikes,
labour shortages and Covid-19, the Canadian feed industry has faced considerable challenges in recent years. Through this turmoil, the industry became stronger through the development of new contingency plans and vital collaborations.

Despite the successes, these experiences revealed the fragility of our supply chain. A more robust supply chain will be crucial in ensuring that our industry can continue to adequately feed Canadian livestock, as well as supply our international customers, even in times of crisis. Over the coming years, ANAC will be partnering with like minded organizations to support initiatives that strengthen our labour force and ensure the feed industry is recognized as an essential service during crises.

RAISING THE FEED SAFETY BAR

The Canadian feed industry has been a longstanding global leader in feed safety. Being the first to develop a feed safety program in North America and one of the first in the world, our industry puts in the work to make Canadian feed products some of the safest and highest quality available on the global market.

Our commitment to feed safety was reaffirmed when we launched the updated version of FeedAssure®, our feed safety program, with more rigorous standards. The updates address emerging threats to feed safety such as feed defense and feed fraud, as well as expand on foundational elements like biosecurity, supplier approval and crisis management.

With emerging diseases such as Porcine Epidemic Diarrhea virus (PEDv) and Highly Pathogenic Avian Influenza (HPAI) threatening domestic livestock and the fear of foreign animal disease such as African Swine Fever (ASF) entering Canada, it is critical that feed mills take precautionary steps to keep feeds safe and disease-free. Through voluntary participation in the FeedAssure® program, Canadian feed and ingredient suppliers are taking the necessary steps to deliver the safest feed possible to livestock producers.

ANAC is committed to continuous improvement through regular reviews of the program, supporting implementation of up-to-date feed safety best practices and proactively addressing new threats to the food value chain.

PARTNERING FOR A SUSTAINABLE FUTURE

Environmental, social and economic sustainability is top of mind for players throughout the animal protein value chain. Environmental impacts from animal protein products are increasingly highlighted by consumers and governments globally as an opportunity for improvement within our sector. While great strides have already been made, the Canadian feed industry is motivated to continue progress in this space and do our part to preserve the social license of high-quality animal proteins for human consumption.

To achieve this goal, working in partnership with our protein producing colleagues is imperative. Through nutritional innovations, we can offer producers new tools to reduce the environmental footprint of their products. Our lobbying efforts over the past year have been successful in shaping a regulatory environment that allows us to bring these innovations to the Canadian market. In January 2024, we saw the first feed additive reducing methane emissions in cattle approved in Canada. This groundbreaking approval was the result of collaboration between industry and government.

To reliably track our progress on sustainability outcomes over time, we must begin with a clear understanding of our performance today. To this end, ANAC joined a coalition of private-public partners representing the entire food value chain from production to retail with the collective goal of credibly measuring and presenting an integrated picture of sustainability for Canada’s agri-food sector. With the solid benchmark generated through this initiative, Canada is well positioned to measure our improvements going forward.

We look forward to continuing to build synergistic relationships and supporting livestock producers in a challenging but exciting world. As the Executive Director of ANAC, I am honoured to be able to help play a small part in our members’ success in helping feed the world.
DUAL BENEFIT OF EMULSIFIERS: PERFORMANCE ENHANCER & COST SAVER
Aurélie Montagnon, Orffa Additives BV

THE DAIRY DILEMMA: FEED COSTS, PRODUCTION PERFORMANCE, AND THE POWER OF PHYTOGENICS
Thierry Aubert, Cargill Animal Nutrition

NEW XYLANASE UNVEILS UNTAPPED POSSIBILITIES FOR BROILER FEED
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ENHANCING CALF HEALTH AND PERFORMANCE THROUGH EPIGENETICS AND METHYLATION
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FEED SANITATION: A LINE OF SEPARATION TO EFFICIENT LAYER PRODUCTION
Jose Ramirez, Anitox

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COST-EFFECTIVE VITAMIN E REPLACEMENT BY A PROVEN HIGHLY BIO-AVAILABLE NATURAL ANTIOXIDANT
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STABILITY OF TRACE MINERALS: DOES THE SOURCE MATTER?
Dr. Yron Joseph Y. Manaig & Marion Taris, Animine

ROLE OF ALTERNATIVE FEED INGREDIENTS AND FEED ADDITIVES IN MANAGING FEED COSTS
Célia Gomes da Silva & Pauline Pourtau Tilly, ADM
dsm-firmenich explains approval of feed protease ProAct 360 in EU

dsm-firmenich, one of the leading innovators in health, nutrition, and beauty, and its alliance partner Novonesis announced the EU regulatory approval of the innovative feed protease ProAct 360™ for use in all fattening poultry and in chickens reared for laying and breeding.

To remain profitable in today’s highly competitive environment, European poultry producers must contend with many factors, including fluctuating ingredient prices, genetic evolution, intestinal health considerations, welfare requirements, and sustainability demands. The effective management of protein uptake is key to successfully navigating these challenges.

According to dsm-firmenich, as the only second-generation protease developed specifically for the feed industry, ProAct 360™ represents new enzyme technology that benefits the poultry industry in terms of feed efficiency, affordability and sustainability. The company points out that ProAct 360™ breaks down protein faster across a broad range of feed ingredients, delivers greater digestibility of all amino acids and better degrades anti-nutritional factors—leading to improved consistency of response and higher return on investment.

Adam Smith, Feed Optimization Marketing & Business Development Manager at dsm-firmenich Animal Nutrition & Health comments: “The issue of EU regulatory approval for ProAct 360™ promises significant benefits for poultry farmers in this region and underlines the dsm-firmenich | Novonesis alliance’s commitment to providing value-adding, sustainable solutions for the global feed and animal protein industry.”

According to the company’s statement, by improving the efficiency of protein absorption in the small intestine, ProAct 360™ also permits the formulation of lower-protein diets with a reduced proportion of soybean meal. This substantially reduces the environmental impact of poultry production while at the same time contributing to improved intestinal health and animal welfare.

Protix unveils new LCA results for BSF

Protix, one of the global leaders in insect ingredients for feed and food, unveiled the results of a new Life Cycle Assessment (LCA) conducted by the German Institute of Food Technologies (Deutsches Institut für Lebensmitteltechnik, DIL e.V.). The figures follow on from numbers published in an earlier assessment conducted in 2022, and demonstrate that Protix’s black soldier fly ingredients have positive effects in terms of environmental footprint.

Driven by its mission to help feed the growing global world population while taking good care of our planet, Protix works to further reduce the footprint of its ingredients for pet food, animal feed and fertilisers. The improved results are driven by continuous improvement across operations, genetics and nutritional science, the company states.

Kees Aarts, CEO of Protix, comments: “We take pride in leading innovations within our industry on a pathway to low-footprint-no-footprint proteins.
With our previous LCA, we shared the vision that the environmental footprint of our black soldier fly ingredients could be reduced and we have lived up to that promise: the latest DIL figures once again demonstrate an improvement in the footprint of our Protix ingredients. We look forward to translating these LCA numbers into new commercial opportunities to help our customers produce better and greener.

**LCA Results:**
- ProteinX® insect meal reduces CO₂ emissions by 78% compared with poultry meal (ProteinX: 0.832 kg CO₂ eq; poultry meal: 3.8 kg CO₂ eq). Poultry meal is often used in pet food and livestock feed. Compared to soy protein concentrate, an ingredient often used in aquaculture, ProteinX lowers CO₂ emissions by as much as 89% (ProteinX: 0.832 kg CO₂ eq; soy protein concentrate: 7.5 kg CO₂ eq).
- LipidX® insect fat dramatically reduces land use, using 99.9% less than coconut oil (LipidX: 0.0102 m² land use and coconut oil: 12.98 m² land use). Coconut oil is commonly used as a fat source in livestock and aquaculture feed as well as in pet food.
- PureeX® insect meat uses a staggering 99.8% less water than poultry meat (PureeX at 0.098 m³ and poultry meat at 61.13 kg m³). Poultry meat is commonly used in pet food as a high moisture protein source.
- Protix’s insect frass shows only 0.01 kg CO₂ eq. per kilogram of product.
- Larvae, used as feed for livestock, show 0.198 kg CO₂ eq. per kilogram of product.

Read more>

**New study: Yeast cell wall extract improves layer performance**

A new study highlights the significant positive effects of yeast cell wall extract supplementation on layer performance during mycotoxin challenges, Alltech announced.

Published in March 2024 in the journal Toxins, “Meta-Analysis of the Effects of Yeast Cell Wall Extract Supplementation during Mycotoxin Challenges on the Performance of Laying Hens” demonstrated that the inclusion of yeast cell wall extract (YCWE, Mycosorb®, Alltech, Inc., KY) supplementation during mycotoxin challenges results in an increase in layers’ body weight by 12.5 grams (g), and a substantial increase in egg production and egg weight by 4.2 percentage points and 1.37 g, respectively. The meta-analysis showed that layers fed mycotoxins experienced lower body weight (by 50g), decreased egg production (by 6.3 percentage points), and reduced egg weight (by 1.95g) compared to control-fed birds. Economic analysis suggested that the inclusion of YCWE not only supported performance but could also result in a positive return on investment. Based on results from the meta-analysis, production and profitability calculations were made, resulting in:

- +2.7 eggs per hens housed (HH) over 9.5 weeks
- +29.7g edible protein output per HH
- 4.65:1 ROI

“To the researchers’ knowledge, this is the first time a meta-analysis study has been conducted with laying hens which evaluates the influence of not only mycotoxins alone but also the use of a mycotoxin mitigation strategy on key performance parameters,” said Dr. Alexandra Weaver, global technical support for the Alltech Technology Group team.

Read more>>
ADM shares LCA results of its plant extract-based feed additive

ADM performed a comprehensive Life Cycle Assessment (LCA) for XTRACT 6930, a plant extract-based feed additive for monogastric animals. LCA is a method to evaluate and quantify the potential environmental impacts throughout the supply chain of a product or service. Notably, ADM compiled LCA results of XTRACT 6930 use on broiler operations within four global regions: Asia, Latin America, Europe and North America.

According to the company’s statement, these results suggest that XTRACT 6930 is a useful tool to mitigate the environmental footprint of the broiler meat sector. Use of ADM’s feed additive has demonstrated a reduction by at least 1.9% of the carbon footprint of live broilers, and at least 2.8% reduced carbon footprint of broiler meat production*. In other words, 1 kg CO\textsubscript{2} eq. spent using XTRACT results in savings of 75 kg CO\textsubscript{2} eq. in live broiler farming and a savings of 100 kg CO\textsubscript{2} eq. in broiler meat processing*. Additionally, XTRACT 6930 has shown a negligible influence on the environmental footprint of broiler feed.

“ADM is proud to be first in the animal nutrition sector to present such robust and reliable LCA data in the plant extract-based feed additives category, externally verified for use on four continents,” said Pierre-Joseph Paoli, President of Growth and Marketing for ADM’s animal nutrition business. “With rising demand to mitigate the environmental impact of our industry, LCA is a necessary step to understand how a single feed solution can have a measurable impact along the entire value chain.”

Intraco and trinamiX collaborate for mobile feed analysis

Intraco Ltd, a leading exporter of premixes and concentrates from Belgium and part of Group DC, and trinamiX GmbH, one of the leading providers of mobile spectroscopy solutions and subsidiary of BASF, announced their collaboration for mobile feed analysis. The aim of this partnership is to give Intraco and its distribution partners the opportunity to analyse the nutrient composition of feed with trinamiX Mobile NIR Spectroscopy Solution - a robust, handheld spectrometer, which comes together with a mobile app and customer portal. This solution enables the feed advisors of Intraco’s distributors to assess raw materials and final feed in real time and advise local farmers to ensure that livestock is fed nutritionally balanced and cost-effectively.

Having a comprehensive understanding of the nutrient content in animal feed is essential for ensuring the quality of animal diets. This is particularly crucial due to the varying nutritional needs of livestock at different stages of life and health conditions. Moreover, as raw materials change, it becomes necessary to regularly modify the diet. Traditionally, feed advisors and farmers had to depend on standard nutritional values or undergo time-consuming laboratory analyses. However, according to trinamiX, with its mobile NIR spectrometer, a wide range of finished feeds, cereals, oilseed and expeller meals, extraction meals and byproducts, as well as forage, can be analysed within seconds.

* Read more>>
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Victam International to be held in 2026 in co-location with VIV Europe

Victam International, one of the foremost gatherings for professionals in the animal feed and grain processing industries, announced the rescheduled dates for its highly anticipated 2026 edition. The event will take place from the 2nd to the 4th of June 2026 at the Jaarbeurs Utrecht in the Netherlands.

Originally slated for 2025, the decision to move Victam International to 2026 was made to align with VIV Europe, another leading event in the industry. By co-locating with VIV Europe, Victam International aims to foster synergy between the two events, creating a seamless experience for attendees and exhibitors alike. This strategic choice underscores our commitment to maximizing value and facilitating meaningful connections within the industry.

The event organizer states: "As the flagship event of our portfolio, Victam International is renowned for its unwavering focus on innovation and excellence. During the event the 4 yearly prestigious innovation awards for Feed Technology and Flour Milling Technology will be handed out. The 2026 edition holds particular significance as we celebrate the event’s 60th anniversary. This special milestone underscores our dedication to advancing the industry and driving progress for the next six decades and beyond."

"Victam International 2026 will feature new halls, allowing for an enhanced exhibition space and a fresh allocation of stands and interactive areas what reflects our ongoing efforts to accommodate the growing demand and evolving needs of our exhibitors and attendees," adds the organizer.

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Phileo by Lesaffre introduces Program Aquasaf Shrimp

Phileo by Lesaffre announced the release of Program Aquasaf Shrimp, a comprehensive program providing practical guidance on the use of fermentation solutions for shrimp producers. The program builds on a decade of research and development on yeast and bacteria, probiotics and postbiotics. It also highlights case studies conducted with numerous institutes and commercial partners around the globe.

Comprising of three key pillars, Program Aquasaf Shrimp provides knowledge and applied solutions to some of the most important challenges associated with intensive shrimp farming. These challenges include mortalities caused by Early Mortality Syndrome (EMS) or White Spot Disease (WSD), inconsistent growth and feed performances resulting from chronic oxidative stress and gut dysbiosis, as well as the dependency on marine ingredients and antimicrobial substances.

“We’re beyond excited to introduce Program Aquasaf Shrimp,” said Dr. Jean-Benoit Darodes de Tailly, Global Program Manager for Aquaculture at Phileo by Lesaffre. “Our program represents a complete shift in the way we approach the problem, aimed at providing a transparent view of the mechanisms of action of our solutions and their benefits across various aspects of health, nutrition, and in different farming situations. It is a tool that supports and empowers professionals with knowledge, assisting them in the decision-making process when developing preventive care strategies”.

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First-of-its-kind microbial protein-containing dog treat launched

German biotech startup MicroHarvest teamed up with animal-free pet food producer VEGDOG to unveil first-of-its-kind microbial protein dog treat. The novel treat was presented to the pet food industry on May 6th at the 2024 Pet Food Forum taking place in Nuremberg (Germany) during Interzoo Europe.

The innovative VEGDOG Pure Bites snack, which is a first for the dog food market in Europe, combines the new microbial protein from MicroHarvest with tasty potato and apple pomace. The companies state that thanks to its hypoallergenic properties, it is particularly suitable for dogs that cannot tolerate conventional protein sources. The high tolerance and digestibility as well as the delicious taste make it the first choice for dogs with severe intolerances and allergies. This also makes VEGDOG Pure Bites interesting for use in veterinary practice, according to MicroHarvest and VEGDOG.

MicroHarvest emphasizes that its microbial ingredient footprint, at 1.4 kg CO₂ equivalent per kilogram of product, offers a sustainability edge equal to insect proteins and significantly surpassing that of plant-derived proteins.

Pet food has been a focus application market from the onset for MicroHarvest. It recently partnered with a Wageningen University master's program to conduct the first acceptance study for microbial protein amongst dog owners in the UK and Germany, countries that represent two of the largest premium dog food and treats markets in Europe.

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Adisseo unveils its 2023 Sustainable Development Report

Explaining that sustainability is embedded into its vision of feeding the planet in a high quality, affordable, safe, and sustainable way, Adisseo announced its 2023 Sustainable Development Report.

In its statement, the company expresses that it positioned sustainable development at the heart of its strategy, focusing its teams and resources to develop products, services and promoting the adoption of sustainable practices across the entire animal nutrition supply chain.

Pointing out that it is committed to aligning its environmental footprint objectives to the COP 21 Paris Agreement ones, Adisseo announced that it focuses on the following as a contribution towards the United Nations (UN) Sustainable Development Goals (SDGs):

- **Zero hunger:** Achieving food security, improve nutrition and promote sustainable agriculture,
- **Decent work and economic growth:** Protecting labor rights and guaranteeing fair treatment and motivating working environments for all employees,
- **Responsible consumption and production:** Supporting the reduction of the environmental footprint of our value chain,
- **Climate action:** Contributing to reduce the Green House Gas (GHG) emissions in our production process.

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Deltavit offers innovative solutions for poultry mites with Acari

Red mites are ubiquitous parasites in poultry farming, with serious consequences for hen comfort and farm profitability. It is estimated that 83% of poultry farms are infested in Europe, with an estimated cost of €360 million for the poultry industry.

Deltavit, one of the firms that specialise in animal nutrition and health, announced its Acari® program, a new tool that support natural solutions for best effectiveness in the management of poultry mites. The company states that its Acari® range is evolving to offer an even more innovative and cost-effective approach to managing mite problems in poultry farming.

The launch of Acari® tool, a new digital tool for farm monitoring, adds a new dimension to the Acari® program. This tool provides each farmer with the information they need to adjust the use of the program’s products to suit the specific situation of their farm. According to the company, these products are real levers for controlling the poultry red mites population:

- A nutritional product based on plants and aromatic substances (Acariflash™) to act at hen level,
- And a product for the farm environment (Acaritec) to act at building level.

"The impact of mites on hen behaviour and laying performance is linked to the level of infestation," highlighted Guillaume Piquet, Deltavit Product Manager. "It deals with guiding the farmer towards the most rational use of products in economic terms, with no rest for the poultry red mites".

Deltavit notes that this approach has proved its effectiveness in various contexts, particularly in terms of egg-laying performance (laying rate, rate of downgraded eggs).

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SUSTAINABILITY,
The Adisseo Way
New study: Krill meal diet positively impacts reproduction in Nile tilapia

A recently published study conducted by LABOMAR (the Marine Sciences Institute in NE Brazil), Spring Genetics Tilapia in Miami, and Aker BioMarine Antarctic AS concluded that krill meal in the diet positively impacted reproductive performance of Nile tilapia and the quality and quantity of offspring.

Krill meal has emerged as a nutrient-rich and sustainable marine ingredient for aquaculture feeds – a source of phospholipids, high quality marine protein, high levels of omega-3 fatty acids: EPA and DHA, and astaxanthin, all of which are known to be beneficial for the growth and health of fish.

Tilapia is the second most farmed fish in aquaculture, and producers are seeking high quality offspring to improve their overall production. In the present study, scientists specifically assessed how varying levels of krill meal in the Nile tilapia diet influenced factors such as spawning, egg quantity and quality, and survival of larvae.

Innovafeed opens its Insect Innovation Center in US

Innovafeed, a global leader in the production of insect ingredients for high-quality animal feed, pet food and plant nutrition, inaugurated its North American Insect Innovation Center (NAIIC) in Decatur, Illinois on the 18th of April. This pilot plant is the first step of the rising French agtech’s industrial expansion to North America and aims to scale up production and commercialization of insect protein in the USA.

Innovafeed breeds Hermetia illucens, also known as black soldier flies, in state-of-the-art indoor farms, while efficiently repurposing agricultural by-products from its strategic partner, ADM, in a pioneering zero-waste framework. This innovative process yields insect meal, oil, and soil amendment, which Innovafeed markets under the brand Hilucia™.

According to ADM, the inauguration of NAIIC will be a milestone in Innovafeed’s expansion in North America. The choice of Decatur, Illinois, is not coincidental: located in the heart of the corn belt adjacent to ADM’s North American headquarters and the world’s largest corn mill operations, the region offers high potential for multiple sites to be deployed in the future. The broader area is also a historical innovation hub for the agro-industry, making it a strategic location for Innovafeed to serve its core markets. Since 2023, the company in partnership with ADM, already has commercialized Hilucia™ insect ingredients for the pet food market in North America. As part of this effort, ADM has invested in a comprehensive R&D study at the University of Illinois at Urbana-Champaign, with results to be released later this year demonstrating the nutritional and health benefits of its ingredients. Future opportunities with other types of animal feed are also being explored as part of the comprehensive partnership between the two companies.

“We are thrilled to partner with
Innovafeed on this exciting project that highlights our commitment to responsible and sustainable sourcing. Our collaboration is a great example of how we are constantly seeking innovative solutions to meet the growing demand for alternative protein sources in animal and pet products. By expanding our value chain and offering collaboration opportunities to leading, innovative partners, we are positioning ADM as the provider of choice for responsible, sustainable materials across the food, beverage, feed, fuel, consumer product and industrial spaces. We are proud to be a part of this job-creating project and look forward to the positive impact it will have on our communities,” says Chris Cuddy, ADM Senior Vice President and President of the company’s Carbohydrate Solutions business. Read more>>

Cargill and Nestlé Purina partner on petfood carbon footprint

Nestlé Purina will invest in farmer adoption of regenerative agriculture practices across the company’s corn and soy supply chains through a new partnership with Cargill, one of the largest ingredient and agricultural solutions companies in the U.S. This work will support soil health and reduce the carbon footprint for Purina dry pet food products across North America, contributing to a more sustainable future for people and their pets.

The partnership is expected to support the adoption of regenerative agriculture practices across more than 200,000 acres of corn and soy farmland in the Midwest and is estimated to reduce the carbon footprint of the Purina grain supply from Cargill by up to 40 percent over the next three years.

“Our vision is to make regenerative agriculture commonplace across the industry,” said Stewart Derechin, Vice President, Global Partner Leader, Cargill. “Through partnerships with customers like Nestlé Purina, we are helping farmers produce food more sustainably while also increasing the productivity and resilience of their farms. We’re working to scale these practices to more than 10 million acres of North American farmland by 2030 to reduce the carbon footprint of the U.S. agriculture and food supply chain and build a more resilient food system.”

This partnership is one way Nestlé Purina is making progress toward its global ambition to reduce carbon emissions and help advance regenerative food systems across its supply chain. Purina is investing to support farmers across several states in the Midwest as they transition to regenerative agriculture practices such as cover cropping, no/low tillage, crop rotation, nutrient management and soil erosion control. Read more>>
Kemin celebrates 20 years of its probiotic product CLOSTAT

Kemin Industries, one of the global ingredient manufacturers that strive to sustainably transform the quality of life every day, and has been for 80 percent of the world with its products and services, celebrates two decades of CLOSTAT™, its flagship probiotic product for managing intestinal health in poultry and livestock. To commemorate the milestone, the Kemin Animal Nutrition and Health – Asia Pacific business unit hosted an anniversary dinner on Tuesday, April 16, in Manila, Philippines. The event coincided with the 8th International Conference on Poultry Intestinal Health (ICPIH), also held in the country’s capital city, on April 17–19.

"We are extremely proud of the impact of CLOSTAT over the past 20 years," said Dr. Chris Nelson, President and CEO, Kemin Industries. "Our flagship probiotic-support ingredient is a testament to Kemin’s commitment to innovation and quality and our vision to improve the quality of life. We are pleased to celebrate this achievement with our valued customers, partners, and friends at ICPIH, and we look forward to continuing to provide the best solutions for poultry intestinal health."

Kemin states that its probiotic solution has pioneered the promotion of healthy microbiome to drive intestinal resilience, manage gut health challenges, and improve animal productivity. CLOSTAT offers a practical and comprehensive solution that supports the development of a balanced gut microbiota, enhances immune function, and reduces antibiotic use—all while safeguarding animal health, welfare, growth, and performance.

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Zoetis to sell MFA portfolio to Phibro Animal Health

Zoetis Inc. and Phibro Animal Health Corporation entered into a definitive agreement where Phibro Animal Health will acquire Zoetis’ medicated feed additive (MFA) product portfolio, certain water-soluble products and related assets for $350 million, subject to customary closing adjustments. This transaction is expected to be complete in the second half of calendar year 2024.

Both Zoetis and Phibro Animal Health have a longstanding commitment to the production animal health sector. The acquired product portfolio, which generated approximately $400 million in revenue in 2023, is comprised of more than 37 product lines that are sold in approximately 80 countries. Also included in the agreement are six manufacturing sites, four in the U.S., one in Italy and one in China. More than 300 Zoetis colleagues who support manufacturing, distribution and commercial activities are expected to transition to Phibro Animal Health.

This transaction demonstrates Zoetis’s disciplined capital allocation strategy to focus its investments on solutions for animal health, productivity and sustainability. With this divestiture, Zoetis plans to be able to focus its livestock investments in other solutions, including vaccine, biologic and genetic programs.

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Nutreco Nigeria opens new fish and poultry feed plant

Nutreco, a global leader in animal nutrition and aquaculture, announced that it officially opened a state-of-the-art fish and poultry feed production facility in Ibadan, Oyo State, Nigeria on April 17, through its operating company trading under the names Skretting and Trouw Nutrition. The new €25,000,000 facility was built on 170,000 square metres of land and has the capacity to manufacture 125,000 metric tons of extruded fish and animal feeds per year.

Since its inception, the operating company, registered as Skretting Nigeria Limited has contributed to the country’s economy by producing feed locally, using locally sourced raw materials. The new feed production facility is poised to further boost the agriculture sector and national GDP and employs 135 staff directly and 150 through a third-party agency. “We are very pleased about the growth of our business in Nigeria, a country with over 218 million people and a rising demand for protein. Opening a facility of this magnitude will ensure that we can meet both local demand and that of neighbouring West African countries, contributing to the growth of the aquaculture and agriculture sectors of Nigeria and Africa as a whole,” said Seyi Adeleke-Ige, General Manager of Skretting Nigeria.

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dsm-firmenich announces Sustell collaboration with IFC

dsm-firmenich, innovators in nutrition, health, and beauty, announced that IFC, one of the largest global development institutions focused on the private sector in emerging markets and a member of the World Bank Group, agreed to use dsm-firmenich’s life cycle assessment (LCA) platform, Sustell™, in a program in Brazil to monitor emissions in the dairy supply chain.

Sustell™ is one of the leading life cycle assessment (LCA) platforms for the animal protein value chain. By capturing feed and farm-specific data and backed by third-party ISO certified methodology, Sustell™ is a scalable platform to allow users and the value chain to accurately measure and reduce the full environmental footprint of their animal protein.

According to dsm-firmenich, by embracing green financing, disclosing environmental risks, and implementing credible measurement platforms, lenders can contribute to the greening of the financial system, the food system and foster a more sustainable future for both the planet and the economy. The company points out that Sustell™ works with numerous banks on measuring and reducing their customers’ environmental footprint, creating new business opportunities and enhancing the overall sustainability of animal production.

Global Head of Emissions Value Management at dsm-firmenich, Dr Heinz Flatnitzer commented: “This shows how banks can use Sustell™ to identify and manage financed emissions in the agriculture and the food sectors. This is particularly important to the banking sector in light of increasingly stringent reporting requirements, efforts to tackle greenwashing and the industry’s commitment to net zero greenhouse gas emissions by 2050 – and to steer capital towards more sustainable operations.”

Read more>>
Balchem EMEA to host seminars on cow nutrition

The Balchem Animal Nutrition & Health team announced that it is hosting three exclusive one-day seminars across Europe. The seminar series, titled “New Developments in Transition Cow Nutrition”, will be taking place in the UK on May 20th, the Netherlands on May 22nd, and France on May 23rd, and will feature cutting-edge research and practical implementation techniques to improved animal productivity, profitability and sustainability.

Dr. Jose Santos, University of Florida, is the featured speaker at each event and will join selected local scientist and on-farm experts. In the UK, Dr. Chris Reynolds from the University of Reading will present “Fresh Ideas for Fresh Cows”. In the Netherlands, Dr. Anne Guadagnin with Schothorst Feed Research will discuss “Optimal Transition Cow Management to Reduce Metabolic Disorders”. In France, Dr. Francis Enjalbert, National Veterinary School of Toulouse, will review “Metabolic Stress in Peripartum Dairy Cows”. Balchem explained that following the presentations and during lunch, there is a Q&A session with the company’s panel. These Q&A sessions will be shared as podcasts on the Real Science Exchange podcast series.

Read more>>

Lallemand to host 5th Biennial Silage for Beef Conference

Lallemand Animal Nutrition unveiled that leaders in beef cattle nutrition, silage management and agricultural research will be convening for the 5th Biennial Silage for Beef Conference on Thursday, June 20, 2024. The theme for this year’s conference is “Clean Feed, Quality Beef: Silage as the Key to Unlocking Productivity”.

The event will equip beef producers with actionable insights and strategies to optimize silage quality, enhance cattle performance and bolster the bottom line. Hosted by the University of Nebraska-Lincoln, Iowa State University and Lallemand Animal Nutrition, the summit will be held in-person at the Eastern Nebraska Research, Extension and Education Center, near Mead, Nebraska, with the option to watch via livestream.

Read more>>
Bioflytech produces flour and fat from dried BSF larvae

Bioflytech started the production of flour and fat from dried black soldier fly larvae in its new facilities located in Palas de Rei, Galicia. The company has started the activity after becoming the first Spanish company in this innovative sector to obtain the authorisation to produce, transform and commercialise this type of product. The dried black soldier fly larvae, with which the rendering lines are being set up and the first batches of flours and fats produced, come from the company’s other plant in Fuente Álamo, Murcia.

These new facilities in Palas de Rei are now up and running after obtaining authorisation for the production - by means of a drying process - of the products that make up the company’s portfolio and which are mainly aimed at animal feed, especially pet food and for the aquaculture sector. The company notes that obtaining this authorisation was possible thanks to the hard work of the technicians involved in the project at all levels, from those who work at Bioflytech to those who are part of the national, regional and local administration.

According to the company’s statement, after obtaining the necessary permits, it has been possible to start the production of flour and fat in the new facilities in Palas de Rei, which have state-of-the-art technology to carry out the transformation of the dried larvae from Murcia. Thus, a rendering machine and a drying machine have come into operation, allowing the product to be transformed into flour, which is mainly used as a raw material for the production of pet food and aquaculture food. The fat is destined, on the one hand, for pig feed and, on the other, for the pharmaceutical and cosmetics industry, which uses it in the creation of soaps and moisturising creams, among others.

Nutreco announces decision to switch to green electricity

Nutreco announced that all its facilities will purchase electricity from now on from renewable sources. The move is expected to reduce Nutreco’s scope 1 and 2 emissions by around 22%, or approximately 90,000 tonnes of CO₂ per year.

Nutreco’s operations are already using 100% green electricity in eight countries – Ecuador, Spain, Chile, Portugal, Turkey, Brazil, Germany and Guatemala. The target is to switch to renewable electricity by the end of 2024 in all Nutreco’s markets where green electricity sources are available. The company’s next priority to meet this, is to move to green electricity in Norway, the U.S., Vietnam, China and Canada.

“This decision is a clear reflection of Nutreco’s commitment to reducing our emissions as we pursue our purpose of Feeding the Future. Our priority will always be to consume less energy, and our teams across the globe are working very hard towards this goal. This move towards renewable electricity accelerates our transformation and positive impact,” said Claudio Cervellati, Nutreco’s Chief Supply Chain Officer.
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We provide complete plant solutions for the animal feed industry to your exact specifications and with industry-leading cost efficiency by leveraging our extensive processing expertise and experience.

By harnessing the power of automation and digitalization, we ensure continuous innovation to keep you at the forefront. AND with the industry's most trusted services, we are always there for you.

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PRODUCTION PERFORMANCE & FEED COSTS
Dual benefit of emulsifiers: Performance enhancer & cost saver
Aurélie Montagnon, Orffa Additives BV

Feed costs, production performance, and the power of phytogenics
Thierry Aubert, Cargill Animal Nutrition

New xylanase unveils untapped possibilities for broiler feed
Dr. Ajay Awati, EW Nutrition

Enhancing calf health and performance through epigenetics and methylation
Clay Zimmerman, Balchem ANH

A line of separation to efficient layer production
Jose Ramirez, Anitox

Muramidase: Enhancing broiler performance and meat yield
Irene Eising, dsm-firmenich ANH

Reduce feed costs with farm automation
Patrick Gloudemans, Fancom BV

Cost-effective vitamin e replacement by a proven highly bio-available natural antioxidant
Steven Beckers, Impextraco - Belgium

Stability of trace minerals: Does the source matter?
Dr. Yron Joseph Y. Manaig & Marion Taris, Animine

Role of alternative feed ingredients and feed additives in managing feed costs
Célia Gomes da Silva & Pauline Pourtau Tilly, ADM
“To meet the demand for animal protein, optimal feed utilization is key to improve productivity. Maximising output with minimal input will contribute to a more economic industry. One of the most expensive ingredients, fat source, is not being used efficiently because of factors impacting digestion and absorption in the digestive tract. Implementation of a nutritional emulsifier can be a game changer here.”

Nutritional emulsifiers are feed additives that are used more and more in diet formulation, with the aim of enhancing fat emulsification in the small intestine. Together with natural emulsifiers (e.g. bile salts), nutritional emulsifiers emulsify the fat globules coming from dietary fat in smaller droplets. Lipase, the digestive enzyme catalysing the hydrolysis of lipids, is therefore able to digest the fat in a more efficient way. Nutritional emulsifiers are also able to emulsify free fatty acids, in order to enhance their absorption in the epithelial cell layer. As nutritional emulsifiers are tightly related to energy efficiency, these feed additives are able to liberate more energy from the diet for animals’ performance. Therefore, nutritional emulsifiers can also be called animal productivity enhancers.

Excential Energy Plus is a nutritional emulsifier developed by Orffa Additives B.V. and is based on glyceryl polyethylene glycol ricinolate (GPGR). This GPGR, coming from castor bean oil, is specifically synthesised in a controlled production process to increase its emulsification properties in the watery conditions of the small intestine. The efficiency of Excential Energy Plus has been proven in more than 100 in vivo trials among different monogastric and ruminant animal species. However, the action of a nutritional emulsifier depends on several factors including, but not limited to; animal species, dosage, emulsifier active ingredient(s), period of supplementation and feed formulation.

Orffa conducted a global meta-analysis on the effect of Excential Energy Plus as a broiler productivity enhancer and feed cost saver, taking into account these different factors. Three different meta-analysis were implemented; the first to compare the effects of Excential Energy Plus to a control diet without a nutritional emulsifier, and a second meta-analysis to compare the product to a diet with a different commercially available emulsifier. The third one studied the inclusion of the nutritional emulsifier in an energy-reduced diet as a feed cost saver.

META-ANALYSIS AS PRODUCTIVITY ENHANCER: EXCENTIAL ENERGY PLUS VS CONTROL
A systematic review of scientific and commercial trials with Excential Energy Plus has been carried
out, selecting specific studies that meet the following criteria:
• Performed in broilers;
• Includes detailed information on the feed formulation and nutrient analysis;
• Assess the effect of Excential Energy Plus as productivity enhancer (top-dressing);
• Includes a control with a basal diet without emulsifier and iso-caloric with the treatment diet;
• Contains data on the growth performance, feed intake and feed efficiency of the birds;
• Performed before the end of 2023.

As a result, the studies in Table 1 with trial details were taken into consideration.

The following performance parameters for both treatments (control diet and Excential Energy Plus diet) were compiled for all studies, when available:
• Body weight gain (BWG; g/bird)
• Average daily gain (ADG; g/bird/day)
• Average daily feed intake (ADFI; g/bird/day)
• Feed Conversion Ratio (FCR), recalculated to a body weight of 2500g with the following formula:

\[
\text{FCR } 2500 = \text{FCR} \times \left( \frac{\text{Body weight (g) } - 2500}{100} \right) + 0.04
\]

• European Production Efficiency Factor (EPEF), calculated with the following formula:

\[
\text{EPEF} = \frac{\text{Liveability }\% \times \text{Body weight (kg)}}{\text{Days in life } \times \text{FCR}} \times 100
\]

Finally, the percentage of change when comparing the data in the Excential Energy Plus group with the control group was calculated with the following formula:

\[
\text{Percentage of change} = \frac{\text{Treatment group data} - \text{Control group data}}{\text{Control group data}} \times 100
\]

Those results were compiled for each trial according to their diet groups and statistical analysis was performed with ANOVA one-way test (significance level P<0.05). After studying the effect of each trial, these percentages of change were averaged and plotted per treatment and for each performance parameter.

To conclude, applying 350 ppm of Excential Energy Plus on-top of a basal broiler diet is expected to numerically improve growth performance by 3.8%, feed efficiency by 3.9% and production efficiency by 6.1%.

<table>
<thead>
<tr>
<th>Number of selected studies</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of study completion</td>
<td>Between 2014 and 2023</td>
</tr>
<tr>
<td>Location of the study</td>
<td>Belgium, China, Colombia, India, Mexico, South Africa, United Kingdom</td>
</tr>
<tr>
<td>Total number of broilers</td>
<td>6652</td>
</tr>
<tr>
<td>Broiler breed</td>
<td>Ross 308, Cobb 430, Arbor Acres</td>
</tr>
<tr>
<td>Broiler sex</td>
<td>Male, 50:50 male and female</td>
</tr>
<tr>
<td>Average days of life</td>
<td>37.1</td>
</tr>
<tr>
<td>Main formulated cereals</td>
<td>Corn-based (n=8), wheat-based (n=2)</td>
</tr>
<tr>
<td>Main formulated fat sources</td>
<td>Animal fat, full fat soybean, palm oil, recycled oils from restaurants, rice bran oil, soybean oil, sunflower oil</td>
</tr>
<tr>
<td>Average dietary nutrients</td>
<td>3042.4 kcal/kg (2713 – 3164) metabolizable energy</td>
</tr>
<tr>
<td></td>
<td>7.01% (4.95 – 8.30) crude fat</td>
</tr>
<tr>
<td></td>
<td>21.59% (21.30 - 21.80) crude protein</td>
</tr>
</tbody>
</table>
META-ANALYSIS AS PRODUCTIVITY ENHANCER: EXCENTIAL ENERGY PLUS VS OTHER EMULSIFIERS

Nutritional emulsifiers can be based on several types of active ingredients, with all different areas of specialty. Measuring the hydrophilic-lipophilic balance (HLB) value of emulsifiers is an interesting way to classify the products and to find out whether they are lipophilic (for a mix of water in oil) or hydrophilic (for a mix of oil in water). Lipophilic emulsifiers with a low HLB value, such as phospholipids, are commonly known as technical emulsifiers that improve the feed production process.

On the other hand, hydrophilic emulsifiers with a high HLB value, such as the specific GPGR used in Excential Energy Plus, are nutritional emulsifiers improving the emulsification in the watery environment of the gastro-intestinal tract. This clearly explains the need to differentiate the types of emulsifiers in vivo.

A second meta-analysis has been conducted to differentiate emulsifiers with varying HLB values. For that purpose, a second systematic review of scientific and commercial trials with Excential Energy Plus has been carried out, selecting specific studies answering the following criteria:

- Performed in broilers;
- Includes detailed information on the feed formulation and nutrient analysis;
- Assess the effect of Excential Energy Plus as productivity enhancer (top-dressing);
- Includes a control with a basal diet, supplemented with another commercial available emulsifier, and iso-caloric with the treatment diet;
- Contains data on the growth performance, feed intake and feed efficiency of the birds;
- Performed before the end of 2023. (Table 2)

The same performance parameters as in the previous meta-analysis, for both treatments, were compiled. Statistical analysis was performed as in the first meta-analysis. Afterwards, the percentage of change when comparing the data in the Excential Energy Plus group with the other emulsifier group was calculated similarly to the first analysis. After studying the effect of each trial, the percentages of change were averaged and plotted per treatment and for each performance parameter. To conclude, applying 350 ppm of Excential Energy Plus is expected to numerically improve growth performance by 1.7%, feed efficiency by 2.8% and production efficiency by 2.5%.

<table>
<thead>
<tr>
<th>Number of selected studies</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of study completion</td>
<td>Between 2014 and 2021</td>
</tr>
<tr>
<td>Location of the study</td>
<td>Belgium, Colombia, India, Netherlands, Poland, United Kingdom</td>
</tr>
<tr>
<td>Total number of broilers</td>
<td>8455</td>
</tr>
<tr>
<td>Broiler breed</td>
<td>Ross 308, Cobb 430</td>
</tr>
<tr>
<td>Broiler sex</td>
<td>Male, female, 50:50 male and female</td>
</tr>
<tr>
<td>Average days of life</td>
<td>34.1</td>
</tr>
<tr>
<td>Main formulated cereals</td>
<td>Wheat-based (n=6), corn-based (n=1)</td>
</tr>
<tr>
<td>Main formulated fat sources</td>
<td>Full fat soybean, palm kernel fatty acid, palm oil, poultry fat, soybean oil</td>
</tr>
<tr>
<td>Average dietary nutrients</td>
<td>2978.4 kcal/kg (2713 – 3164) metabolizable energy 6.89% (5.95 – 8.30) crude fat 21.00% (19.92 - 21.60) crude protein</td>
</tr>
<tr>
<td>Dosage of Excential Energy Plus</td>
<td>350 ppm (n=7)</td>
</tr>
<tr>
<td>Active ingredients of the other commercial available emulsifiers</td>
<td>Lysophospholipids (n=5), GPGR with a different HLB value compared to Excential Energy Plus (n=1), mixture of lysophospholipids, monoglycerides and synthetic emulsifier (n=1)</td>
</tr>
<tr>
<td>Dosage of the commercial available emulsifiers</td>
<td>500 ppm (n=6), 1000 ppm (n=1)</td>
</tr>
</tbody>
</table>
compared to the use of other types of commercially available emulsifiers at higher dosages.

**META-ANALYSIS AS COSTS SAVER: EXCENTIAL ENERGY PLUS VS CONTROL**

Thanks to the improvement of energy efficiency, nutritional emulsifiers enable nutritionists to formulate diets with energy-reduced levels. This feed reformulation is highly related to the initial feed, taking into account the fat sources and the total crude fat (from oils, animal fats and cereals). Therefore, a third meta-analysis has been conducted to review the impact of Excential Energy Plus on broiler performance and feed costs when applied with an energy reformulation strategy. For that purpose, a last systematic review of scientific and commercial trials has been carried out, selecting specific studies answering the following criteria:

- Performed in broilers;
- Includes detailed information on the feed formulation and nutrient analysis;
- Assess the effect of Excential Energy Plus as feed costs saver (reformulation);
- Includes a positive control with a basal diet and a negative control with reduced energy levels;
- Contains data on the growth performance, feed intake and feed efficiency of the birds;
- Performed before the end of 2023. (Table 3)

The same performance parameters as in the previous meta-analysis, for both treatments, were compiled. Those results were compiled for each study according

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**Excential Energy Plus**

**is the game changer for me!**

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**EXCENTIAL ENERGY PLUS**

- Nutritional emulsifier
- Improves fat and energy digestibility
- Optimal HLB
- Efficient in various types of diets
- Effectively saving feed cost

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to their diet groups and statistical analysis was performed similarly to the previous meta-analysis.

To conclude this meta-analysis, no performance parameters were significantly negatively impacted by the reduction of energy when supplementing Excential Energy Plus. On top of that, diet costs were reduced, in average, by 5.26 USD/ton of feed including the cost of feeding the nutritional emulsifier. When taking into account the average feed intake and costs of the diets, a return on investment of 3.44 can be concluded.

SUPPORT OF THE BROILER’S INDUSTRY PRODUCTIVITY WHILE OPTIMIZING FEED COSTS

Nutritional emulsifiers are feed additives that allow for better digestion and absorption of the different nutrients in animal feed. By their key action in the fat and energy metabolism, they optimise the energy utilization of feed that can be used for growth performance. Excential Energy Plus has a well-proven record based on both scientific and commercial trials, to significantly improve growth, feed efficiency and production efficiency, resulting in higher profits. Moreover, a large variety of emulsifiers exist, from technical to nutritional ones, but they can easily be classified by describing their active ingredients and HLB values. Excential Energy Plus, a nutritional emulsifier with a high HLB value, has been demonstrated to increase the performance to a higher extent than other types of commercially available emulsifiers.

Applying 350 ppm of Excential Energy Plus, on-top of a basal broiler diet without emulsifiers is expected to improve growth performance by 3.8%, feed efficiency by 3.9% and production efficiency by 6.1%. When applying the product and comparing results with another commercially available emulsifier, growth performance is expected to improve by 1.7%, feed efficiency by 2.8% and production efficiency by 2.5%.

Moreover, when applying Excential Energy Plus in energy-reduced diets, it enables to maintain optimal broiler performance while reducing feed costs by 5.26 USD/ton, and resulting in a return on investment of 3.44.

About Aurélie Montagnon
Aurélie Montagnon is Central Technical Manager at Orffa Additives BV. Aurélie Montagnon graduated from ISARA, France in 2020, with an engineering master’s degree in Agriculture, environment and resources management, with specialty in breeding, nutrition, environment and health.
“Phytogenics may offer a solution to optimize feed efficiency, support margin in dairy farming, and reduce costs in dairy farming. By focusing on optimal feed intake and thereby enhancing nutrient utilization, dairy farmers can navigate the challenges of feed costs and milk prices while maintaining profitability and sustainability in their operations.”

Dairy farmers face ongoing challenges in maintaining profitability, especially with the constant fluctuations in feed and milk prices. The efficiency of nutrient utilization is crucial for profitability, given that feed costs typically account for 70-80% of the variable costs of milk production. Enhancing feed efficiency in dairy cows has become a key strategy for increasing profitability.

This article delves into the evolving landscape of feed costs, the importance of feed efficiency in dairy cow margins, and the transformative impact of phytogenic feed solutions on dairy farm performance.

EVOLUTION OF RAW MATERIAL PRICE AND MILK PRICE IN DAIRY FARMS

The milk price experienced a significant increase in 2022 and 2023 but started to decrease toward the end of 2023, following the trend of dairy product prices. This decrease, coupled with high feed costs, has created a challenging situation for the dairy industry, often referred to as the "scissors effect."

For years, dairy farmers have dealt with fluctuations in feed prices and milk prices, impacting their profit margins significantly. These fluctuations highlight the need for strategies that can help stabilize costs and improve efficiency in dairy farming operations.

Phytogenics, offer potential solutions to help farmers and feed mill companies save on feed costs while providing flexibility in feed formulation and diet optimization. By utilizing phytogenic feed solutions, dairy farmers can potentially manage their costs and improve profitability even in challenging market conditions.

EFFECT OF FEED EFFICIENCY FOR THE MARGIN IN DAIRY COWS

Feed efficiency (FE) is a critical factor for profitability in high-yielding dairy cows, alongside reproduction and longevity. FE is typically measured as the kilograms of milk produced per kilogram of dry matter consumed. It reflects the cow’s ability to convert feed nutrients into milk or milk components. FE is not only an indicator of nutrient absorption and metabolism but also impacts the
income after feed costs and has implications for environmental impact. Target FE values vary based on the stage of lactation, with different targets for cows at different stages.

Defining FE in lactating animals is more difficult than for growing animals in their linear phase, as dairy cows show stages of rapid catabolism post-calving, followed by anabolism of reserves until their next calving. Feed efficiency of 1.5 to 1.6 is a reasonable target for cows or herds between 150 to 200 days in milk (DIM). For cows being in milk for more than 250 days, a FE below 1.4 should be expected. For animal in the beginning of lactation the target is above 1.6; Yet a very low FE (below 1.2) in early lactation, could indicate health problems such as acidosis or, if the cow is in good health, a very poorly performing animal.

Improving FE can also have positive environmental effects, such as helping support the reduction of methane production and protein losses. Maintaining a high FE is crucial for overall herd productivity.

**EFFECT OF PHYTOGENICS IN FEED EFFICIENCY**

Research with phytogenics has been shown to support the increase in milk production and improvements in milk quality in field trials, demonstrating its effectiveness in improving feed efficiency. The re-
Results in this field trial highlight the potential of phytogenic feed solutions to revolutionize dairy farming by providing solutions that may support farm profitability and environmental sustainability (Graphic 1).

A phytogenic feed solution was tested in a field trial in China, including a local diet. This product has shown to improve milk production and energy corrected milk significantly, together with an improvement of the milk quality (Table 1).

The phytogenic feed solution tested in this trial combine essential oils, spices, and triterpenoid saponins. The increase in milk production observed in this trial was likely due to an improvement in energy efficiency and protein efficiency in dairy cows. It works by stimulating fiber digestibility in the rumen and enhancing starch and fat digestibility in the small intestine.

Plant-based products like phytogenics, have shown promise in supporting optimal feed efficiency and reducing costs in dairy farming. The following effects of phytogenics in ruminants are observed and proven:

- Support of optimal level of rumen undegradable protein hence improving the metabolizable protein level
- Improving the microbial protein synthesis
- Help minimizing NH3 losses
- Improving protein digestibility in the small intestine

**CONCLUSION**

Phytogenics may offer a solution to optimize feed efficiency, support margin in dairy farming, and reduce costs in dairy farming. By focusing on optimal feed intake and thereby enhancing nutrient utilization, dairy farmers can navigate the challenges of feed costs and milk prices while maintaining profitability and sustainability in their operations. Integrating these solutions into dairy farming practices can lead to a more efficient and profitable industry, benefitting farmers, consumers, and the environment alike.

*This article only provides scientific information and should not be construed as marketing claims or guidance. All technical statements are based on scientific literature; references are available upon request. The products discussed in this article are not available in all countries. Please contact a Cargill representative to learn more about the local availability of products.*

**Table 1. An improvement of the milk production with a reduction of the milk Urea nitrogen the sign of a best protein efficiency**

<table>
<thead>
<tr>
<th></th>
<th>Control (Group 3 and 5)</th>
<th>Phytogenics (Group 4)</th>
<th>Phytogenics Effect</th>
<th>Phytogenics Effect (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of animals</td>
<td>360</td>
<td>171</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk production (kg/day)</td>
<td>37.00a</td>
<td>38.31b</td>
<td>+1.31</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Milk fat content (%)</td>
<td>4.031</td>
<td>4.111</td>
<td>+0.079</td>
<td>0.208</td>
</tr>
<tr>
<td>Milk protein content (%)</td>
<td>3.306</td>
<td>3.280</td>
<td>-0.026</td>
<td>0.157</td>
</tr>
<tr>
<td>ECM (kg/day)</td>
<td>40.75a</td>
<td>42.15b</td>
<td>+1.40</td>
<td>0.006</td>
</tr>
<tr>
<td>Milk Urea Nitrogen (mg/dL)</td>
<td>12.93a</td>
<td>12.20b</td>
<td>-0.73</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

About Thierry Aubert

Thierry Aubert is the technical lead in ruminants micronutrition & health solutions at Cargill Animal Nutrition. His areas of expertise include management of research projects or collaboration with the Cargill team, training for the sales team and technical local team, technical sales support for the company’s customers and distributors, and many more. Aubert also manages the support for different channels: Cargill, Provimi, external distributors.
Initially introduced in the 1980s, the xylanase’s use has expanded globally without notable advancements. Despite shifts in production methods, processing technologies, and the incorporation of various by-products, xylanase enzymes have not evolved correspondingly. This has left a gap in meeting the dynamic needs of today’s commercial nutritionists. However, the landscape is set to change...

For over 30 years, the application of xylanase in broiler diets has remained largely unchanged. Initially introduced in the 1980s, the xylanase’s use has expanded globally without notable advancements. Despite shifts in production methods, processing technologies, and the incorporation of various by-products, xylanase enzymes have not evolved correspondingly. This has left a gap in meeting the dynamic needs of today’s commercial nutritionists. However, the landscape is set to change with the advent of cutting-edge in-feed xylanase technology.

WHY THE SHIFT TO INNOVATIVE XYLANASE ENZYMES IS CRUCIAL

Historically, xylanase enzymes were adapted from industries outside of animal production to address gut viscosity issues in broilers fed wheat-based diets. This adaptation proved effective in mimicking the growth performance achievable with low-viscosity corn/soya diets, while also reducing disease risks by diminishing anti-nutritional factors (ANFs) and gut viscosity.

The introduction of xylanase not only facilitated nutrient release from previously indigestible feed components but also allowed for the adoption of an energy matrix value, optimizing feed formulation costs. Despite its widespread use, with penetration rates exceeding 50%, traditional xylanase solutions have inherent limitations, particularly in diets predominantly based on corn-soybean, which are rich in insoluble arabinoxylans.

ADVANTAGES OF GH10 OVER TRADITIONAL GH11 XYLANASE

The GH10 xylanase differs fundamentally from the GH11 family, which has been commonly used but is less effective against insoluble arabinoxylans found in corn-soy based diets. GH10 enzymes require fewer unsubstituted xylan monomers to act effectively, allowing them to break down arabinoxylans more efficiently, even near branched areas. This results in a broader and more effective degradation of feedstuffs, including complex fiber components.

THE FUTURE OF XYLANASE IN FEED: ENHANCED FLEXIBILITY AND COST-EFFECTIVENESS

Axxess XY from EW Nutrition is from GH-10 family of xylanases and is designed for optimal performance across a wide range of feed substrates...
found in both corn-soy and wheat-soy diets. It offers unprecedented flexibility in incorporating cost-effective ingredients into diets, thus stabilizing feed costs. Additionally, its ability to generate a diverse array of prebiotics like xylooligosaccharides and arabino-xylanoligosaccharides supports a healthier microbial environment in the gastrointestinal tract, enhancing overall bird health and performance.

**GH-10 Xylanases: Unleashing a Spectrum of Prebiotic Benefits**

Since the mid-90s, it has been recognized that xylanase not only aids in feed digestion but also influences microbial activity within the gastrointestinal tract through the creation of fermentable oligosaccharides. The GH10 xylanases have shown superior capability in breaking down a variety of fiber components into valuable prebiotics such as xylooligosaccharides (XOS) and arabino-xylanoligosaccharides (AXOS). These compounds are instrumental in promoting the growth of fiber-degrading bacteria within the intestine, which has beneficial effects on the host’s health.

Research indicates that bifidobacteria and lactobacilli, which are among the most prominent probiotic strains, vary in their utilization of XOS and AXOS. For instance, *Bifidobacterium adolescentis* can utilize both AXOS and XOS, whereas *Lactobacillus brevis* only utilizes XOS. This differential consumption leads to the production of butyrate, a short-chain fatty acid that enhances gut barrier function and reduces the colonization of pathogens like Salmonella in broilers. Furthermore, the presence of these oligosaccharides has been shown to improve overall performance by reducing feed conversion ratios.

The GH10 xylanase requires only two consecutive unsubstituted xylan monomers to cleave the xylan main chain, whereas a GH11 xylanase requires 3 or 4 consecutive unsubstituted xylan monomers. Therefore, the number of potential AXOS and XOS oligomers is higher from the action of the GH10 xylanase. This results in a wider range of oligomers, quite valuable as the effect is spread across the large intestine, each oligomer having a different fermentation rate. Consequently, the colon microbial activity becomes saccharolytic, which potentially reduces the undesirable products of proteolytic degradation, such as phenols and cresols.

Prebiotic combinations will vary depending on the substrate available. However, there is more flexibility in breaking down insoluble NSPs across different feedstuffs using GH10 xylanase compared to GH-11 xylanase.

**Strategic Implications for Future Xylanase Applications**

The strategic development of a GH10-based xylanase represents a pivotal advancement in animal
feed technology. This enzyme is tailored to break down a broad spectrum of substrates found in typical corn-soy and wheat-soy diets, enabling the inclusion of a higher proportion of cost-effective ingredients. Its robust activity in producing prebiotic oligomers from arabinoxylan indicates a significant potential to enhance the microbiota’s health and functionality.

The comprehensive benefits derived from using this advanced xylanase are clear. Birds maintain a balanced digestive system that is better equipped to handle environmental and health challenges, leading to improved performance. For nutritionists, this enzyme provides a dependable tool to optimize feed formulations flexibly and cost-effectively, especially crucial during times of supply fluctuations and raw material price volatility. The inherent thermostability of this xylanase ensures that it remains effective under a wide range of feed processing conditions, further emphasizing its suitability for all types of poultry feed.

**CONCLUSION**

The innovative GH10 xylanase enzyme offers substantial benefits over traditional formulations, supporting not just enhanced growth and efficiency in broiler diets but also contributing significantly to gut health through its prebiotic effects, achieved through the production of prebiotic oligosaccharides that support beneficial bacteria. Its introduction marks a significant advancement in poultry nutrition, aligning with the modern demands of efficiency and sustainability.

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**About Dr. Ajay Awati**

Dr. Ajay Awati has led efforts to develop and launch some of the leading products in the global feed additive market. For over ten years, the application of enzymes in animal nutrition has been his primary interest.

He is a veterinarian with a Master’s degree in Animal Science from the University of Wageningen, with two master theses to his credit. His PhD thesis, also from Wageningen, was focused on fermentable carbohydrates as prebiotics in weaning piglet nutrition.

After several years at the forefront of the animal nutrition and animal production industry, Dr. Ajay Awati finally joined EW Nutrition in 2018 to lead enzyme product development, with support from a top-level team of enzyme scientists and a state-of-the-art production facility in Germany.
Full flexibility for feed performance

» Unparalleled feed processing stability
» Effective against soluble and insoluble fiber fractions
» Promotes gut health and assists in antibiotic reduction

Functional Innovations backed by Science
ew-nutrition.com
Recent scientific findings advocate supplementing dairy cows with rumen-protected choline to optimize fetal programming on a genetic level, resulting in enduring health and productivity advantages for their offspring.

The foundation for calf well-being and performance is laid long before birth. One critical element in this process is the essential nutrient choline and the methyl-group donors it delivers during pregnancy and lactation. As late pregnancy approaches, choline takes on a pivotal role. Inadequate choline delivered to the dam can negatively impact gene expression in the calf, a phenomenon known as epigenetics.

The consequences of choline deficiency during gestation are profound, influencing placental development, fetal growth, cognitive function, and the calf’s immune system. However, recent research suggests that rumen-protected choline can offer a vital solution. Supplying the necessary methyl donors to the dam during the final trimester of pregnancy optimizes fetal programming, yielding substantial health and productivity gains for the calf throughout its lifetime. Understanding the intricate connection between nutrition, epigenetics, and calf well-being equips dairy producers to make informed decisions for their herds’ future.

**CHOLINE AND EPIGENETICS IN DAMS**

The nutritional and care regimen for cows can exert a lasting influence on the development of their calves, a phenomenon often linked to epigenetic changes occurring while the calf is in utero. Epigenetics refers to modifications in an offspring’s phenotype caused by genetic alterations like methylation, rather than changes in the DNA base pairs themselves. These changes influence how an individual functions and behaves without altering its genetic code.

While extensive research on the impact of epigenetics has been conducted in human medicine and with laboratory animals, cattle have received comparatively less attention in this area. Dr. José Santos from the University of Florida likens the effects of epigenetics on offspring to the adverse outcomes of smoking and alcohol consumption during pregnancy in humans.

Both nutritional factors and external stressors, such as heat stress, during gestation can influence the offspring, resulting in smaller, less productive calves, and sometimes, these effects persist throughout their lives. Some of these changes may be attributed to epigenetic modifications in the calf.

Dr. Santos mentions an interesting finding, “We’ve shown that male calves born to dams supplement-
ed with rumen-protected choline and fed colostrum from similarly treated dams displayed improved immunoglobulin absorption. These same calves exhibited reduced inflammatory responses when exposed to bacterial compounds simulating infectious diseases.”

The University of Florida research also showed that calves from supplemented dams grew faster than calves not exposed to choline in utero. Researchers saw an improvement in growth of about 0.05 kg per day, resulting in heifers being 36 kg heavier at first calving (see Figure 1). This initial growth also resulted in heifers that produced 524 kg more milk during their first lactation.

He adds that the effects of specific nutrients, like choline, on calves are still emerging, with considerable room for further exploration compared to other well-established research areas.

Dr. Heather White from the University of Wisconsin – Madison, who recently concluded a research project on prepartum feeding rates of rumen-protected choline, provides insights into the methylation process. Methylation involves the attachment of a methyl group to DNA’s histone, the structural component around which DNA is wound, determining its level of compaction.

"In essence, if the DNA is tightly wound, it remains unread at a specific moment," White explains. "Methylation can activate or deactivate genes, and some methylation modifications endure throughout the offspring’s lifetime."

The process of DNA methylation, along with other aspects of epigenetics, can be significantly influenced by the dam’s nutrition during gestation, shaping the calf’s gene expression.

In the context of dairy cattle, rumen-protected choline supplementation has been studied for more than 25 years, primarily during the prepartum and early postpartum phases. Cows consistently respond positively to this supplementation, resulting in increased milk production, energy-corrected milk production, and dry matter intake. Furthermore, the latest research demonstrates that calves born to these choline supplemented cows also experience enduring benefits in terms of growth and overall health.

Due to choline’s sensitivity to the rumen environment, it necessitates protective measures to avoid degradation within the cow’s rumen. Encapsulation is a method that shields the nutrient from the harsh rumen microbial environment, enabling it to pass through the rumen intact and ultimately be absorbed and utilized in the small intestine.

In the absence of supplemental choline, many cows fall short in choline levels.

White emphasizes, "Choline acts as a methyl donor. We understand its role as a methyl donor in adult animals. When we provide it during pregnancy, it may contribute to the methylation of fetal DNA, potentially explaining its lasting influence on calf growth beyond birth.”

White also highlights that several choline studies have extended their observation period to 100 days or more postpartum, as opposed to the typical 21-day window, consistently revealing positive responses in milk production that endure well into the distant postpartum period.
"It’s crucial for individuals to bear in mind that the benefits of choline supplementation are not short-lived; they persist in the long term," White affirms.

A GLIMPSE INTO LONG-TERM CALF PERFORMANCE

Dr. White’s research revealed intriguing results, with calves born to choline-supplemented dams displaying improved gut integrity markers when facing bloat challenges. Angus-Holstein crossbred animals also exhibited benefits in terms of daily gain, growth, feed efficiency, and marbling, all the way to the slaughter stage. Importantly, these effects were observed in both male and female animals.

The study found that the maternal treatment had a lasting impact on calf performance, extending up to 16 months of age, despite the calves themselves never directly receiving rumen-protected choline supplementation.

FUTURE EXPLORATION

The full extent of the impact of feeding rumen-protected choline to cows during pregnancy on calves due to epigenetic modifications and its potential perpetuation across generations remains a subject of ongoing research.

Dr. Santos points to emerging evidence suggesting that nutritional interventions during pregnancy can affect the epigenome of calves, possibly transmitting these changes to future generations. This concept finds support in studies conducted on mice and humans, indicating the transmission of epigenetic effects across generations.

He references studies conducted by his colleagues, Geoffrey Dahl and Jimena LaPorta, which discovered that offspring from dairy cows that received evaporative cooling during their dry periods were more productive into the second generation compared to those from cows that did not receive such cooling during periods of summer heat stress. Similar trends have been observed in research involving mice and humans, highlighting the transgenerational effects of epigenetics.

With the clear benefits of choline supplementation during the transition period and the promising initial research on the effects of choline supplementation to dams, it is likely that dairy producers will increasingly adopt rumen-protected choline supplementation. Continued research will help refine supplementation practices and uncover more short- and long-term benefits for both dams and offspring.

Dr. Santos notes, "Research is ongoing to better understand the effects of choline on calves and to ascertain the consistency of findings across different management scenarios and conditions. The promising results suggest that this trend is likely to continue."

About Dr. Clay Zimmerman

Dr. Clay Zimmerman obtained his Bachelor of Science degree in Dairy Science from Virginia Tech and earned his Master’s and Ph.D. in Animal Nutrition from North Carolina State University. For the first 22 years of his career, Dr. Zimmerman served as the head dairy nutritionist for two large feed companies in the United States, one in the Midwestern United States, and one in the Northeastern United States. He joined Balchem Corporation in 2013 and has served in various roles such as Technical Services Specialist and Global Protein Platform Manager. Dr. Zimmerman currently serves as the Director of ANH Technical Services for Balchem Corporation. In this role he also oversees all of Balchem’s external animal research.
**SCIENTISTS SAY:**

“**Choline is a Required Nutrient for Essentially Every Cow**

Choline plays an important role in metabolic health. Multiple studies have shown ReaShure’s impact on transition cow health.

-Dr. Marcos Zenobi, Research Study from 2018

**Is choline essential or required? I think it’s required and we should be framing out a requirement in our nutrition models.**

-Dr. Mike Van Amburgh, Cornell Nutrition Conference, 2022

**Certainly, Rumen-Protected Choline appears to have some new opportunities to be placed in high-producing dairy cow rations and may impact animal health during the transition.**

-Dr. Mike Hutjens, Mikehutjens.com

**Even in very high-producing cows, we saw a milk response of approximately 2.3 kg/cow/day after supplementation.**

-Dr. Heather White, Tri-State Dairy Nutrition Conference, 2023

**Choline dramatically increased colostrum yield – an 85% increase in our study.**

-Dr. Barry Bradford, Tri-State Dairy Nutrition Conference, 2023

**This new science changes everything we thought we knew about choline’s impact on the cow and her calf. The ReaShure family of products is the original and most researched rumen-protected choline source, so you can be sure you’re getting the benefits you expect. Trust ReaShure and Balchem to deliver, across generations. Visit Balchem.com/ReaShure-XC to learn more.**

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Precision Release Choline
Feed hygiene in poultry production is a frequently forgotten aspect of biosecurity that can have far-reaching consequences. Contaminated feed may lead to poultry diseases with detrimental effects on performance and feed safety issues with important economic and reputation consequences. Maintaining healthy laying hen flocks in an antibiotic-free environment requires a comprehensive improvement of current management practices and disease prevention strategies.

Strategies minimizing the opportunities of disease-causing agents to infiltrate susceptible flocks support producers’ profitability objectives, and are typically achieved by establishing lines of separation through a sound biosecurity program. For layer production these programs start by separating the pullets of layers from the exterior of the farm, cleaning and disinfecting vehicles, using protective gear and sanitizing any potential fomite from feed, which is critically important. Significant time and effort are involved in every biosecurity effort, and feed is a critical fomite in the layer industry due to its ability to introduce contamination through raw materials and its widespread dissemination throughout layer operations.

The microbial quality of feed directly impacts the health, productivity, and ultimately, the profitability of layer production operations. Amidst the multiple factors influencing gut health, feed sanitation emerges as a cornerstone practice for safeguarding the delicate balance within the gastrointestinal ecosystem. Recent data evaluates the profound impact of feed sanitation on commercial layer gut health, proper microbiome development and how it could help producers optimize hen performance and profitability.

FEED HYGIENE STRATEGIES SUPPORT LAYER PRODUCTION

Feed hygiene in poultry production is a frequently forgotten aspect of biosecurity that can have far-reaching consequences. Contaminated feed may lead to poultry diseases with detrimental effects on performance and feed safety issues with important economic and reputation consequences. Maintaining healthy laying hen flocks in an antibiotic-free environment requires a comprehensive improvement of current management practices and disease prevention strategies. Heightened biosecurity measures are essential to minimize the risk of avian pathogen transmission, with contaminated raw materials and finished feed serving as efficient vectors for disease dissemination throughout the production chain.

Effective strategies for optimizing feed hygiene are imperative for the success of layer production operations. Stringent quality assurance measures are crucial
in feed hygiene, beginning with sourcing high-quality ingredients and thorough inspections to detect contamination. Proper storage in clean, dry and ventilated facilities minimizes spoilage risks. Regular cleaning, disinfection and strict sanitation protocols prevent harmful pathogen buildup. Robust monitoring, including microbial testing, detects contamination promptly and enhanced biosecurity, restricting access and implementing hygiene protocols, reduces pathogen spread. Nutritional optimization, with tailored feed rations and additives like prebiotics and probiotics, supports health and egg quality. Finally, education and training of farm personnel ensure compliance with protocols, fostering accountability and diligence in feed management.

Feed hygiene is the linchpin that holds the entire operation together. By prioritizing feed hygiene and implementing comprehensive strategies to maintain feed quality, producers can safeguard the health and welfare of their flock while optimizing production efficiency and profitability. As the adage goes, "an ounce of prevention is worth a pound of cure" – investing in feed hygiene today is not just a prudent decision but a strategic imperative for long-term success in the poultry industry.

UNDERSTANDING FEED’S IMPACT ON GUT MICROBIOME MANAGEMENT

The gut microbiome of chickens plays a pivotal role in maintaining health, productivity and overall well-being. Comprised of trillions of microorganisms, including bacteria, fungi, viruses and archaea, the microbiome interacts closely with the host to regulate nutrient absorption, metabolism and health and modulate immune responses. Feed quality significantly impacts the structure and function of the poultry gut microbiome.

A balanced microbiome is essential for proper digestion, nutrient absorption, immune responses, performance and avian health. Imbalances in gut microbiome composition (dysbiosis), can lead to various health disorders, including gut inflammation, decreased feed conversion and increased sus-
Jose Ramirez has over 35 years of experience in the feed, poultry and swine industries. Following his completion of a degree in agricultural science from the University of Puerto Rico, he went on to further his education with an MBA in Technology Management. As Technical Services Manager for the Americas, Ramirez aids producers in understanding feed as a fomite and works alongside leading producers to implement effective feed-source pathogen mitigation and milling efficiency strategies.
Muramidase has a positive effect on gut functionality, leading to higher nutrient digestibility and absorption and in the end shows to contribute to highly efficient birds with optimal body weight and higher meat yields. These highly efficient broilers contribute to reduction of two major global issues the poultry industry is facing…

Optimizing performance and maintaining gastrointestinal functionality are crucial for success in broiler production. Optimal performing, healthy broilers contribute most to the global growing protein demand and a reduction of antimicrobial resistance. The use of muramidase in broiler feed is a new promising solution to support gut functionality, thereby improving broiler performance and meat yield. In this article we will explain the benefits and mode of action of muramidase and its impact on broiler growth, feed conversion ratio (FCR) and meat yield.

THE ROLE OF MURAMIDASE IN GUT FUNCTIONALITY

As defined by Pietro Celi in Animal Feed Science and Technology, 2017, an optimal gastrointestinal functionality is ‘a steady state where the microbiome and the intestinal tract (host) exist in symbiotic equilibrium and where the welfare and performance of the animal is not constrained by intestinal dysfunction’. Muramidase contributes to an optimal gastrointestinal functionality by breaking down bacterial cell debris. Peptidoglycans (PGNs) form the structural base of bacterial cell walls. After cell death or division, PGNs are left behind in the lumen of the intestinal tract and can hinder nutrient absorption and optimal gut function. By breaking down PGNs, muramidase contributes to better nutrient digestion, absorption and -partitioning in the body. This can be seen by birds having a higher body weight gain, a better FCR and higher meat yield.

MURAMIDASE IMPROVES NUTRIENT DIGESTIBILITY, MEAT YIELD AND WELFARE IN BROILERS

Several studies have shown that broilers supplemented with muramidase have a higher nutrient digestibility and absorption. Sais et al., 2019 showed 7% higher apparent ileal energy digestibility (P<0.05) and 4% higher apparent ileal crude protein digestibility (P=0.09) at day 35 of age. The improvement of crude protein digestibility was confirmed by Goodarzi et al., 2019 who saw 6.5% higher apparent ileal crude protein digestibility (P=0.001) and a higher apparent ileal fat digestibility (ether extract) of 2% (P=0.002) at day 35 of age. Goes et al., 2022 also saw a higher fat apparent ileal digestibility of 16% (P=0.01). Sais et al, also found a higher nutrient absorption on day 9 of broiler age. The birds fed with muramidase had 18% higher amounts of vitamin A in their plasma (P=0.04). At the same age, the birds also had a signifi-
cantly higher amount of total fatty acid apparent ileal digestibility of 2% (P<0.05). Knowing vitamin A is absorbed via fat, these two findings can be linked to each other. Goes et al. confirmed the improvement of nutrient absorption by measuring blood carotenoids levels. The muramidase supplemented birds had 23% higher total carotenoid concentrations in their blood (P=0.007). In all studies, the nutrient digestibility and absorption improvement lead to an improved performance of 57g BW (2%; NS) and 7 points FCR (5%; P=0.45) in Sais et al., 2019, 45g BW (2%; NS) and 4 points FCR (3%; P=0.001) in Goodarzi et al., 2019 and 80g BW (3%; NS) and 6 points FCR (4%; P=0.004) in Goes et al., 2022.

Footpad lesions are a visual sign of reduced gut functionality. Muramidase supplementation decreased litter moisture and footpad lesion scores (Pirgozliev., 2020), which was confirmed in several trials. When evaluating meat yield data from the slaughterhouse, Brugaletta et al., 2002 showed that muramidase supplementation improved breast yield% with 2.3% (>750 observations/group; 3 groups total), without increasing myopathies (wooden breast, white striping and spaghetti meat). Other trials also showed breast meat yield improvement, with an average of 3%, including higher carcass and thigh weights (data unpublished). Table 1 shows a summary of the performance, digestibility and absorption improvements described above.

### THE LINK BETWEEN GUT FUNCTIONALITY, BIRD PERFORMANCE AND MEAT YIELD

How can we explain the improved meat yield when muramidase was fed to the birds? Ni et al., 2022 found that geese with higher villus height/crypt depth ratio had improved muscle fiber density and breast muscle/

| Table 1. Summary performance, digestibility and nutrient absorption data Muramidase trials |
|----------------------------------|---|---|---|---|---|---|---|---|
| **Parameters:** improvement of muramidase treatment vs. control |
| **Reference** | **Performance** | **Nutrient digestibility*** | **Nutrient absorption** |
| | **BW** | **FCR** | **Energy** | **Protein** | **Fat** | **Vitamin A** | **Carotenoids** |
| Sais et al., 2019 | 2.0% | 5.0% | 7.0% | 4.0% | 2.0%** | 18%** |
| Goodarzi et al., 2019 | 2.0% | 3.0% | 6.5% | 2.0% |
| Goes et al., 2022 | 3.0% | 4.0% | 16% | 23% |

* Apparent ileal digestibility  
** measured at day 9 of age
About Irene Eising

Irene Eising works as Product Manager Balancius® in the EMEA performance solutions team at DSM-Firmenich Nutritional Products. She has 11 years' experience in the animal feed industry, specializing in monogastrics and gut health solutions. Prior, Eising obtained experience in both the feed mill and animal additive industry. She studied at Wageningen University and Research where she obtained both her BSc and MSc in Animal Science, specializing in animal nutrition.

body weight ratio. Savaris et al., 2021 investigated the effects of vitamin A on meat yield and quality in broilers and found that vitamin A supplementation significantly improved breast and leg yield. There was also an interaction between vit. A levels and duration of supplementation and the occurrence of wooden breast and white striping, with an optimum level described at 29,000 IU/kg. Cavani et al., 2009 describes the importance of oxidative stability for meat quality. Lipid oxidation can cause toxic compound formation and the loss of nutritional values. Several nutrients such as carotenoids, vitamin E and C and selenium act as antioxidant and prevent lipid oxidation. Increasing the absorption of these nutrients can improve oxidative stability and decrease lipid oxidation, leading to meat with higher nutritional value and less toxic compounds. An increased absorption of vit. A due to muramidase supplementation can be an indication for improved breast meat yield described above. Muramidase supplementation improves gastrointestinal functionality by removing PGNs as an irritant in the gut lumen and the effects of better gut functionality described by Ni et al. is a potential explanation of the higher breast meat yields found in muramidase supplemented birds.

CONCLUSIONS

Nutrient partitioning to protein deposition is influenced by several factors. Nutrients like carotenoids and vitamins contribute to oxidative stability and reduce lipid oxidation, ensuring better meat quality. Nutrients like vitamin A contribute to meat yield. A better gut functionality (measured by villus/crypt ratios) improves muscle fiber densities. Muramidase has a positive effect on gut functionality, leading to higher nutrient digestibility and absorption and in the end shows to contribute to highly efficient birds with optimal body weight and higher meat yields. These highly efficient broilers contribute to reduction of two major global issues the poultry industry is facing: meeting the growing protein demand and reducing the reliance on antibiotics (reducing antimicrobial resistance).
“Are the animals healthy? How much feed and water are being consumed? Are the animals growing as expected or should I change my delivery schedules? Automatic systems save time and provide you with valuable information about the growth and health of your animals.”

Feed costs account for a major part of the total production costs in livestock farming. On poultry farms, this amounts to approximately 60-65% of the total production costs, while for pig finishers this figure can be as high as 70%. With the currently spiraling feed prices, your farm’s profit margins are under considerable pressure. As a livestock farmer, you cannot exert much influence on feed prices because they are determined by the market. Unless you have your own feed kitchen and lots of your own raw materials, but only a small proportion of livestock farmers have that. What you can do is take a critical look at feed consumption and feed composition on your farm. It is crucial to use feed efficiently and focus on achieving the highest growth per kilo of feed.

INSIGHT INTO FEED COSTS

There are gains to be made by cutting feed costs on almost all pig and poultry farms. Without compromising on the technical results. Quite the opposite in fact, as a balanced feed strategy ensures optimal production from your animals. There are certain points to consider when using a smart strategy to cut feed costs on your farm.

Insight into the feed costs is the first step in making improvements, so it is sensible to start registering feed and water consumption. Producers still often think that the best way to get a grip on the feeding process is to feed manually. But this is a misconception. An automated feeding process includes extensive registration options to keep track of stocks and monitor daily consumption. Even a simple feeding system has feed clocks that register the running times of the system. Clear feed data registration enables you to calculate precise index numbers, compare data and make informed decisions. This also saves time and helps to accurately control how much feed is given, as well as ensuring that each animal is automatically fed its feed ration. And you can notice any abnormal patterns at once. This helps you control feed costs, while abnormalities are a good indicator of any infections or diseases.

FEED ACCORDING TO NEED IN THE CORRECT FEED COMPOSITION

Production animals need extra feed in addition to the ration needed for maintenance. The energy requirement for maintenance is the amount of
energy needed by an animal to maintain its vital body functions. The animals also need extra feed for growth and production (e.g. milk, eggs or progeny). As an animal gets older its body weight and feed intake change, as do its nutritional needs. It is therefore important to carefully examine the precise nutritional needs of the animals and feed them a ration that is accurately formulated to achieve optimal technical results. And as soon as possible, switch to larger portions of cheaper feed with a lower mineral content. With broilers, for example, this is done by adding wheat to the ration.

If the feed composition is not adapted during this phase, mineral rich (nitrogen and phosphate), and therefore more expensive, feed will be fed unnecessarily for too long. This leads to a higher feed conversion rate and the associated higher feed costs, but not to better technical results. The surplus minerals will also be released to the environment, leading to unnecessarily high nitrogen and phosphorous emissions.

STOP FEED WASTE

Unnecessary leakage from your feeding system, or overfull feeders are just two examples of easily preventable feed waste. Regularly inspect your feeding system for mechanical defects. System malfunctions are not only a source of annoyance, they can also disrupt animal growth and even affect feed quality. Closely monitor the stocks of feed, clean the feed lines regularly, periodically inspect the mechanical parts in your installation and check the accuracy of feed weighing. Then you can rely on a frictionless feeding process.

Repair any holes or tears in the pipes where feed can leak as quickly as possible. Not just to prevent waste, but also because this leaked feed attracts pests like rodents. Did you know that a rat that weighs 250 grams can easily eat its own weight in
feed a day? Keeping the installation clean improves hygiene and prevents feed obstructing the pipes.

Remember to inspect the silo too. Moisture that enters the silo through holes and gaps, for example, will cause caking and promotes mould growth and spoilage of the feed.

Take a walk through the house when the feed lines are operating and look at the eating behaviour of your animals. An easily accessible feeder or pan prevents feed being spilled onto the floor. See whether all the feed is being eaten, or are just the larger pellets picked out, for example. It is often the smaller feed pellets that contain the important nutrients. Another aspect to check is whether any demixing occurs so you can be sure of uniform and homogeneous feed quality from the start of the feed line up to the furthest feeders in the house. Adapt the amount of feed if necessary.

CREATE A GOOD HOUSE CLIMATE

Achieving optimal animal performance with minimal feed consumption is the challenge faced by every farmer on a daily basis. Progress in genetics and improved feed management strategies have impacted positively on feed conversion in recent years. Feed conversion is the efficiency with which an animal converts feed into production or weight. The influence of the house climate on the feed conversion rate is also significant.

An important task of the climate control system is to maintain a constant house temperature in the animals’ thermo neutral zone and to prevent cold airdrop onto the animals. The thermal neutral zone is the temperature range within which pigs or poultry can maintain their body temperature without regulating their heat production. When the house temperature is too high, the animals will need to release heat and produce less heat. Eating less can reduce heat production, but their growth will also suffer.

When the house temperature is too low, energy is required to maintain the body temperature. The energy from the feed will be diverted from growth to maintaining the body temperature instead. Researchers at Wageningen University have demonstrated that the average energy demand increases by 1.8% when the temperature drops by 1°C. This means that when the ambient temperature drops by 10°C, the maintenance requirement increases by an average of 18%.

A correctly controlled climate with optimally synchronized interaction between the air inlets and outlets, exhaust system, heating and cooling ensures the best thermal comfort for the animals, whatever the outdoor conditions. Temperature fluctuations - or even worse - draughts must be avoided at all times in the house. Extra sensors measure the relative humidity, CO₂ of ammonia concentration and monitor the air quality to prevent respiratory infections.

A poor house climate also increases the risk of disease. Animals that are ill often lag behind in growth and need extra feed to recover and catch up on the lost weight. This negatively impacts on feed conversion and the feed costs.
**About Patrick Gloudemans**

Patrick Gloudemans is Product Manager Feeding System at Fancom BV. He has a strong expertise in smart farming solutions that help farmers to create superior conditions in the house for healthy and future-proof farming. Before joining Fancom six years ago, he spent 19 years working in feed and poultry equipment manufacturing organizations.

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Throughout its history, synthetic feed-grade Vitamin E acetate has been known for its (high) price volatility combined with a global supply chain prone to disruptions. Polyphenol-rich natural extracts, on the other hand, have a rather high stability in cost. However, not all types of polyphenolic antioxidants are readily bio-available to the animal and thus suited to partially substitute Vitamin E for feed cost reduction. Luckily, reliable assays become increasingly disposable to evaluate a product’s true antioxidant capacity in animal cells.

Vitamin E (VE) is applied in feed for a dual purpose. Firstly, for its unique bio-essential functions for the animal regarding immunity, reproduction, preservation of cell membranes, etc. Secondly, as a standard antioxidant with a high biological activity in the animal, thanks to its phenolic structure (Figure 1) and beneficial reduction potential. The latter implies it’s an effective scavenger of oxidising agents (i.e. free radicals) in the animal’s body. The most widely used type of VE in premixes and compound feed is the synthetic form all-rac-DL-α-tocopheryl acetate 50% Adsorbate. This is an ester of α-tocopherol and acetic acid, being stable during storage and handling. Within the animal’s body, it is converted into highly bio-available free tocopherol via a necessary hydrolysis step.

**BIOACTIVE ANTIOXIDANT ALTERNATIVES TO VITAMIN E**

Vitamin E acetate is known for its typical price volatility and riskful global supply chain that can lead to supply disruptions. Consequently, more and more formulators are replacing the antioxidant part of synthetic VE’s dosage in the premix or compound feed by natural polyphenols. It is crucial to stress that, in the animal, polyphenols can only substitute the antioxidant properties of dietary VE and not its essential vitamin functions. Polyphenols are a diverse group of more than 8,000 phytobiotic compounds, occurring in almost every plant. Plants like tea, grapes, berries and nuts are rich in polyphenols. Thanks to their phenolic chemical nature like VE, polyphenols serve as good antioxidants able to capture unstable free radicals (like Reactive Oxygen Species). However, not all phenolic compounds have the same scavenging capacity (i.e. free radical affinity) due to intrinsic differences in their chemical structure. Next to capturing radicals, some polyphenols can also work as effective recyclers of used up antioxidants like oxidised...
VE (Figure 2). This thanks to their chemical redox potential value, which can be even favourably lower than the one of the latter. As such, specific types of polyphenols can also prolong the effect of VE via a synergistic interaction.

Even more important is that not all polyphenols are strong antioxidants under biological conditions. How can an antioxidant be claimed to replace the (systemic) antioxidant properties of for instance VE in the animal, when it doesn’t make its way to the blood and the cells of the body tissues? That is why high values for antioxidants in classical in vitro methods (e.g. ORAC, TEAC, DPPH, FRAC) do not necessarily mean a high intra-cellular antioxidant capacity. These conventional tests typically comprise a direct oxidative challenge, induced in a test tube containing nothing but a synthetic radical solution. Needless to say, such a concept will not take into account the intestinal stability, bio-availability or intra-cellular antioxidant activity of a compound or product.

**HOW TO EVALUATE AN ANTIOXIDANT’S BIOLOGICAL ACTIVITY?**

*In vitro* methods with their typical shortcomings were mentioned before. So how to test a product’s antioxidant capacity in a biologically relevant way for the animal? It is important to note that live animal trials with a (small) partial replacement of VE by an antioxidant are not always ideal. This is because, within such an application, zootechnical performance is anyhow not expected to show a significant drop, as most diets are overdosed in VE.

A more direct and representative way is to measure the level of Intra-Cellular Oxidative Stress (ICOS), preferably within an oxidative challenge model. This records accurately the protective effect of an antioxidant on radical-challenged animal cells (Figure 3), in terms of intra-cellular accumulation of Reactive Oxygen Species (ROS).

![Figure 2. From left to right: Radical neutralization and Vitamin E antioxidant recycling by polyphenols of a natural dietary blend (ELIFE®).](image1)

![Figure 3. From left to right: Reduced integrity and eventually death of an animal cell due to oxidative damage by generated free radicals (protective antioxidant not added).](image2)
The University of Antwerp in Belgium, for instance, has established its own validated ICOS model via fluorescence-based measurements in animal gut epithelial cells (i.e. the IPEC-J2 porcine type). Such an assay creates the following benefits for an antioxidant compound or -product compared to other evaluation methods:

1. assessing its bio-availability or uptake by gut epithelial cells (its systemic, whole-body effect)
2. simulating its protective effects on gut integrity (vs. ROS-induced inflammation) and thus also disease susceptibility
3. measuring its antioxidant effect inside the cell (where most oxidative stress is typically generated)
4. allowing a head-to-head comparison with Vitamin E (its water-soluble analogue Trolox®)

**INTRA-CELLULAR OXIDATIVE STRESS TEST**

The aim of this ex vivo test is to measure the integrity of IPEC-J2 gut epithelial cells, after an induced oxidative challenge by either hydrogen peroxide (H₂O₂) or menadione, which are strong ROS generators. This by measuring the oxidation across the cell membrane via fluorescence, with the use of an indicator for ROS radicals. This indicator diffuses into the animal cell and if ROS are present therein, it becomes oxidised. When this occurs, the molecule turns fluorescent and thus can be measured (Figure 4). Therefore, the higher the oxidation, the higher the fluorescence.

**ICOS & VITAMIN E EQUIVALENCE**

In a peer-reviewed, independent study conducted by the University of Antwerp¹, the above ICOS fluorescence test on animal cells was used to evaluate the biological efficacy of a dietary antioxidant (ELIFE®). The latter is a concentrated blend of different, EU-sourced botanical extracts rich in primarily short monomeric and oligomeric polyphenols (covering different subclasses of flavonoids and phenolic acids).

Within the setup of this ICOS test, the phytobiotic antioxidant blend was added to the IPEC-J2 cell culture at increasing dosages from 0 (control) up to 1,000 ppm. This was done both with and without an initial triggering of oxidation (generating of ROS). The fluorescence results of the ELIFE® treatments were compared to a treatment of Trolox® (VE analogue), which was added in an amount equating to 1,100 ppm of synthetic VE50 ADS. The intra-cellular ROS content by fluorescence measurement was expressed in arbitrary units.

The outcome of the test (Figure 5) proved that ELIFE®’s polyphenols, which are primarily of the short and water-soluble type, penetrated the gut epithelial cells and exerted a significant intra-cellular antioxidant activity. Such a biological action is key, as most ROS radicals are produced inside animal cells due to the high mitochondrial activity.
First of all, the test results showed a clear dose-response in the reduction of intra-cellular ROS content up to 1,000 ppm ELIFE®. Secondly, with regards to VE replacement, the decreased intra-cellular ROS presence was similar between the Trolox® treatment (equal to 1,100 ppm synthetic VE50 ADS.) and the 500 ppm ELIFE® group. As a result, a dosage ratio of at least 1:2 between the antioxidant blend and VE50 ADS. could be concluded. Such an antioxidant equivalence would signify a matrix value of min. 1,000,000 IU/kg product for partial VE replacement (1 mg ELIFE® antioxidant blend = 2 mg VE50 ADS. = 1 IU).

**PRACTICAL EXAMPLES OF PROFITABLE & SAFE REPLACEMENT**

In monogastric diets, no replacement is allowed by the antioxidant blend at VE levels up to 20 IU/kg feed (i.e. minimum nutritional requirement + safety margin). In subspecies with a higher VE need, like sows or breeder chickens, this lower limit lies at a higher level. Above this threshold, the replacement rate of VE50 ADS. by the antioxidant blend is only gradually increased with dietary VE level. Such safe substitution advice is key, so that the min. physiological requirement for VE, as set by independent animal research institutes (like NRC, INRA or FEDNA), is never compromised. Below Table 1 shows some replacement examples and their indicative feed cost savings with ELIFE® in different animal applications (calculated with an end user price of 7.5 USD/kg for VE50 ADS.).

**CONCLUSIONS**

Due to their chemical nature, polyphenols are more versatile antioxidant molecules compared to
Vitamin E (or even C). However, not all polyphenols are equally bio-available nor evenly bio-effective inside animal body cells. ELIFE®, a blend of selected botanical extracts rich in short-type polyphenols, is a potent antioxidant equivalent to synthetic Vitamin E in the animal. This claim has been demonstrated in multiple researches using bio-relevant lab models, such as direct oxidative challenges to animal gut epithelial cells. Thanks to its high antioxidant capacity in such biological matrices, ELIFE® allows a reliable replacement of Vitamin E acetate 50% ADS. This translates into an efficient 1:2 dosage ratio and a safe substitution rate (depending on the initial Vitamin E level in the diet). In combination with its low cost per kg of VE50 ADS. equivalence, the product has proven to create interesting financial savings for formulators.

**Sources**


Further references are available upon request via elife@impextraco.com

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**About Steven Beckers**

Steven Beckers is a monogastric nutritionist with a Master’s degree in Applied Bio-Sciences Engineering from the University of Leuven (Belgium). Since 2019, Beckers has been a Global Product Manager of multiple specialty feed additives at Impextraco. Here he provides technical support to customers and end users, to help establish innovative concepts in different agricultural markets. He is devoted to maximizing animal health and performance, by correctly advising and optimizing the application of value-added products.
THROUGH THE POWER OF BETTER NUTRITION, WE IMPROVE THE LIFE OF ANIMALS AND PEOPLE GLOBALLY.
In the animal nutrition industry, various chelated Zn sources have been marketed for their claimed superior bioavailability over traditional sulfates. However, it is crucial to highlight that EFSA’s opinions have not definitively concluded on this matter. To date, EFSA’s scientific evaluations consistently challenge these claims of higher bioavailability for chelated Zn sources compared to standard sulfates.

STABILITY OF TRACE MINERALS: DOES THE SOURCE MATTER?

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N utrients such as carbohydrates, fats, proteins, including minerals and vitamins, are primarily absorbed within the intestine. Before reaching this organ, the ingested bolus has to pass through an acidic environment: the stomach. The gastric milieu plays a crucial role in the digestion process across animal species, facilitating the activation of enzymes and the pre-digestion of enzymes and lipids.

TRACE MINERALS AND THE ACIDIC GASTRIC ENVIRONMENT

As the feed enters the digestive system, pepsinogen and hydrochloric acid will be secreted to assist in the breakdown of feed and facilitate digestion. Across swine, poultry and ruminant species, the pH conditions in the gastric chyme usually range between 2.0 to 5.0 (Figure 1), before it reaches the small intestine. The acidic environment aids in the mineral solubilization for their absorption in the intestinal tract (Broom et al., 2021). Among the trace mineral sources in the market, we can find sulfates, oxides, chlorides, chelates, among others. In this article, we are going to focus on positively charged metals (cations).

Regardless of the source, the first stage of trace mineral absorption is the exposure to the acidic environment of the stomach, where gastric juices and low pH promote the solubilization of trace minerals. During this stage, the physical-chemical properties of trace mineral sources play an important role: sources with large particles which are not completely soluble in mild acidic conditions, such as low-quality metal oxides, are...
not fully dissociated and thus have very poor bioavailability (Cardoso et al., 2021). In the stomach, most trace minerals dissociate from ligands to which they are bound, allowing the resulting free metallic ions to enter the small intestine. However, if not absorbed, the increase in pH conditions leads to a de novo chelation processes (Vacchina et al., 2010). Moreover, the bioaccessibility of zinc (Zn) and other metal ions is drastically dependent on chemical interactions in the small intestine. A higher degree of dissociation in the small intestinal lumen enhances phytic acid’s capacity to chelate cations. Consequently, in conditions characterized by high phytate and low phytase activity, trace mineral sources that are less soluble in water may be less susceptible to interact with phytate. The acid-induced solubilization and dissociation set the stage for the subsequent absorption of metallic ions in the small intestine, ensuring the effective utilization of metal ions. Then, in the small intestine, specific transporters aid the uptake of metallic ions into the intestinal cells, which are transported by their chemical ligands. These transporters recognize and enable the absorption of different trace minerals (Richards et al., 2010).

Nowadays, some of the trace minerals are being chelated to improve their bioavailability and minimize antagonistic interactions with phytase, calcium, or other dietary components. This process helps them resist degradation in the stomach’s acidic conditions, thereby sustaining mineral homeostasis. Some advocates of chelation assert that these chelated trace minerals utilize active transport pathways supported by amino acid and peptide transporters across enterocytes, thereby optimizing mineral absorption and tissue deposition. However, according to recent European Food Safety Authority (EFSA) opinions, studies have shown that Zn deposition in animal tissues from chelates of glycine, hydroxy analogue of methionine, or amino acids hydrate have demonstrated no significant differences when compared to that of Zn sulfate or inorganic Zn. Additionally, previous studies using radioisotope labeling have shown varying ratios of Zn to C and S isotopes from Zn-methionine at the gut barrier and within enterocytes (Beutler et al., 1998, Hill et al., 1987a, and Hill et al., 1987b). These studies have also revealed distinct time kinetics of absorption of these labelled Zn ions compared to C and S ions in enterocytes, suggesting differing absorption pathways for Zn and methionine. Similar findings have been observed with other chelated sources. In addition, studies applying X-ray absorption structure spectroscopy determined identical Zn-speciation within intestinal cells of sheep and broilers fed either inorganic or organic Zn, respectively, providing further evidence that entry routes for Zn into the organism do not differ between feed Zn sources (Sui et al., 2011 and Liu et al., 2014). Recent research in pigs and poultry have illustrated that chelating agent alone significantly reduces phytate antagonism with Zn from Zn sulfate. This suggests that the occasional superiority of chelates under high phytate conditions is mainly attributable to altered chemical interactions within the gastrointestinal lumen rather than by alternative, molecular transport mechanisms (Windisch et al., 2002 and Boerboom, 2021). Under semi-synthetic conditions, denoted by the absence of phytic acid in the diet, the superiority

Figure 1. The digestive system of swine, poultry, and ruminant with certain pH conditions along the GI tract (authors).
of chelated Zn as opposed to Zn sulfate diminishes, causing even numerically lower true absorption rates due to a small intestinal solubility of the chelates.

**CHELATED MINERALS STABILITY UNDER DIFFERENT PH CONDITIONS**

The stability of chelates can be severely affected by pH. An *in silico* simulation (Figure 2) represents a model of the copper-glycinate complex behavior in water at varying pH levels. Initially, before any interaction with water, copper is entirely bound to glycine in a stable complex. However, when the pH is lowered to 3, approximately 80% of copper becomes free ions (Cu\(^{2+}\)), indicating reduced stability of the complex. On the contrary, at high pH levels, both the complex and precipitated forms equally make up 50% of copper, with no free ions present, suggesting a less reactive complex. The figure also shows that at pH 5.25, only 70% of the chelate is available, highlighting its decreased proportion as the pH decreases. This emphasizes the partial dissociation of chelates in acidic stomach conditions and potential chelate reformation or formation of other complex with organic molecules present in the higher pH environment of the small intestine.

Based on the *in silico* simulation, our observations align with the findings reported by Byrne et al. (2021) for copper proteinates and Vacchini et al. (2010) for glycinites. For instance, Vacchini et al. (2010) illustrated an increase in metal-free glycine at acidic pH levels (below pH 5), with Fe-Gly appearing more stable during acidification compared to other glycinites (Cu, Zn, Mn). The graphs also indicated significant dissociation of these glycinites at pH below 4 to 5. The presence of glycinites in the intestinal tract leads to dissociation under acidic pH conditions, followed by chelation at basic pH, resulting in more than 100% of the initially added trace minerals in glycinites being present in the feed. Similarly, Byrne et al. (2021) revealed that proteinates are dissociated as soon as the pH drops below 6.5, with less than 50% of Cu-proteinates in the chelated form at pH <3.5. The key takeaway is that chelates, like other trace mineral sources, undergo dissociation at low pH and re-chelation at high pH. In the presence of free ions, there exists the potential for either the reformation of chelates or the creation of another complex with organic molecules in the higher pH environment of the small intestine.

**EFSA WEIGHS ON THE BIOAVAILABILITY OF CHELATED TRACE MINERALS**

Beyond considerations of pH stability, the bioavailability of chelated trace minerals has garnered atten-
tion due to its potential impact on animal nutrition and overall performance. EFSA is actively exploring the scientific evidence surrounding the utilization of chelated trace minerals in both food and feed. This investigation addresses aspects such as safety, bioavailability, and the potential health and nutritional effects of these minerals in humans and animals.

In considering the absorption mechanisms of chelates, there is a theoretical proposition that suggests their absorption via amino acid or peptide transporters. Taking Zn as an example, ZIP4 (Zrt/ Irt-like Protein 4) serves as the major active apical transport mechanism from lumen to enterocyte. However, ZIP4 expression tends to be downregulated if there is a sufficient or oversupply of Zn to prevent excessive Zn absorption, thereby maintaining Zn homeostasis. When there is an excess of free Zn ions in the cytosol of the enterocyte, ZnT1 is activated as a response to maintain Zn balance. This activation is regulated by Metal Transcription Factor 1 (MTF1). ZnT1 works by transporting Zn across the basolateral membrane of the enterocyte, directing it toward the circulation and preventing an accumulation of Zn within the cell (Goff, 2018 and Windisch, 2002). If chelated Zn is indeed absorbed intact, it poses a risk of toxicity. A chelator with such strength that even the metal transporters at the apical gut mucosa (which are strong chelators themselves) cannot extract its metal would fail to dissociate within the enterocyte cytoplasm, leading to uncontrolled accumulation. However, all available data to date suggests that Zn from both chelated and inorganic sources is subject to homeostatic regulation, which strongly suggests that both deliver ionic Zn to the respective molecular machinery.

In the animal nutrition industry, various chelated Zn sources have been marketed for their claimed superior bioavailability over traditional sulfates. However, it is crucial to highlight that EFSA’s opinions have not definitively concluded on this matter. To date, EFSA’s scientific evaluations consistently challenge these claims of higher bioavailability for chelated Zn sources compared to standard sulfates (Table 1). An optimal chelating agent should possess a stability constant that can balance effective sequestration from feed materials and efficient uptake by the animal.

CONCLUSIONS
While chelating agents aim to improve absorbability, the animal has a pivotal role in downregulating transport pathways, especially when the trace mineral requirements are already met. Regardless of the source, all forms of trace minerals face instability at low pH, including chelates, as at least some of them are partially dissociated and then re-chelated at a higher pH environment. Moreover, in modern conditions with phytase-supplemented diets, bioavailability studies performed in the past decades without phytase should be reevaluated. Among trace mineral forms, sources with slow dissolution kinetics along the acidic segment of the GIT must be considered, as they can affect the bioavailability of trace minerals. Moreover, to ensure proper trace mineral availability determination, they were best studied under subclinical deficiency as the most common Zn-malnutrition phenotype.
Zinc chelates Published date Summary of EFSA Opinion

Zinc chelate of hydroxy analogue of methionine 27 November 2009 Studies involving piglets, laying hens, and dairy cows indicate this does not result in different Zn concentrations in muscle, liver, kidney, skin/fat, eggs, and milk compared to inorganic sources.

Zinc chelate of amino acids hydrate 23 March 2012 Tissue deposition of this zinc source is expected to be similar to that of zinc sulfate.

Methionine-zinc 23 January 2013 Data on Zn uptake and tissue deposition in species other than poultry do not suggest greater bioavailability than other authorized Zn sources.

Zinc chelate of L-lysinate-HCl 10 November 2015 Tolerance studies indicate safety as a zinc source, with no distinct zinc deposition in edible tissues/products compared to the standard inorganic source, Zn sulfate heptahydrate.

Zinc chelate of methionine sulfate 8 June 2017 Bioavailability comparable to Zn sulfate or ZnO in poultry, pigs, and ruminants.

Zinc chelates of lysine and glutamic acid 25 July 2019 Based on Zn deposition across various tissues (e.g., tibia in chickens), it serves as a bioavailable Zn source, comparable to the standard inorganic Zn source, with no expected increase in zinc content in animal tissues and products.

Zinc chelate of ethylenediamine 22 March 2021 May contain multiple Zn species and not solely comprised of Zn mono-chelate of EDA; submitted combined tolerance, residue, or efficacy study in chickens for fattening was deemed invalid.

Zinc (II)–betaine complex 21 February 2023 Considering the deposition of Zn in edible tissues/ organs in chickens for fattening, the additive serves as a source of bioavailable Zn and is comparable to the standard inorganic Zn source.

About Dr. Yron Joseph Y. Manaig

Dr. Yron Joseph Y. Manaig, an animal nutritionist from Philippines/Spain, holds a master’s degree in animal nutrition from University of the Philippines Los Baños. He earned a European Joint Doctorate in Molecular Animal Nutrition (MSCA-ITN) from Universitat Autònoma de Barcelona (Spain) and Università degli Studi di Milano (Italy). Dr. Manaig specializes in swine nutrition, feed ingredient evaluation and formulation, and OMICS. He joined ANIMINE in 2023 and has been working with the R&D group since.

About Marion Taris

Marion Taris is currently the analytical project engineer of Animine Precision Minerals. She is a scientist specializing in chemical analysis. She studied chemistry and physics before specializing in chemical analysis. She graduated from the University of Pau (France). Between 2017 and 2021, she worked on the development of new strategies for the analysis of enzymes immobilized on electrodes for the French national center for scientific research (CNRS). Marion joined Animine in 2023 and has been working with the research and development group since.
ROLE OF ALTERNATIVE FEED INGREDIENTS AND FEED ADDITIVES IN MANAGING FEED COSTS

“Improving animals feed efficiency means that less inputs are required to obtain better outputs, optimizing zootechnical performance, obtaining a greater economical profit, especially in a volatile commodity market and when feed costs are a major part of the expenses for the producer. However, additives can also contribute to a more sustainable animal production, reducing the environmental impact of feed production...”

Population growth, with rising incomes and high living standards in developed countries, is driving an increased demand for high-quality protein sources. Due to its accessible cost when compared with other sources and high nutritional value, proteins of animal origin are still the preferred source for human nutrition. Ruminants, chickens, and pigs contribute to 96% of the global supply of animal protein and aquaculture is growing fast. Meeting the needs of consumers while taking into account food security, environmental concerns and cost-effective resources is a big challenge in the daily lives of animal producers who need to secure their profitability.

Production costs have been rising in every segment of animal production, where feed costs account for a significant amount. The COVID-19 pandemic, geopolitical conflicts and extraordinary weather events led to climbing energy costs and volatile commodity markets. To face this challenge and optimize feed resources and feed efficiency, all stakeholders in the feed chain must ensure cost-effective, innovative and sustainable tools. Genetic improvement, precise nutrition and sustainable sourcing of raw materials play an important role in this synergistic strategy to minimize production costs and enhance feed efficiency.
But which other alternative ingredients can be used to minimize the feed costs for the producer? Nutrition plays a major role in the maintenance of the animal health through various possibilities. But are all equivalent in terms of cost and performances?

Managing animal health is one of the greatest challenges to animal production. It is estimated that more than one in five animals are lost from disease each year, while many more incur the costs of sub-clinical infections (WOAH, found as OIE, 2015). Disease and sub-optimal health not only constrain animal well-being and the economic return for the producer, but further negate sustainability, where unhealthy animals carry a heavier environmental footprint.

CONTRIBUTING TO ANIMAL RESILIENCE

Making sure that both energy and nutrients are efficiently absorbed and used by the animal is the nutritionists’ main goal.

Farm animals have an intense metabolism, making them more vulnerable to changes. Parameters such as environmental events, critical production periods or modification of the diet characteristics can affect animal performance. Those stressors/challenges can concern all animal species with various consequences:

• Early days of life up to weaning: The first days and weeks of an animal’s life are marked by heightened sensitivity to environmental factors, such as temperature, housing conditions, access to clean water and more.

- Some species are more at risk when separated from their mother and transferred to a new facility due to the immaturity of the newborn’s immune system, as 70 to 80% of the immune cells are located in the gut.

- Many animals are vulnerable to heat stress when air temperature and humidity rise for extended or unexpected periods, during periods of drought, and when air flow is lacking.

• Feed transition: New formula is first recognized as a stranger by the organism, especially during the weaning, which means the first encounter between piglets and some raw materials. Consequently, animals have to adapt their enzymatic system in order to digest these new raw materials, which is an important physiological change.

• External parameter: Vaccination, heat stress period.

• Metabolism intensity at gestation, farrowing, calving, laying peak, lactation peak, and high average daily gain period are periods requiring high energetic needs.

Although young animals are inherently more sensitive to fluctuations in their environment, certain environmental challenges can impact all animals, irrespec-
tive of age. Heat stress constitutes one such challenge, which may be increasingly problematic with climate change. High ambient temperatures can impact an animal’s ability to maintain energetic, thermal, hormonal and mineral balance. In turn, temperatures above the thermal neutral zone can be detrimental to lactation, growth and reproduction across all agriculturally important livestock species, including aquaculture.

Consequently, taking care of the feed composition with selected raw materials and feed additives according to the animal physiologic stage, its environment, management practices, genetics and objective of production is essential to successfully address the challenge.

**GUT MICROBIOTA MODULATION**

The complex microbial community (microbiota) of the gastrointestinal tract (GIT) plays a crucial role in animal health and can be considered as an important metabolic “organ”. Composition of the intestinal microbiota is dynamic with spatial shifts along each GIT region in relation to environmental changes (Hooper et al., 2002). The entire GIT of chicken is estimated to house 640 species of bacteria from 140 different genera (Waite et al., 2015), where about 90% of the species are yet to be described. Thus, when talking about the importance and influence of gut microflora, the number of bacterial cells in the host is 10 times the eukaryote cell number in poultry body or their genes number is 50 to 100 times higher than the total number of genes constituting the host.

**Those bacteria have several roles:**
- Metabolic and nutritional (digestion)
- Maturation of immune system
  - Barrier effect to protect the organism of ‘stranger attack’
  - Participation to the set-up of a mature mucosa
  - Production of Immunoglobulin A and activation of pro inflammatory signals
- Global health because dysbiosis can be the first step of an infection, which decreases the tolerance of animals to fight against other agents and consequently, can lead to a more global disease.

In the dynamic world of livestock production, the increase of antimicrobial resistance and consumer demand for high-quality food has raised the interest for sustainable and ‘natural’ alternatives to antibiotic growth promoters (AGPs) to meet growth performance and feed efficiency expectations. To support growth and maintain a well-balanced and secure microflora during the whole life of the animals, a lot of solutions are available on the market. Among them, a unique non-viable whole-cell *Pichia guilliermondii* yeast can positively impact gut microbiota populations in poultry, swine and ruminants. Studies also demonstrated that an innovative combination of copper at very low level associated with a synthetic zeolite have capabilities to modulate the intestinal microbiota thanks to the well-known antimicrobial properties of copper (Meyer et al. 2015).

**ENHANCEMENT OF FEED DIGESTIBILITY**

An optimal zootechnical performance can be achieved from different angles. Genetic selection allowed to have the highest performance ‘athletes’ in the livestock industry, but even with the best genetic breeds, to achieve top-level performance it is necessary to maintain health, maximize feed utilization and have the best farm management practices. Different and innovative tools are available to potentiate the best response from the animals from the feed digestibility perspective:

- **Enzymes** are especially important for monogastric animals as they allow greater formulation flexibility to utilize opportunity ingredients containing higher amounts of NSPs (non-starch polysaccharides), expanding the portfolio of cost-saving ingredients that can be utilized in diets. NSPs multi-enzyme complex enables swine and poultry to better utilize the fibrous components of feedstuffs, such as hulls, middlings, and dried distillers grains (DDGS), by improving their digestibility and availability and getting more energy available from those ingredients. Phytases enable swine and poultry to better utilize phytate-bound phosphorus present in plant-based ingredients.

- **Organic acids** and their salts help to decrease the buffer capacity of feed, supporting the reduction
of the gastric pH, which will inactivate pepsinogen to active pepsin for effective protein hydrolysis. This is especially essential in young animals during the post-weaning period and transition diets when there is a limited digestive and absorptive capacity due to insufficient production of hydrochloric acid.

THE BEST PERFORMANCE INSPIRED BY NATURE

For decades, antibiotic growth promoters have been a cost-effective ally in the animal industry to improve zootechnical performance and feed efficiency. Given the increase in antimicrobial resistance and the ban on the use of antibiotics as growth promoters, it is essential to consider alternative solutions. To meet this demand, many additives on the market have been evaluated and among them, plant extracts have shown to be one of the most beneficial. The proposed mode of action of phytogenic compounds is attributed to the stimulation of enzymatic secretions and activity, nutrient utilization and absorption in the gastrointestinal tract, mitigation of gut inflammatory response, improvement of animals’ antioxidative status, reducing damage to intestinal cells and maintaining the integrity of the intestinal mucosal layer (Awaad et al., 2014; Bravo et al., 2014; Karadas et al., 2014; Pirgozliev et al., 2019).

An extensive number of studies in broilers demonstrated that the combination of carvacrol (present in oregano), cinnamaldehyde (present in cinnamon) and capsicum oleoresin (present in red chili pepper) has the potential to achieve similar levels of growth performance as AGPs and showed positive results in broiler carcass and meat quality (Bravo et al. 2009; Heng et al. 2017; Oguey., 2017). Additional studies also showed this combination improved the nutritional value of low-metabolizable energy diets when fed to broilers. This beneficial effect seems to be mediated by decreasing the energy required for the maintenance of gastrointestinal tract, diverting more energy towards animal growth rather than maintenance (Bravo et al., 2011). In addition, all existing results were gathered in a meta-analysis (Oguey et al., 2015) showing consistency in the product’s effects by increasing body weight gain (BWG: + 4.5 %), improving feed efficiency (FCR: - 3.9 %), and increasing the amount of metabolizable energy available (AMEn: +50 kcal/kg) when supplemented to broilers at 100 g/ton (Figure 1.).

<table>
<thead>
<tr>
<th>ADG (g/d)</th>
<th>FCR (g/g)</th>
<th>AMEn (kcal/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>1.61</td>
<td>3200</td>
</tr>
<tr>
<td>PHYT</td>
<td>1.60</td>
<td>3250</td>
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Figure 1. Meta-analysis of the effects of a standardized blend of cinnamaldehyde, capsicum oleoresin and carvacrol (PHYT) on the zootechnical performance and metabolized energy in broilers.
In a more recent trial in swine (results presented at European Federation for Animal Science Annual Meeting, Lyon 2023) the effect of supplementing a standardized blend of cinnamaldehyde, capsicum oleoresin and carvacrol (80 g/ton of feed) was evaluated on growth performance of fattening pigs fed restricted-feed and water diets. Three experimental groups were evaluated: the first one (negative control, NC) with a low nutritional value diet (2317 kcal/kg NE), the second with low nutritional value diet supplemented with the phytogenic mixture (NC+PHYT), the third group (positive control, PC) was fed with a high nutritional value diet (2365 kcal/kg, +48 kcal/kg vs. NC). As presented in figure 2, during the fattening period the pigs fed the phytogenic mixture observed significantly higher (P< 0.0001) growth performance in comparison to NC group (+6.1 average daily gain, - 6.6% feed conversion ratio) and it showed comparable values to the PC in the same period of the study till slaughter (Samson et al., 2023). This confirms that phytogenics can improve feed efficiency in fattening pigs and may compensate for the reduced nutritional value of the diet.

This specific combination of phytogenics showed to be an effective tool to increase the energy available for growth performance and to optimize the feed formulation costs. In ADM, we use state-of-the-art technology to deliver high-quality end products and meet customer needs. Our phytogenic bio-active-based products consist of a combination of finely selected substances found in aromatic plants and spices, encapsulated in a fat matrix for greater stability and application. In addition, phytogenic molecules have proved their effectiveness without involving risks to animals, consumers or the environment (Gharib et al., 2014).

**FINDING THE IDEAL BALANCE BETWEEN FEED COST AND FEED EFFICIENCY**

Gut health is a multifactorial and complex topic, depending on the environment, farm management, feed and housing changes. It is also probably the greatest concern for meat producers because of its impact on growth performance, animal welfare, economic sustainability and a consumer concern about food safety and traceability. Nutritional factors, infectious...
disease agents, genetic selection, environment, and management practices can negatively affect the delicate balance among the components of the gut and subsequently impair growth rate and feed efficiency. That's why improving gut health is an essential step to reach the best feed efficiency. Small changes in FCR parameter at any given feed price will have a substantial impact on financial margins, as more than 50% of the total production costs is allocated to the feed. In a context of high raw materials cost leading to high feed price, looking for strategies to reduce FCR in a flock are a must. Some solutions are aimed at quickly lowering the feed cost but show their technical limits. Another approach can be the use of solutions as feed additives ingredients that will reduce the FCR through an improvement of animal weight or the optimization of the feed consumption. This strategy will lower the production feed cost and/or will be iso-cost but profitable as leading to a higher production level.

CONCLUSION

Nutritional management offers a large panel of alternative feed ingredients targeting better nutrients digestibility, feed quality and gut health available on the market. They are essential to optimize animal productivity and feed efficiency as well as to ensure the profitability of the sector.

Nevertheless, as feed efficiency is a multifactorial complex trait, a holistic approach on other parameters involved such as the equipment and facilities, animal health, genetics, farm management and environmental factors have to be considered to achieve the best feed efficiency possible.

Furthermore, there is no consensus on a unique definition for feed efficiency as it would depend on economic, geopolitical, environmental and food security aspects.

Improving animals' feed efficiency means that less inputs are required to obtain better outputs, optimizing zootechnical performance, obtaining a greater economical profit, especially in a volatile commodity market and when feed costs are a major part of the expenses for the producer. However, additives can also contribute to a more sustainable animal production, reducing the environmental impact of feed production, including carbon footprint mitigation from crops cultivation, processing and transport. In addition, the application of additives as preservatives also contributes to reducing spoilage, waste and to maintain the best nutritional value in animal diets.

It is in this direction that ADM will continuously work to unlock the power of nature to contribute to a more resilient animal production and a sustainable future.

References are available upon request.
Gilles Houdart, Global MHS Business Director, Cargill Animal Nutrition:  
“To help solving our customers’ challenges, we have developed the Micronutrition and Health Solutions (MHS) business within Cargill Animal Nutrition & Health (ANH). MHS is deeply rooted in nutritional science, research, innovation, and sustainability and combines the best talent, resources, and capabilities of Diamond V, Delacon, and Cargill Animal Nutrition (CAN) providing a world class portfolio of postbiotics, phytogenics, anti-mycotoxin agents, and enzymes to promote better animal lives and enhance customer livelihoods.”

PROVIDING A HOLISTIC APPROACH TO ANIMAL NUTRITION WITH CARGILL’S MHS

Feed additives have played an important role in animal nutrition for several decades. Among other reasons, they can serve to improve feed efficiency, increase animal performance, and fully exploit its genetic potential. Recently, Cargill launched its newly created Micronutrition and Health Solutions (MHS) business going beyond traditional feed additives considering all microelements in animal diets impacting the microbiome providing an innovative, holistic approach to animal nutrition and health. We sat down with Gilles Houdart, Global MHS Business Director, to gain deeper insights into the MHS business and how it aims to improve animal lives and customer livelihoods.

Mr. Houdart, can you explain the idea behind Micronutrition and Health Solutions and the concept of the Microverse™?

Working closely with our customers, we know that today’s farmers, livestock, and aquaculture producers are challenged to improve animal productivity, health, nutrient utilization and to move towards zero nutrient waste. We recognize the need to reduce feed costs, help minimize antibiotic usage and reduce environmental emissions. At the same time, there is no one-size-fits-all solution that meets the wide range of customer specific needs.

To help solving our customers’ challenges, we have developed the Micronutrition and Health Solutions (MHS) business within Cargill Animal Nutrition & Health (ANH). MHS is deeply rooted in nutritional science, research, innovation, and sustainability and combines the best talent, resources, and capabilities of Diamond V, Delacon, and Cargill Animal Nutrition (CAN) providing a world class portfolio of postbiotics, phytogenics, anti-mycotoxin agents,
and enzymes to promote better animal lives and enhance customer livelihoods.

Our idea with MHS is to apply a holistic approach to animal nutrition that goes beyond traditional feed additives combining not only advanced science-based products but also cutting-edge nutrition and health expertise and digital tools to address customers unmet needs and is based on our concept of the Microverse™. The Microverse™ is formed by the many microorganisms, molecules and micronutrients found in the complex ecosystem offered by nature that can interact in an animal diet to impact the microbiome. By discovering the power of the Microverse™ we uncover the countless secrets of natural matters and develop our science-based portfolio to provide nutrition at the deepest level to help animals thrive.

What key benefits does MHS offer to its customers? How can your business create added value to them?

Building on decades of innovating additives solutions for our customers, our science-based portfolio provides solutions for all needs, for all life stages of every species, including swine, poultry, ruminant, equine, aqua and pet, to help support production goals and solve business challenges. Leveraging our size, scale, and experience we provide customers with tailored products and solutions in a precise manner, delivering the right product at the right time with the right amount.

Through our advanced knowledge of the Microverse™, understanding how all microelements interacting can influence the microbiome, we offer customers who are looking to improve animal health and performance a broad portfolio and accelerate growing one of the world’s largest, most diverse, science-based micronutrition portfolios.

Leveraging Cargill’s global R&D capabilities we have a complete, unique research and development system in place, ranging from molecule discovery to practical animal application, and develop solutions both alone and in cooperation with partners to propel new product development through real-world research. Our trusted digital and data-driven solutions enable confident decision-making and gain predictability when our customers are navigating animal health challenges. We ensure the production of high-quality solutions and continue to invest in our state-of-the-art manufacturing sites. By harnessing the power of our global capabilities, our specialized local teams partner with customers to solve their specific business challenges.

Earlier you mentioned the importance of the microbiome playing a key role in your research. Can you share a concrete example how Cargill’s microbiome research helps customers improve animal health?

To pick just one example of how Cargill is helping producers understand the secrets of the microbiome, I would like to highlight Galleon™, one of
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Cargill’s latest innovations for broilers. This innovative non-invasive analysis tool has been used in more than 100 trials around the world analyzing nearly 30,000 samples, and helps customers to determine how the gut microbiome of their flock is related to their nutrition and health, and management practices. Using data collected over several years Gallon™ unlocks the complexities of the microbiome in a practical way to provide poultry producers deeper insights into the performance of their flocks. Gallon™ is a powerful tool for confident decision-making based on science as it delivers detailed statistical reports and recommendations to optimize animal health and performance, and thus represents a major innovation milestone for the poultry industry.

Digital tools and services are redefining livestock farming providing valuable insights for producers. What role does digital solutions play in your portfolio?

We take a holistic approach to animal nutrition, leveraging Cargill’s deep expertise and suite of digital tools to deliver trusted solutions that help farmers address animal health challenges. In some markets we offer for example the Cargill Nutrition System (CNS). It includes research, methodology and a database that combines Cargill knowledge surrounding what animals need to grow and be healthy, and the raw materials that feed those animals. Considering variables like species, climate, geography and targeted business goals, CNS enables precise feed formulations tailored to our customer’s unique operations. CNS has the largest global data set and innovative research at its core and delivers precise formulations and diets, constantly adapting to an ever-changing market.

Our flexible scenario planning tool Panorama™ is a solution to help broiler operations make confident decisions for the best economic results. It allows real time control and considers market volatility and production complexities, enabling more precise diets.

Another great example of digital offerings is Bir-doo, a contactless daily broiler weight measurement solution from Cargill’s digital technology partner Knex that uses 3D cameras and artificial intelligence for better farm management and harvest planning.

MAXI NIR, as a further example, enables real-time formulation for precise feed production at feed mill ingredients line.

Nowadays livestock production is in the spotlight as one of the biggest contributors to greenhouse gas emissions. Sustainable and at the same time economically viable livestock production will continue to be constant challenges for producers. How is MHS addressing today’s challenges contributing to sustainable food production?

Our customers face increased complexity as they balance animal health and welfare, performance, and business economics while reducing their environmental footprint. We partner closely with customers to provide advice and offer holistic solutions knowing that appropriate animal feeding is the key to ensure resilience, welfare and performance of the animal. Our MHS portfolio plays an essential
role in addressing these priorities aiming to help enhance welfare, increase efficiency and nutrient utilization, promote circularity, reduce emissions and subsequently lowering environmental impacts. Our aim is to feed animals in a way that supports a growing population while contributing to a more sustainable, equitable and resilient food system.

For example, thinking about methane emissions from beef and dairy cows, which are a major environmental issue facing farmers, we are already proposing direct in-feed mitigation solutions as well as holistic approaches to reduce methane emissions intensities. Still, we keep on investigating new science-based solutions and practices to further reduce methane originated from the ruminant enteric fermentation.

What can the market expect in terms of new product innovations in the future?
To serve customers into the future we are further committed to innovation and investments in the portfolio and are driven to develop new scientifically proven technologies to connect the dots with our digital tools, products, and technical expertise. Based on deep microbiome research, digestive modeling, mode of action studies and phytogenic expertise, our world-class R&D capabilities boost product development and innovation. Thinking for example of synergies in mode of action between postbiotics and phytogenics, we see tremendous opportunities for innovative product development and have already elaborated a strong, very promising innovation pipeline.

We are committed to deliver a science-based portfolio, enabled by our world-class R&D, innovation, and manufacturing capabilities, that is globally proven through rigorous, systematic trials conducted and locally applied in markets by our trusted experts, with the purpose of being highly effective and targeted. Micronutrition and Health Solutions is how we support our customers on the path towards maximizing animal productivity, digestive health, and nutrient utilization.
“Sustainability metrics are becoming a necessary tool for communicating with your supply chain about progress toward sustainable production, and more frequently, downstream partners are already requesting such information. The GFLI now offers a methodology for companies to validate their company-specific ingredient or product, aligned with the GFLI methodology and with the possibility to have this data included in the GFLI database.”

The GFLI database currently consists of over 1800 datasets of all major feed ingredients, populated in part by baseline statistical datasets as well as by data-in providers, following the principle of life-cycle analysis (LCA) to scope the emissions of an ingredient’s production cycle (from cradle-to-gate). Data providers create a bridge between statistics and industry, creating representative data based in part on primary figures. This is a way for the industry to be proactive in gathering relevant data and showcasing not only a ‘current situation’ overview of the emissions related to their ingredient production, but also supports continuous improvement tracking over the years.

**INCREASING DATASETS THROUGH “DATA-IN PROJECTS”**

Through sectoral data provision projects (i.e. “data-in projects”), a consortium of companies, an association of member companies, or research institutes create a proposal for collecting the relevant data for a list of ingredients which will be calculated per the GFLI methodology. Following the GFLI procedures for a data-in project, a complete LCA inventory is created, which can then be shared with the GFLI for data integration. All data provided to GFLI is handled confidentially, with no traceability to your company facilities. Sectoral data-in projects allow for companies to take their first steps towards their sustainability journey, with primary data supplementing available secondary data. Using representative averages is relevant as a fall-back option when it is not possible to access primary data because high quality averaged data can still reflect the sector’s efforts to achieve sustainable production.

**WHAT’S THE RELEVANCY OF PARTICIPATING IN A SECTORAL DATA-IN PROJECT?**

- Sectoral datasets provide a benchmark for any governmental body, research institutes, and companies, that look for high-quality secondary datasets to understand the averaged emissions of an ingredient, influencing research and regulatory decisions made on representative data;
• Validation of datasets through the rigorous procedures of the GFLI, not only verifying that it is PEF & FAO-LEAP compliant – but also fully integrated into the latest versions of software tools Simapro & OpenLCA – making abovementioned benchmarking attainable;

• Participating in sectoral data-in projects allows for a unified approach toward data collection, and creates the possibility to improve upon the existing GFLI methodology framework, i.e. make approaches more specific, or find alternative and new pathways to convey sustainability metrics for specific ingredients (read chapter 6 of the Procedures document);

• May also support the collection of company-specific data for your own sustainability journey & branded data;

• Making sustainability metrics more attainable for smaller companies participating in consortium-led data-in projects.

• Insights on the supply chain, allowing structured discussions with upstream partners for representative figures up to the feed manufacturing process. This due diligence for processes allows the sector to become the driver of sustainability;

• Availability of secondary datasets for back-up of data for companies where primary data is not available, in order to comply with (inter)national regulations, supply chain demands, and voluntary programs (i.e. CSRD, SBTi, GHG protocol, PACT framework, etc.), as well as communication strategies within the full supply chain.

**COMPANY-SPECIFIC ‘BRANDED DATA’**

Sustainability metrics are becoming a necessary tool for communicating with your supply chain about progress toward sustainable production, and more frequently, downstream partners are already requesting such information. The GFLI now offers a methodology for companies to validate their company-specific ingredient or product, aligned with the GFLI methodology and with the possibility to have this data included in the GFLI database.

The GFLI branded data is a mostly primary source-driven venture that allows companies to disseminate a representative LCA of their ingredient or product. Notably, the ‘chain of custody’ is considered for a full production cycle (scope 3), which means that the collected data should not only present on-site emissions, but also the production steps of the ingredient before it reached the facility (i.e. for rendering ingredients, some level of data is required from the slaughterhouses’ processes and animals).
All the details for the methodological approaches required, as well as the procedures for completing a branded data-in project can be find on our webpage.

WHY IS BRANDED DATA RELEVANT?
• Insight on own processes
Gain insight on your own product’s or ingredient’s processes, and identify hotspots that contribute to the impact of the product. These insights can be considered quick wins as long-term investments may be considered in order to produce more sustainably.

• Insights on the supply chain
The animal feed sector is centred in a large supply chain for animal sourced food. With demands coming from downstream partners, the feed industry is challenged to have their own data in order. These insights allow for structural discussions with the upstream supply partners and create a due diligence for processes, allowing you to become the driver for sustainability.

• Sustainability reporting
The beforementioned insights can also be utilized for sustainability reporting. The Science Based Targets initiative (SBTi) is one example where companies can proactively and voluntarily set targets for emission reductions and track their progress. In the European Union, the publication of the Corporate Sustainability Reporting Directive (CSRD) will make it mandatory for any company to report on their efforts on sustainable production. Following the GFLI methodology and calculating your own LCA allows you to report for both initiatives.

• Validation
All the datasets coming into the GFLI database are internally reviewed by the GFLI, as well as independently verified by third-party certification bodies. These rigorous procedures ensure high quality data that conforms to the GFLI methodology and is compatible for meaningful comparisons within the GFLI database. Although comparing company-specific datasets is not straightforward due to the influence of management differences and other inputs that may impact the figures, comparing with averaged datasets that considered these different processes allows you to benchmark your ingredients/products with the average.

• Marketing and communication
The datasets created, the insights gained, and the emission factors resulting from the LCA allows for communicating (benchmarked) results. This information is relevant for customer and supply chain communications, as well as for marketing purposes with respect to the branded product. The GFLI recently published its logo use policy and license agreement, which includes a new logo configured to communicate figures calculated with the use of the GFLI database.

Are you already working on calculating your scope 1, 2, and 3 emissions? Or are you participating in the voluntary Science Based Targets initiative? Read GFLI’s methodology and procedures for a branded data-in projects on the GFLI website and get started working toward GFLI-compliancy!

About Laura Nobel
Laura Nobel is a manager at the Global Feed LCA Institute. Together with a small, dedicated team, she engages in a lot of the aspects necessary to maintain and grow a non-profit in a quickly developing discipline. Her main tasks are the management of the Technical Management Committee, branded data, documentations and communications.
Animal health and feed additive products are crucial for maintaining the well-being and productivity of livestock and companion animals. By providing essential nutrients, managing health conditions, and optimising feed quality, these products help ensure the welfare of animals and the production of safe, high-quality food products.

However, bringing animal pharmaceutical and feed additive products to market is a long and difficult process. A complex regulatory landscape exists with a wide range of requirements in quality, safety and efficacy/utility documentation and studies that must be met before a product may be approved. That landscape is further exacerbated by differences in requirements between regions and product categories.

Successfully navigating this regulatory landscape can be a significant challenge for product developers, especially those new to the regulatory approval process. Misconceptions about timelines, product categories, and regulatory requirements can lead to lengthy delays and increased costs. For feed additives, the best-case scenario for generating data, submitting an application and gaining approval from the relevant regulatory authority after the review...
process could be 3-4 years while, for health products, this may take 6-8 years. In either case, however, the data generation and approval process can be delayed by years if a comprehensive and complete dossier is not submitted or if studies must be redone.

To mitigate the risk of delay and its fiscal impact, complying with the relevant guidelines and regulations is critical from the outset of product development. In this article, we shed light on the common challenges that occur on the journey to regulatory approval for animal health and feed additive products and demonstrate how planning and partnerships can help you navigate this complex landscape. Specifically, we will cover:

- Keeping up to date with current regulatory guidance
- Product formulation challenges
- Manufacturing and site qualification
- Safety and residue testing and setting tolerance levels
- Study site identification and patient recruitment for animal health products
- Compiling data packages for the US and Europe

Through understanding the common challenges and strategies for navigating the regulatory landscape, developers can enhance their chances of success and bring products to market more efficiently.

DEMYSTIFYING COMMON REGULATORY CHALLENGES FOR ANIMAL NUTRITION AND HEALTH PRODUCTS

There are several key bottlenecks and challenges in regulatory approval that product developers should consider as they approach quality, safety, and efficacy/utility testing. Each of these challenges has the potential to delay timelines and add significant costs during the product development and submission process.

KEEPING UP TO DATE WITH CURRENT REGULATORY GUIDANCE

Regulations and guidelines evolve as regulatory authorities keep up with new safety data, novel techniques, and government policies. As a result, the regulatory landscape can shift substantially during the years required for product development, potentially leading to unforeseen changes in requirements. But there are steps developers can take to help mitigate risks. For example, in the US, developers are encouraged to work with the Center for Veterinary Medicine (CVM) to agree on the pivotal clinical study protocol prior to conducting the study. This allows product developers to mitigate the risk of regulatory changes affecting their clinical study.

It’s important to note that the health and feed additive spaces are regulated separately, with feed additive guidance updated more frequently in the European Union — typically every two to three years. Accordingly, product developers need to stay informed about potential regulatory changes on the horizon. By closely monitoring regulatory updates, developers can stay ahead of the curve and ensure their planned product testing and data dossier meet the latest requirements.

A major challenge in product development is demonstrating the safety and efficacy/utility of a product, while ensuring that the final formulation is well characterised. Generating the necessary data to support the dossier is often a time-consuming and expensive process, especially for complex formulations requiring multiple iterations in clinical development.

As a result, the complexity of the formulation and robust data needed to support regulatory approval can create significant challenges for product developers. The risk of delays can be reduced with careful planning around the regulatory requirements regarding formulation and investing early in its development.

MANUFACTURING AND SITE QUALIFICATION

Good Manufacturing Practice (GMP) standards are essential for regulatory approval of animal health products. CVM/European Medicines Agency conduct regular inspections to ensure cGMP compliance. While GMP requirements apply to all manufacturers, there are more obligations for organisations importing investigational veterinary medicinal products manufactured outside of the re-
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SAFETY AND RESIDUE TESTING AND SETTING TOLERANCE LEVELS

Residue and tolerance testing are essential components of the regulatory approval process for veterinary products affecting food-producing animals. Designed to demonstrate safety of your product for human consumption, these studies are required to establish tolerance levels for compound residues in food products. However, conducting residue and tolerance testing poses unique regulatory challenges for product developers.

One challenge is generating new data to establish tolerance levels, which has to be done even if another sponsor has previously provided human food tolerance data for the same compound. Without their own raw data, or if it is not sufficient to ‘reset or confirm the tolerance’, the regulatory approval process can be delayed.

In both the US and EU, human food safety testing may require radiolabelled studies to track the depletion of compounds through the animal’s body and into food products. However, performing these studies can be difficult as they rely on specialist equipment, expertise, and study sites. Product developers must take a proactive, regulatory-focused approach to food residue and tolerance testing to minimize delays and ensure their studies are compliant with regulatory requirements.

STUDY SITE IDENTIFICATION AND PATIENT RECRUITMENT FOR ANIMAL HEALTH PRODUCTS

Clinical field studies are critical components of the product development process for medicinal products, but they have the potential to cause major delays. While good communication with the regulatory authorities is essential for planning and approving protocols in line with current guidance, logistical issues associated with setting up clinical field studies often prove to be the most common challenges. For example, identifying appropriate study sites and recruiting patients can be significant bottlenecks, particularly where patients are limited in your target indication.

Furthermore, clinical field study data are essential for regulatory submissions, and can take weeks or months to complete. Delays at the outset of these studies can significantly impact the approval timeline, leading to lost resources or increased costs. Product developers can ensure a smoother path to
regulatory approval by building strong relationships with regulatory authorities and other clinical stakeholders to conduct thorough logistical planning around site identification and patient recruitment.

**COMPILING DATA PACKAGES FOR THE US AND EUROPE**

While the US and EU share a common goal of ensuring robust quality, safety, and efficacy/utility data, they have different standards and requirements for submitting data. Consequently, submitting the same data package to regulatory authorities in both regions is insufficient. While there may be some overlap in the data required by each authority, developers must carefully plan their study designs and data dossier compilations to meet the unique submission and assessment requirements of each region for their chosen product category.

To optimise cost-effectiveness and efficiency in the submission process to authorities in multiple regions, product developers should thoroughly assess testing requirements. For example, it may be that there are simple measures that can be taken to ensure one study adheres to both US and EU requirements rather than having to complete two studies. By proactively addressing these requirements, developers can minimise delays and ensure that each dossier aligns with the submission guidelines of the respective authority.

**ROADMAP TO REGULATORY SUCCESS**

In the complex regulatory environment of animal health and feed additive products, there is potential for delay and increased costs at every step of the development and approval process. Product developers can help mitigate these risks for their organisations by preparing for the regulatory submission journey as early as possible in the development cycle.

**A REGULATORY ROADMAP TO INFORM YOUR DEVELOPMENT PLAN**

Mapping the route from product categorisation to regulatory approval can help inform the product development plan, establishing relevant milestones, timelines, and potential costs. Having these identified early can help your organisation manage expectations with stakeholders and secure sufficient funding prior to embarking on the long and costly product development and approval journey.

Furthermore, comparing existing data with an up-to-date regulatory roadmap may reveal if it can be used for dossier submission. Some early testing, particularly around product composition and quality, may already meet existing guidelines and not require additional testing. Careful monitoring of the regulatory horizon for potential changes to guidelines and regulations should be factored into the regulatory roadmap to avoid unnecessary repetition of costly tests during product development.

**BUILD RELATIONSHIPS WITH CRO/CDMOs WITH REGULATORY EXPERTISE**

Delays in the regulatory approval process can have significant repercussions, potentially leading to increased development costs and underserving both consumers and animals. To mitigate risk of delay, product developers must cultivate beneficial relationships with a range of stakeholders, including the regulatory authorities, manufacturers, clinicians, and regulatory experts to ensure that their roadmap supports the product development plan.

Partnering with an animal health CRO/CDMO with deep regulatory expertise can help you curate your regulatory roadmap and development plans as you progress through the product development cycle. Such partners can perform a gap analysis to identify what data are missing and which tests must be conducted, and also provide clearer visibility of the project’s costs and timings. By maintaining the regulatory roadmap/gap analysis as a living document, the development plan can be updated as gaps are filled, or as timelines or costs change.

Animal health CRO/CDMOs with regulatory experts can also help mitigate some of the general challenges faced by product developers from the outset. Many of the processes performed in early development such as formulation and product release profiling generate data that can be used in the regulatory
submission, but only if it meets standards set out in the guidance. If you partner with an organisation with both development and regulatory capabilities, they can easily coordinate on specific data requirements, thereby helping to de-risk and streamline development processes in line with regulatory requirements.

CRO/CDMOs can also help with identifying correct product categorisation, informing on realistic timelines at each stage of product development, and providing insight to changing guidelines. Additionally, if a developer is seeking approval in both the US and EU, guidance from partners with experience in both regions may provide information on overlapping requirements and how to streamline costly testing processes.

What’s more, animal health CRO/CDMOs can ensure quality standards are met throughout the product development cycle and that the product is correctly characterised when the final formulation is established. In addition to adhering to required safety and GMP standards for manufacturing, CRO/CDMOs can also assist in identifying appropriate test sites and organise patient enrolment, minimising the risk of delays to already lengthy safety and efficacy/utility study periods.

**PLAN AHEAD AND PARTNER TO ENSURE SUCCESS**

Navigating the regulatory landscape for animal health and feed additive products can be a daunting task, but it is necessary to ensure quality, safety, and efficacy/utility. Although the road to regulatory approval can be difficult and costly, the benefits of bringing a new product to market are clear: happier, healthier, and safer animals.

To overcome the numerous regulatory challenges and ensure a smoother path to approval, product developers must take a proactive and strategic approach. This includes planning early and integrating compliance measures into the product development process, as well as partnering with animal health CRO/CDMOs with expertise in regulatory affairs. By working closely with these experts, product developers can ensure that they meet all regulatory requirements and avoid potential setbacks, ultimately accelerating time to market and enhancing product success.

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**About Dr. Bill Zollers**

Dr. Bill Zollers, Head of Regulatory Affairs at Argenta, has extensive experience in all facets of veterinary drug development and new product registrations within the US and Canada. In his 30+ years, he has led several cross-functional teams to help navigate over 20 veterinary product approvals. During this time, Dr. Zollers has held numerous positions in animal health industry trade organizations, and served on many committees, subcommittees and working groups. Dr. Zollers earned his PhD degree from the University of Missouri. He joined Argenta, a global CRO and CDMO dedicated to animal health, in February 2020 and is responsible for oversight of regulatory consultation for drug sponsors.

**About Dr. Cornelia Hüttinger**

Dr. Cornelia Hüttinger is the head of Regulatory Affairs Department at Argenta Munich, responsible for general strategic advice, registration, and regulatory life cycle activities for the registration of feed, feed additives, biologicals, and veterinary medicinal products. Dr. Hüttinger studied veterinary medicine at the University of Munich and did her thesis in oncology. Before joining Argenta she did Internship Programme at the University of Veterinary Medicine in Vienna and worked as assistant veterinarian in a Small Animal Clinic near Munich.

**About Laura Payo Lewis**

Laura Payo Lewis holds a Master’s degree in Biotechnology from the University of Salamanca. For over 12 years Laura has been working with a variety of projects involving additives for pets and livestock in the EU and other leading markets. She developed a passion for regulatory affairs by helping companies successfully bring new feed additives to market and ensuring market continuity. Laura is currently leading the Animal Nutrition Regulatory department at Argenta Barcelona.
Animal Health is of utmost significance for coexistence of human and animal ecosystem, the fact being evident from “One Health concept” being widely accepted and practiced across geographies. Lot of work and new initiatives are undertaken at various levels to ensure food security for increasing world population i.e., adequate levels of safe and sustainably produced proteins. Animal health markets hold a promising opportunity globally, however recent developments have led to the changing needs and expectations, if addressed can help the producers meet the feeding demands of world sustainably.

Global animal health is classified on the basis of animal type, into two major segments i.e., livestock (poultry, swine, cattle, fish) and companion animals (dogs, cats, horses) with a market share of 48% and 52% respectively. India animal health market is divided into four segments basis species, which include livestock (ruminants), poultry, companion (dogs and cats) and aqua representing 52%, 39%, 7% and 2% market share, respectively. Global challenges like outbreaks especially ASF in swine, FMD and Brucellosis in ruminants, Avian Flu in poultry has made it tough for these markets to maintain growth over last couple of years, on the contrary companion animal segment has been resilient and growing at over 7% CAGR annually, with a few countries growing at double digit, including India.

GLOBAL ANIMAL HEALTH TRENDS

- “Artificial Intelligence” has caused disruption in each sphere and animal health sector is not an exclusion too, e.g., use of AI /smart farming like technology enabled collars/sensors among livestock for monitoring critical data like movements, sitting vs standing time, etc. for optimizing production and performance.
- Technological advancement integration of AI based and IOT sensors is helping to take informed advanced decisions leading to reduced disease incidences among animals.
- Precision nutrition is gaining grounds where optimum nutrients are supplied as per the specific needs of the animal for improved production and minimal impact on the environment.
- Production animals are expected to reach their best genetic potential, which can be achieved by improved nutritional efficiency, that in turn leads to increased productivity and sustained production.
- Beef on dairy as a concept is gaining acceptance, as it can provide higher quality beef products without impacting current milk efficiencies, and greater feed efficiencies leading to reduced carbon emissions.
• Safe and Healthy produce is what the customers ask today. This responsible shift i.e., being conscious of the impact of our actions towards the planet has led to increased acceptance and usage of phytogenic feed additives vs traditional use of ABG’s or synthetic derivatives.

• Awareness of pet parents on balanced nutrition, importance of healthy and clean ingredients and sustainable sourcing are key trends shaping the companion animal space.

**EVOLVING LANDSCAPE OF ANIMAL HEALTH SEGMENTS GLOBALLY**

**Livestock:** Environmental restriction and low carbon footprint objectives set by various government agencies have left the owner with no option but to produce best quality produce with minimal emissions, which is attainable by increasing per animal productivity, rather than increasing head counts to meet feeding needs of the world.

• 20% of global livestock production is lost to diseases each year (HFA ref.).
• Ban on use of ABG’s across the globe has shifted the practices to prevention rather than treatment which is highly evident by a decline in global antibiotic sales and increase in vaccine numbers.

**Way forward:**
• Scaling up existing practices in animal health and husbandry without increasing emission, to meet the feeding demands of the world population.
• Use of feed additives and phytogenic ingredients is one of the promising sectors that will support sustainable production in coming years as this not only increases productivity per animal but also reduces emission by mitigating harmful effects on the environment.

**Companion Animals:** Need for companionship and human animal bond is getting stronger and stronger as Zoomers are taking pet parenting as an informed decision today.

**Way Forward:**
• Right nutritional information on packs, clean and green labelling practices
• Sourcing ingredients from sustainable sources in pet food
• Vaccination and preventive health care option.

Animal health market offers a long-term opportunity that can be capitalized by helping animal producers with right information on balanced feeding/nutrition, ways to improve nutrient digestibility and optimum health by using phytogenic/feed additives. The success lies not only in increasing per animal productivity but also enhancing productivity across the entire production chain to produce suitable and sustainable produce for feeding our ever-increasing world population. Alongside the need of Zoomers to provide best alternatives to optimize health and longevity of their beloved pets is an excellent avenue for us.

**About Ritesh Sood**

Dr. Ritesh Sood, is a techno-commercial veterinarian with over 17+ years in animal health space. His learnings include technical and commercial management of across species, geographies. He has a keen interest in small animal nutrition and is passionate about pets.
Feed Preservatives and Global Market Status

The increasing demand for animal food products such as meat, milk and eggs worldwide leads to an increase in the animal population and expansion of the livestock sector, which in turn increases the demand for animal feed. The key factor in this demand is the demand for quality and safe animal food, and therefore the demand for quality and safe animal feed. This demand drives the need for reliable and effective methods of preservation, namely feed preservatives, to ensure the integrity of feed throughout the supply chain. Forecasts reveal that the global feed preservatives market will reach a size of USD 4.9 billion in 2023 and will continue at a CAGR of approximately 4.6% between 2023 and 2030.

By Derya Yildiz

Feed preservatives are organic and inorganic substances added to animal feeds to extend shelf life and maintain nutritional quality. These preservatives help prevent the growth of harmful microorganisms such as bacteria, yeasts and fungi in feed ingredients and finished feeds and reduce the risk of microbial spoilage. They thus contribute to the overall safety and stability of animal feed, ensuring that animals receive nutritionally complete and uncontaminated feed. In addition, these preservatives are also very important for keeping the feed uncontaminated from production to consumption, i.e. extending its shelf life.

The applications of animal feed preservatives are varied and essential for the welfare and productivity of livestock and poultry. However, because excessive doses or inappropriate use can be dangerous to animals or humans, it is recommended that feed preservatives be used at reasonable levels and with appropriate safety procedures. To ensure the safety and efficacy of
feed preservatives, regulatory authorities such as the FDA and the European Food Safety Authority have established recommendations for their use.

COMMONLY USED FEED PRESERVATIVES

Common types of animal feed preservatives include organic acids, antioxidants, mould inhibitors and antimicrobial agents. Each of these preservatives serves specific purposes in maintaining the quality of feed ingredients and finished feeds and are segmented into feed acidifiers, mould inhibitors, feed antioxidants, anti-caking agents. According to market research companies, feed acidulants are the segment with the largest market share in the global feed preservatives market. This segment is expected to grow significantly in the coming years and dominate the global market.

FEED PRESERVATIVES MARKET AND FORECASTS

According to a recent report by Acumen Research and Consulting, the global animal feed preservatives market size was realised at USD 4.8 billion in 2022. Pointing out that the market will grow at a CAGR of 6.4% between 2023 and 2032, the company estimates that the total size will reach USD 8.8 billion by 2032.

DataM Intelligence's report provides similar data on the market size and growth expectations. According to the company’s report on the global feed preservatives market, the market size, which reached USD 4.12 billion in 2022, will reach USD 6.76 billion by 2030, growing at a CAGR of 6.4% during the forecast period 2023-2030.

Spherical Insights & Consulting also estimates the market size at USD 4.7 billion in 2022. According to the company’s report, the feed preservatives market will reach USD 8.9 billion by 2032, growing at a CAGR of 6.5% during the forecast period.

Another market forecast supporting the first 3 reports belongs to Maximize Market Research (MMR). According to MMR’s report, the global feed preservatives market, valued at USD 4.79 billion in 2022, will grow at a CAGR of 6.6% during the forecast period 2023-2029. The company expects the market value to reach USD 7.49 billion in 2029.
Global Market Insights Inc. points to the value of the market in 2023 in its report. According to the company’s report, the market size was USD 5.06 billion in 2023. The company predicts that the market will grow at a CAGR of more than 6.1% from 2024 to 2032.

The current market size and CAGR expectations of these 5 research companies, which are the source of our report on the global feed preservatives market, paint a very similar picture. With an average calculation based on these reports, we can foresee that the global feed preservatives market had a size of USD 4.9 billion in 2023, will grow at a CAGR of 4.6% between 2023 and 2030 and will reach a size of approximately USD 7.6 billion in 2030 with this growth rate.

FACTORS SUPPORTING MARKET DEVELOPMENT

The global feed preservatives market has recorded significant growth in recent years due to various factors. One of these factors is the expansion of the livestock and feed industry. The increasing demand for animal food products such as meat, milk and eggs worldwide leads to an increase in the animal population and expansion of the livestock sector, which in turn increases the demand for animal feed. However, the key factor here is the demand for quality and safe animal food, and therefore the demand for quality and safe animal feed. This demand drives the need for reliable and effective preservation methods to ensure the integrity of feed throughout the supply chain.

Developments in the field of feed preservatives also play a role as a driving force in the growth of the market. The industry is developing innovative and sustainable solutions that fulfil both the need for effective preservation and the growing demand for environmentally friendly applications. Legal regulations for feed safety and quality standards also support these solutions.

Another important factor that cannot be ignored is climate change. The increase in unpredictable weather events due to climate change increases the risk of bacterial and fungal contamination, i.e. the risk of feed spoilage. This situation increases the need for preservatives, considering the possible harmful effects of feeds produced without feed preservatives.

All these factors, along with the awareness of the economic losses related with feed spoilage and contamination, are leading farmers and feed producers to adopt feed preservatives more and more.

According to analysts, the biggest opportunity in the market is expected to be in the natural preservatives segment. Antibiotics are no longer used to preserve feed due to antibiotic resistance resulting from their widespread use. This limitation is considered as a growth opportunity for natural and innovative feed preservatives. Concerns about sustainability are also increasing the shift towards natural products. However, governments are implementing rules and regulations for environmentally friendly production. Therefore, companies are expected to have tremendous growth opportunities by developing natural and organic feed preservatives in the current period.

FACTORS LIMITING MARKET DEVELOPMENT

Low profit margins are considered among the factors that will limit market development. According to analysts, high profit margins are difficult to achieve in the animal nutrition sector. In recent years, high margin products have been sold in lower volumes, which reduces the sales volume. The demand for feed preservatives has gradually decreased as a result of under-delivery principles, which has reduced the profit that was initially accessible.

High production costs are also considered to act as a major limiting factor for the feed preservative market. The development and production of feed preservatives requires specialised equipment with advanced technology and skilled labour force. This increases the production costs. According to the researchers, this may cause a decline in the growth of the market.

Legislation can play a role as a limiting factor in feed preservatives, as in many other areas. Researchers point to strict regulations that limit the use of
certain preservatives due to their potential hazards. Developing products in compliance with these regulations is considered to be one of the biggest challenges for companies working in feed preservatives.

Other limiting factors include concerns over the potential impact of preservatives on animal health; increasing competition among key players, which may act as a barrier for new entries into the market. The market is expected to become more competitive in the coming years as many players compete for market share.

MARKET SITUATION BY ANIMAL SPECIES

In terms of animal species, the poultry segment is expected to witness significant growth in the coming years. As the global demand for poultry products such as chicken meat and eggs continues to grow, the need for high quality and safe poultry feed is increasing. Animal feed preservatives, including antioxidants, mould inhibitors, and antimicrobial agents, are essential to maintain the freshness and nutritional integrity of poultry feed throughout production and supply chain.

The poultry industry’s emphasis on efficiency and productivity has led to greater adoption of preservatives to prevent feed spoilage and contamination. Moreover, intensification of poultry farming practices, especially in emerging economies, is contributing to the demand for improved feed preservation methods.

The other key segment in feed preservatives is the cattle segment. According to research companies, the cattle segment will continue to hold a significant market share in the global feed preservatives market in the upcoming period.

MARKET DEVELOPMENT ON REGIONAL BASIS

North America stands out as the dominant region in the animal feed preservatives market due to its high livestock population, developed livestock industry, presence of major feed preservative manufacturers, high sophistication in the feed additive sector and stringent regulatory standards. Especially the United States and Canada have an important role in shaping the market. The North American livestock sector, which includes poultry, swine and cattle farming, is an extensive and highly industrialised sector, resulting in a significant demand for high quality and preserved animal feed. One of the key factors contributing to North America’s dominance in the animal feed preservatives market is the region’s commitment to feed safety and quality standards. Strict regulations enforced by agencies such as the U.S. Food and Drug Administration
(FDA) and the Canadian Food Inspection Agency (CFIA) mandate the use of preservatives to ensure the integrity of animal feed. Compliance with these regulations has driven the adoption of advanced preservative technologies, positioning North America as a leading market for innovative and effective solutions. The region is also at the forefront of technological innovation in feed preservation. The region’s abundant access to raw materials such as dextrose and corn is likely to boost feed preservative production.

According to research companies, despite the dominance of North America, Asia Pacific holds great potential for the future of the feed preservatives market. The cattle and poultry industries in the region, particularly in India and China, are rapidly developing and industrialising. This will increase the demand for animal feed and with it feed preservatives in the coming years. It is also predicted that the region will use feed preservatives more frequently due to the favourable outlook for disease-free beef. China, one of the world’s largest meat producers, is expected to continue to be favourable for market expansion in the region.

MARKET ENVIRONMENT
IN TERMS OF SUPPLIERS
Key players in the feed preservatives market are implementing various growth strategies such as mergers & acquisitions, collaborations, and new product launches to strengthen their market position and expand their product portfolio. A significant number of these players are actively engaged in offering a wide range of organic and natural feed preservatives, which has heightened their popularity in the market. Focusing on research and development to offer effective products to their customers, these players are also focusing on improving customer experience and increasing their production capacity in the market by implementing new marketing strategies.

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3. Feed Preservatives Market Trends, Global Outlook & Forecast (exactitudeconsultancy.com)
7. Feed Preservatives Market - Global Industry Analysis and Forecast 2029 (maximizemarketresearch.com)
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Vilofoss Group appoints new CEO

Agriculture has been the focal point of Dennis Jørgensen’s entire career and on 1 June, he will assume a leadership role in one of Denmark’s largest companies, the DLG Group. Jørgensen takes over as CEO of the Group’s vitamins and minerals business, the Vilofoss Group, which has activities in most of Europe and partners in several continents.

Dennis Jørgensen takes over from Jesper Pagh, Group COO and member of the Executive Board of the DLG Group, who was the interim Head of Vilofoss, when the former CEO left to take on a job closer to his home country, the Netherlands.

“I am pleased that Dennis has accepted the role as Head of Vilofoss. Dennis comes with years of experience and in-depth industry knowledge. Over the years, he has created great results, and at the same time he is a skilled leader who sets direction, drives development, and manages to involve his team. I really look forward to our collaboration,” says Jesper Pagh.

Dennis Jørgensen is a trained farmer and started his career in management positions in agriculture. In 1998, he chose to become more commercially oriented and over the years, he has held leadership responsibilities in companies such as Brenntag Nordic and AB Agri in Denmark and the UK. In 2022, he completed a management education at INSEAD and today runs his own company, Nordic Nutrition Partner A/S.

Read more>>

Arla Foods Ingredients acquires Volac’s Whey Nutrition business

Arla Foods Ingredients signed an agreement to acquire the Whey Nutrition division of Volac’s business through a purchase of the shares in Volac Whey Nutrition Holdings Limited and its subsidiaries, Volac Whey Nutrition Limited and Volac Renewable Energy Limited. Completion of the transaction is expected later this year subject to required regulatory approvals.

The UK-based Volac group specialises in turning whey into ingredients for sports nutrition, with by-products being sold for food and animal nutrition. At its heart is its whey processing facility in Felin Fach in Wales.

The acquisition would play a significant role in Arla Foods Ingredients’ future plans. It envisions the Felin Fach site as a global production hub and a cornerstone of an enhanced product offering in the performance, health and food sectors.

For Volac, this represents a logical step in its evolution as a family business and provides the springboard for the optimal development of the Whey Nutrition Business as well as Volac’s remaining Animal Nutrition Business.

Luis Cubel, Group Vice President and Managing Director of Arla Foods Ingredients, said: “This brings together two complementary offerings in a growing and increasingly international space for whey products. Volac is a pioneer in the use of whey protein for performance nutrition and has a wealth of expertise as well as an incredibly talented team. It shares our commitment to helping companies worldwide harness the full potential of whey, and we’re hugely excited about the opportunities that lie ahead.”

Read more>>
NR X Holstein crossbred cows surpass pure Holsteins

In a study conducted by Geno at a large US dairy farm with over 15 years of experience in milking crossbred cows, results reveal that Norwegian Red (NR) X Holstein crossbred cows surpass pure Holsteins in various key performance indicators.

The study, utilizing raw data collected through Dairy Comp and analysed using SAS (Statistical Analysis System) statistical software, focused on different generations, including over 2,900 Holsteins and more than 5,400 NR X Holstein crosses, spanning F1 to F4 generations.

Comparable Milk Yield with Lower Feed Cost
Over 10 months (305 days), NR crossbred cows produced an average of 25,052 lbs. or 11,363 kg from all generations compared to 25,155 lbs. or 11,410 kg of milk produced by Holsteins. This parity in milk yield was achieved with a lower feed cost for NR crosses.

Increased Income from Shorter Days Open
NR crossbred cows showed a shorter period of days open, with 17 fewer days open compared to Holsteins. This advantage in reproductive efficiency contributed to more milk sold and increased overall income.

Higher Milk Solid Yields and Percentages
NR crossbred cows outperformed Holsteins in fat percentage, with an average of 4.25% across all crossbred generations compared to Holsteins’ 3.73%. These higher fat yields add to the overall economic advantage of NR crossbred cows.

Neogen introduces Farm Fluid MAX for livestock and poultry markets

Neogen Corporation announced that it launched Neogen Farm Fluid MAX in Great Britain and will soon be available in other European markets, subject to global registrations and notifications. This dual-action disinfectant is designed for challenging farm conditions and is formulated for use as part of a Neogen Pathogen Programme.

The company explained that Neogen Farm Fluid MAX, an extension of the respected Farm Fluid product line, is specially designed to be applied as part of coccidiosis control protocols. It is proven to challenge and destroy oocysts, breaking the protozoa cycle and inactivating up to 100% of sporulated and non-sporulated oocysts. At 2% dilution, the disinfectant has demonstrated effectiveness on multiple field strains of Eimeria oocysts, including E. tenella, E. maxima, and E acervulina.

"Farm Fluid MAX is a robust and powerful solution, demonstrating our commitment to providing the highest-quality products for our customers around the world," said Andy Hughes, Senior Director of Animal Safety, EMEA, at Neogen. "We have formulated this disinfectant with chlorocresol (CMK), a second biocide, and other supportive ingredients, including a solvent for increased solubility and a surfactant, making it the ideal solution for combating difficult farm environments."

Neogen Farm Fluid MAX can be used in a variety of applications for the general disinfection of both indoor and outdoor animal housing, as well as in wheel and boot dips with minimal degradation by direct sunlight.

Read more>>
Trouw Nutrition, Nutreco’s livestock feed business line, will contribute four research posters to the 8th International Conference on Poultry Intestinal Health (ICPIH) in Manila, Philippines, 17–19 April, and host a pre-event Salmonella control gathering on 16 April. Scientific study posters will offer new insights to inform some of the poultry industry’s most pressing concerns including Salmonella control, mycotoxin risk management and reducing antibiotic use in poultry production. He holds a bachelor of science degree in logistics and international business from Penn State University and an MBA from Duke University’s Fuqua School of Business.

“I’m excited to continue advancing responsible seafood practices globally with our partners. GSA is proud to engage with many of the world’s leading aquaculture and wild-caught seafood producers, retailers, foodservice operators, and NGOs, and I look forward to closer collaboration as we advance our shared vision. This work isn’t possible without the incredible team at GSA. Their commitment to our mission and dedication to continuous improvement inspires me daily. It’s an honor to serve this team and lead GSA into the future,” said Kocsis.

Read more>>
First schemes offering responsible soy products pass independent ITC benchmarking process

FEFAC and ITC announced that the first schemes offering responsible soy products to the European feed market successfully passed the independent ITC benchmarking process against the updated FEFAC Soy Sourcing Guidelines 2023. Amaggi Origins Field, CARAMURU Sustentar Programme, Cefetra Certified Responsible Soya Standard, COFCO International Responsible Agriculture Standard and RTRS (Round Table on Responsible Soy) have become the five schemes that have been benchmarked and published on the dedicated FEFAC benchmarking online tool on ITC Standards Map. There are more schemes undergoing the benchmarking process, meaning more results will be presented in the future.

“I am pleased that the first schemes have passed the benchmarking exercise against our updated Soy Sourcing Guidelines and am looking forward to further results,” said Pedro Cordero, FEFAC President. “While we are still fully engaged with our value chain partners on the implementation of the EU Deforestation Regulation, it is good to show our continued commitment to delivering on the ambition to provide market transparency on the availability of soy that is free from conversion of natural ecosystems and covering a broad spectrum of sustainability credentials.”

Rajeev Murthy named Novus Asia Business Director

Novus, a company with a focus on innovative, advanced technology to help protein producers, announced Rajeev Murthy as senior director & managing director of Asia beginning April. Murthy will shape and steer the intelligent nutrition company’s strategy in this market.

“Rajeev comes to Novus with more than 25 years of industry experience,” says Sr. Vice President and Chief Commercial Officer Ed Galo. “Along with his positive track record for driving commercial success, employee engagement and talent development, we are confident in his ability to elevate our presence and enhance our strategic initiatives across Asia.”

Originally from India, Murthy says luck brought him to the animal agriculture industry, but he’s made it his life’s career “for the difference one can make in improving access to healthy and safe protein.”

When it comes to supporting poultry, swine, and dairy producers in Asia, Murthy says customer profitability is key.

“For poultry, driving profitable growth while being mindful of changing customer needs where sustainability and antibiotic use are concerned is important,” Murthy reflects. “For swine, we need to investigate ways to return to a profitable operation in a world that is still impacted by challenges resulting from African Swine Fever. With dairy, we can show how to drive efficiency in the operation.”

As part of Novus’ goals to deliver solutions closer to the customer, Murthy will be based out of the company’s office in Bangkok, Thailand.
Icelandic salmon producer LAXEY successfully completed a EUR 40 million capital increase, and it was announced that Nutreco is one of its new investors. LAXEY, a hybrid flow-through salmon project located on Vestmannaeyjar, also referred to as the Westman Islands, was founded in 2019. The project is building on the legacy of the local fishing industry while tapping onto the natural advantages of land-based aquaculture in Iceland.

LAXEY’s main owners, the Oskarsson family, have 75 years of fishing heritage behind them. They had started their first round of fundraising last autumn, hoping to attract international investors in order to reach its production goal of 4,500 metric tonnes of salmon in 2025. They have set their sights on 27,000 metric tonnes by 2030.

Skretting emphasizes that it holds a strong position in Iceland, the fastest growing market in the salmon industry, and is also a global leader in feed to closed aquaculture systems (CAS) farms. With this investment in place, Skretting has committed to supplying LAXEY with feed through the whole build-up phase of the project.

“In Skretting we believe in close and long-term collaboration with fish farmers in order to release the full potential from nutrition, feeding and efficient logistics,” says Håvard Walde, General Manager of Skretting Norway. “We are very proud to partner with LAXEY. This partnership puts us in a good position to prepare for our next steps in Iceland.”

Argenta reconfigures RD&I division

In recent years, Argenta’s Research, Development & Innovation (RD&I) business grown substantially, both organically and through several acquisitions. In addition, the company has progressed its product development partnership with NovaQuest. Now, the company has restructured RD&I into two new divisions, CRO Services and Pharmaceutical Development Services (PDS), each with its own dedicated leadership and focus. With this restructuring, Argenta aims to better leverage the scale and expertise of its CDO, CRO and Product Development teams across the world to improve its services and offerings to clients.

“The new structure will enable us to work together more efficiently, deliver our strategy more effectively, and provide the best service to our customers and co-development partners,” said Will Downie, CEO at Argenta.

As a result of the restructure, Edward McGruder, Global Head of RD&I, has decided to leave the company and pursue new career opportunities. McGruder joined Argenta in 2019 and during his tenure, the company has benefitted greatly from his expertise, network in the animal health industry, and vast R&D experience.

“I would like to take the opportunity to thank Edward for everything he has done for the company, for the leadership legacy he leaves us with, and wish him the very best in his future endeavours,” Downie added.

Skretting commits to supplying feed to salmon project

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Aker BioMarine strengthens its position in Chinese market with partnership

Aker BioMarine partnered with Function, its largest customer of Superba Krill oil in China. This partnership underscores the parties’ mutual ambition of pursuing a long-term strategic partnership. Through the collaboration, Function aims to drive growth of krill-based products within the Chinese market, where Aker BioMarine has seen significant growth over recent years. The partnership furthermore includes an intention for Function to license the Kori® krill oil brand in China, and to be the first customer of Aker BioMarine’s new protein product Understory®.

Understory® is Aker BioMarine’s new premium protein product and is produced in its newly opened production facility in Ski, Norway. The facility is currently ramping up production, and Function has the intention to purchase a portion of the 2024 output, with an expressed ambition to purchase more as the factory ramps up going forward. This will be Aker BioMarine’s first commercial sale of Understory®.

Kori® is the company’s own omega-3 krill oil brand in the US. To further grow the brand, Aker BioMarine has been looking to expand Kori outside of the US, and as a first step the company reported in its fourth quarter 2024 report that Kori has won distribution with Costco Japan, although relatively small volumes to begin with. As part of this strategic partnership, Function has a stated ambition to license the Kori® brand for sales of krill oil products in the Chinese market in exchange for royalty payments.

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dsm-firmenich unveils EU authorization for Hy-D®

dsm-firmenich, one of the leading innovators in nutrition, health and beauty, announced that it received a renewal of the European Union authorization for 25OHD3 from Saccharomyces cerevisiae CBS 146008 in poultry and pigs and extension for its use in ruminants, based on its Hy-D® scientific dossier submitted to the European Food Safety Authority (EFSA). 25OHD3 (Hy-D®, the unique form from dsm-firmenich) is the main circulating form of vitamin D3 in humans and animals, and sufficient levels are associated with improvements in animal health and performance.

With this latest EU authorization for ruminants, farmers will be able to optimize animal lifetime performance for more sustainable farming. dsm-firmenich stated that Hy-D® enhances intestinal calcium/phosphorus (Ca/P) absorption, critical to avoid complications during the transition period. Its role on improving Ca/P metabolism results in higher Ca/P retention throughout lactation to ensure females arrive stronger to next calving that also promotes yield increase in milk. Furthermore, Hy-D® strengthens immune capacity beyond the other existing sources of vitamin D, reducing the risk of infectious diseases and metabolic disorders, thereby reducing the need for medications and promoting resilience of ruminants.

Hy-D® offers significant benefits for both swine and poultry, including improved bone strength, optimized health, increased meat and egg yield, and enhanced overall quality. The company unveiled that the proper usage of Hy-D® can positively impact animal well-being and productivity.

Read more>>
Perstorp Animal Nutrition prepares for leadership change

Perstorp Group, a wholly-owned subsidiary of PETRONAS Chemicals Group Berhad (PCG), announced a change of leadership within its animal nutrition business effective June 1st. Executive Vice President Aart Mateboer has announced his retirement after May 31st. The company is determined to conduct a seamless leadership transition and continuously deliver on its ambitious growth plan.

“Animal nutrition remains integral to Perstorp’s and PCG’s strategic future and has recently developed an ambitious strategic plan, outlining the roadmap for expanding its business long-term, primarily based on product development and differentiation. Focus has been and will continuously be on delivering on this plan,” says Ib Jensen, President and CEO of Perstorp Group.

“Aart Mateboer has been leading the Perstorp Animal Nutrition team with dedication and has built his team based on confidence and empowerment. When he retires on May 31st, it marks the conclusion of an intense and successful chapter in his career. His decision to retire fully reflects personal aspirations and goals, and I would like to extend my warm gratitude for his invaluable contributions,” Jensen continues.

“The change of Leadership will also mark a new chapter in Perstorp Animal Nutrition’s journey towards sustained growth and excellence. The search for Aart’s successor has commenced and will be announced in due time,” Ib Jensen concludes.

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Viktor Eckel joins management board of Dr. Eckel

Dr. Eckel Animal Nutrition added a new name to its board of management. Dr. Viktor Eckel joined founder Dr. Antje Eckel on the management board as Managing Director with the main responsibility for products and innovation. According to Dr. Eckel, this strategic decision marks a significant step towards securing the company’s future.

For 30 years, the family company has been all about innovative feed additives for sustainable animal nutrition. With a second generation at the management table, the company is now in a great position to meet the current challenges of a growing international market, according to CEO Antje Eckel.

Viktor Eckel is setting out his priorities clearly: sustainability, resilience and resource efficiency. And he emphasizes, “When it was founded 30 years ago, Dr. Eckel was among the first companies backing plant-based alternatives. We recognised at an early stage how important they are for promoting animal health and well-being and pursued a more sustainable approach from the outset. This commitment remains at the core of our philosophy today.” Viktor Eckel, who believes that this is the key for feed manufacturers and producers in Germany and worldwide to achieve high-resistance, resource-efficient and profitable production, adds: “Offering our customers the best solutions and services for this now and in the future is an amazing, exciting role that I and the rest of the team are very much looking forward to.”

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Global changes and local solutions featured at ANCC 2024

What impact will global changes have on Canada's feed industry? How can local solutions help the sector thrive? How can the feed industry address animal nutrition and feed security to build the sector of tomorrow? Answers to these questions will be at the core of the 8th annual Animal Nutrition Conference of Canada (ANCC) hosted by the Animal Nutrition Association of Canada (ANAC).

The event will gather feed industry specialists, researchers, and industry partners from across Canada and around the world in Winnipeg from May 14-16.

“We are looking forward to hosting an outstanding conference,” says Rhett Arnason of More than Just Feed, Vice Chair of ANAC. “Today there are many changes impacting our sector, from the global to the local level. We have the opportunity to work together, share knowledge and drive progress to emerge as a leader in this new landscape. The ANCC will offer valuable perspectives on many of the key developments along with a robust technical program, networking opportunities, student events and more. We can’t wait to welcome our feed industry community to Winnipeg – a fitting location as a major hub of our country’s feed grains sector and agricultural community.”

With a conference theme of “Animal nutrition and feed security: Global changes and local approaches,” the event will showcase ideas and insights on many key issues, trends and developments. “As researchers and feed industry representatives, it is always valuable to come together to share our unique perspectives,” states Dr. Greg Page of Huvepharma, ANCC Program Chair. “Our program promises to inform our shared knowledge while stimulating fresh thinking on how we can work together for a successful and sustainable future.”

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BEWITAL agri announces its new managing director

Thomas Rathmer has been named as the new Managing Director of BEWITAL agri GmbH & Co KG since 1 March 2024. The previous Managing Director of the speciality feed manufacturer, Gerrit-Jan Overbeek, is retiring, the company announces. Overbeek has shaped BEWITAL agri for 22 years and has continuously developed the company.

“We are delighted to have Thomas Rathmer, a proven expert in animal nutrition and animal health with a strong international network, on board the BEWITAL Group. To support the future development of the company, we have made targeted investments in our production facilities and expanded our global sales network in recent years. With Thomas Rathmer, we believe we are very well positioned for the future to utilise our growth opportunities worldwide,” said Jürgen Petershagen from the owner family.

After completing his agricultural training, Thomas Rathmer studied agronomy in Soest. He has been part of the BEWITAL agri team for over ten years and took over the position of Sales Manager in 2021. Thomas Rathmer was appointed an authorised signatory of BEWITAL agri at the beginning of the year.

Read more>>
Nutreco announced the appointment of Maarten Bijl to the newly created Chief Digital Officer role, effective June 1, 2024. Bijl will also become a member of the Management Board.

Bijl has spent the last 15 years working across SHV companies in roles encompassing strategy, commercial management, and regional general management. The last three years have been spent at Nutreco as Managing Director Trouw Nutrition North America.

In this new role, Bijl will be responsible for the digital transformation of Nutreco, seeking productivity gains through data analytics, the digitisation of processes and the application of the latest digital technologies. In addition, Bijl will focus on creating an improved and seamless customer experience and developing a digitally enabled business model to accelerate the Trouw Nutrition and Skretting strategies.

“Nutreco recognises the rapid digital developments that are happening in our markets and the world in general. To successfully deliver on our purpose of Feeding the Future and our vision to be the leading partner in nutritional and functional solutions for sustainable farming, Nutreco must lead in the digital transformation of our industry. I’m delighted Maarten has taken on this opportunity for our business,” says CEO-elect David Blakemore.

“There is a great opportunity to adopt the latest digital technologies in the animal nutrition industry, learn from other industries and make a leap forward. I look forward to ensuring Nutreco is positioned to take advantage of the latest digital developments to support our customers and our colleagues to make our purpose of Feeding the Future a reality,” adds Bijl.

Read more>>

Trouw Nutrition welcomes Eduardo Lopes Alberto as new CEO

Nutreco announced the appointment of Eduardo Lopes Alberto as the new CEO of Trouw Nutrition as of June 1, 2024. Alberto replaces David Blakemore who will succeed Fulk van Lede as Nutreco’s CEO.

Eduardo Lopes Alberto joined Trouw Nutrition in January 2024 as Vice President of Global Innovation and Research. Prior to joining Nutreco, Alberto worked at DSM-Firmenich for seven years, most recently as the Vice President Global Innovation and previously as the Vice President for the North America region. Prior to joining DSM, Alberto worked at Elanco Animal Health and MSD Animal Health with diverse global roles in marketing, sales and R&D and managing business operations in the USA, Asia, and Latin America.

Alberto has a Doctor of Veterinary Medicine from the Universidade Estadual Paulista, Brazil, holds an MBA from the University of São Paulo and graduated from the General Management Program at Harvard Business School.

“I’m delighted to have the opportunity to lead Trouw Nutrition and this passionate team as we continue to deliver on our ambition for the company’s next phase of growth and our promise of Feeding the Future,” said Alberto.

Read more>>
dsm-firmenich showcases new omega-3 range

dsm-firmenich, innovators in nutrition, health and beauty, showcased its full range of ingredients at Petfood Forum 2024, including the latest addition to the company’s portfolio, Veramaris® Pets – one of the world’s most powerful and complete omega-3 solutions for cats and dogs. The company notes that at stand 1306, attendees also discovered DHAgold™ alongside innovative taste ingredients and gut health-supporting nutrients, to help pet nutrition brands create food, treats and supplements that are good for pets, good for producers and good for the planet.

Veramaris® Pets algal oil is the latest addition to dsm-firmenich’s petfood portfolio. Containing 60% eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) – the highest of any solution on the market – it delivers more than double the potency of equivalent fish-oil while also providing enhanced taste and stability benefits, according to dsm-firmenich.

Around 930 billion fish are removed from the oceans each year, just to supply the pet food industry with fish oil and meal. The company emphasizes that Veramaris® Pets aims to change this as an infinitely consistent and scalable source of omega-3 that does not rely on fish stocks. With Veramaris® Pets joining dsm-firmenich’s growing petfood portfolio, producers will benefit from the company’s worldwide team of experts, global supply chain and access to a range of nutritious and taste products.

At Petfood Forum, dsm-firmenich also showcased DHAgold™, which offers petfood brands even more versatility in DHA fortification. According to the information provided by the company, this easy-to-use powder is made from fermented algae and is scientifically proven to support brain health in dogs. In one study, a group of 8- to 11-year-old dogs were fed food containing DHAgold™ for 6 months and displayed significantly improved memory and visual performance.

Land O’Lakes CEO listed among TIME100 most influential people

TIME named Beth Ford, Land O’Lakes, Inc. President and CEO, to the 2024 TIME100, its annual list of the 100 most influential people in the world. The list recognizes the impact, innovation and achievement of the world’s most influential individuals.

“I am honored to be mentioned among this impressive group of people. The list recognizes influence is most critical on issues that affect everyone, like the global food supply,” Beth Ford commented. “Our farmers, cooperatives and ag retailers carry the most risk in the food system. Without investment in rural America – its communities, its businesses, and its families – the interconnected global food chain is vulnerable. We all owe so much to the grit, determination and resilience of the people who feed us all.”

Beth Ford has served as President and CEO of Land O’Lakes, Inc. since 2018. Land O’Lakes operates in all 50 states and more than 60 countries, touches half the harvested acres and over 10,000 rural communities in the U.S.

Ford, who has held senior positions in seven companies in six industries, leads not only by delivering financial performance, but also by addressing the important global issues and structural changes that can improve areas directly impacted by food and agriculture.

Read more>>
Lallemand Animal Nutrition, one of the global leaders in the science of fermentation and a primary producer of yeast and bacteria, announced the launch of a new website dedicated to pet and equine nutrition: https://lalprobiome.lallemandanimalnutrition.com/

The new website is a comprehensive resource for pet-food and equine feed and supplements industry professionals, veterinarians and nutritionists. The company unveiled that it provides technical content on pet and equine health and nutrition, including articles, white papers and webinar recordings on new website.

LALPROBIOME.lallemandanimalnutrition.com is a showcase of Lallemand's innovative microbial-based solutions for pets and horses. According to the company's statement, these solutions address five main areas:

1. Digestive care
2. Immune support
3. Antioxidant optimization
4. Gut-brain axis
5. Bedding and comfort

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Agrifirm assigns Doris Yu as Managing Director Asia

Royal Agrifirm Group, a global agricultural company, announced that Doris Yu has joined Agrifirm as its Managing Director Asia, from a career that includes leadership positions at global companies such as Cargill and Royal DSM. Most recently, Yu served as Senior Vice President and General Manager at Yara International. With a track record of strategic leadership and business development, Doris Yu is positioned to lead Agrifirm’s team in advancing the company’s strategy and growth initiatives in Asia.

Commenting on Doris Yu’s appointment, Jolanda van Haarlem, Group Director Specialties and Global Strategy Director at Royal Agrifirm Group, remarked, "We are pleased to welcome Doris to Agrifirm as the new Managing Director of Asia. With her wealth of experience and leadership qualities, we look forward to her contributions to our ongoing efforts in the region."

Doris Yu also expressed her enthusiasm for joining Agrifirm, stating, "I am honored to be joining Agrifirm. I look forward to collaborating with the team to drive forward our strategic objectives and deliver value to our customers and stakeholders."

The appointment of Doris Yu comes as Jeroen Jeuken, Managing Director Asia, prepares to pursue other opportunities after nearly a decade of dedicated and committed service at Agrifirm. Under Jeuken’s leadership, the Asian region has achieved significant milestones in business development and growth, setting the foundation for further progress. He has played a pivotal role in navigating Agrifirm through significant challenges in Asia, including the complexities posed by the COVID-19 pandemic and the African swine fever outbreak. Agrifirm states that it extends its sincere gratitude to Jeroen for his contributions and wishes him the very best in his future endeavors.

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Marine ingredients industry gathers at IFFO's meeting

The Members Meeting of IFFO, the Marine Ingredients Organization, took place in Miami from the 16th to the 17th April, gathering 220 delegates from 29 countries, representing the fishmeal and fish oil sector, the aquaculture and nutraceutical industry as well as scientists and certification programme representatives.

At a time when the first anchovy season is starting in the North-Centre of Peru, the speakers shared positive expectations for a rebound in fishmeal and fish oil production to take place in 2024 after last year being marked by the El Nino / La Nina phenomenon.

With 20 speakers, the emphasis was very much on market trends and science and how evidence-based considerations can help frame the understanding of the sector and its contribution to the global food system.

“Everything starts with facts and data. These have to be our North star to support informed decision making in a wide range of fields such as fishery management, traceability, mitigation of environmental impacts, enforcement of labour rights,” stated Petter Martin Johannessen, IFFO’s Director general at the end of the meeting.

IFFO’s next meeting will be its annual conference in Lisbon from 21st to 23rd October 2024.

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Nutreco names David Blakemore as new CEO

Nutreco CEO Fulco van Lede announced that he will be stepping down from his role this summer after leading the company for the past three years. Nutreco explained that David Blakemore will succeed Fulco as CEO. In addition, Therese Log Bergjord, CEO of Skretting for the past seven years has announced her decision to step down, also in the summer.

“I have thoroughly enjoyed my time at Nutreco, and my many years as part of the SHV team, and I’m proud of what we’ve achieved together,” says Fulco van Lede. “It’s been a privilege to work alongside Nutreco’s passionate team as we tackle the challenge of sustainably feeding an ever-growing population. Yet, after 20 years at SHV, with the last 10 working at Board level, it is time for me to broaden my horizon.”

According to Nutreco’s statement, it is Fulco’s personal decision to step down as CEO. With effect from June 1, 2024, David Blakemore will succeed Fulco as CEO.

Blakemore joined Nutreco in 2022 as CEO of Trouw Nutrition, the company’s livestock feed business line, and member of Nutreco’s Management Board. He has over 30 years of experience nurturing customer relationships, driving the commercial and innovation agendas and guiding operations and has established a strong track record of delivering results and building strong teams.

“I am honoured to have the opportunity to lead this great business and passionate team as we continue to deliver on our promise of ‘Feeding the Future’ and our ambition for the next phase of growth,” says David Blakemore.

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BioZyme assigns Maria Haag as Director of Analytics

BioZyme* Inc., one of the global fermentation leaders, announced the appointment of Maria Haag, Ph.D., as the company’s new Director of Analytics and Software Development. In her role, Haag will streamline and strengthen existing technologies and develop new solutions to create efficiencies within the company.

“I am super excited about the opportunity to join the team at BioZyme,” Haag said. “Not too many careers will let me combine my two favorite things in life—animals and computers. I want to make sure that people feel good about their jobs, including our customers. That means ensuring that everyone on the team has the technology they need to do their jobs.”

Haag earned both her Ph.D. and master’s degree in Animal Genetics and Genomics, respectively, from the University of Missouri. However, she spent her doctoral studies in a computer lab rather than in a typical animal science lab. A life-long learner and computer guru, Haag developed educational software for classroom use, the company stated.

In her early career, Maria Haag also developed software to help livestock producers visualize the long-term effects of genetic selection.

Skretting CEO Bergjord to pass baton to van Tilburg

Skretting, one of the world leaders in the manufacture and supply of aquaculture feeds, announced that Therese Log Bergjord will be stepping down from her position as the CEO of the company. Log Bergjord will be succeeded by Bastiaan van Tilburg, who is currently Managing Director for Trouw Nutrition Europe and Central Asia, the company explained.

Skretting stated that the company has grown under Bergjord’s unique brand of leadership over the past seven years, with sales volumes increasing during her tenure. She has led the team through difficult times – including the Covid-19 pandemic and raw material challenges – while maintaining an unwavering focus on innovation and sustainability. The company emphasizes that Bergjord has inspired and touched Skretting’s people through her integrity and passion for aquaculture.

“After seven years in Nutreco I came to the decision that it was time for a change. I have headed up Skretting for this period and it has been a privilege. I have enjoyed every part of it; my exceptional colleagues, our innovation capabilities and the entrepreneurial culture we are so proud of. I am truly grateful for the support and cooperation with my colleagues in the Management Board and across Nutreco and SHV. My main focus now is to secure a proper handover to Bastiaan,” says Therese Log Bergjord, CEO of Skretting.

“Therese’s genuine interest in people and her positive leadership style have always stood out to me and it’s clear that she has built a very strong and closely connected team, and a culture of collaboration. Also, as a recognized leader in the aqua industry Therese has helped Skretting to be the reference brand in the market. She will be deeply missed, but she leaves the company in a very solid state and with a bright future ahead,” reflects van Tilburg. “For me it’s an immense honour and great pleasure to follow in Therese’s footsteps. I feel a tremendous responsibility to build on her legacy.”

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CBS continues its US expansion with Dr. Seth Monegue

A new phase of US progress is underway for CBS Bio Platforms to support rising demand and opportunities for the company’s Feed Science Platforms (FSPs). CBS USA announced new developments for both its team and FSPs portfolio. This includes new progress across R&D, manufacturing, distribution and customer support, along with team expansion led by the addition of Dr. Seth Monegue as Technical Services Manager, USA.

“We are pleased to welcome Dr. Monegue to the CBS team,” said Rob Patterson, CBS Bio Platforms VP of Innovation & Commercialization. “He brings a wealth of knowledge and experience as a director of nutrition and feed manufacturing, who shares our passion and focus on innovation and customer success. He will play a key role as we continue to execute our US expansion plans, bringing FSPs to more customers across production regions.”

Monegue holds a PhD in swine nutrition from the University of Kentucky, where he previously completed master’s and bachelor’s degrees in animal science. He has over 10 years of experience in animal nutrition and feed manufacturing roles, including broad experience working directly with producers and industry across multi-species on feed technology adoption and integrated nutrition strategies to improve results.

“I’m very excited for this opportunity,” expressed Monegue. “CBS Bio Platforms has an outstanding reputation as a science-driven company at the forefront of many of the innovations making a real difference at the farm level and rising in demand today. This aligns very well with my own ‘science-first’ philosophy and approach. I’m looking forward to working with the CBS team and customers to bring more of the best science-based solutions to more farms.”

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AB Agri appoints new Managing Director for AB Neo

A B Agri announced the appointment of Heidi Burrows as the new Managing Director to lead its specialist neonate nutrition business, AB Neo. Burrows assumed the role on 15 April 2024 and brings a diverse breadth of experience to AB Neo following a tenure of over 15 years at sister company, AB Vista, where she held leadership roles spanning commercial, operational and regulatory departments.

On the appointment, Heidi Burrows said: “I am delighted to be joining AB Neo as managing director. As a neonatal business with a strong grounding in research and its own Centre of Excellence trial farm, AB Neo is uniquely placed to help customers meet the nutritional needs of all young farm animals – today and in the future. We have an ambitious growth strategy, and I am excited to be joining the team as we set off in pursuit of our goals and look to support the business’s growth.”

Following four years as AB Neo managing director, Ian Wellock moves into a role at AB Agri sister company, Premier Nutrition as Senior Pig Nutritionist. Commenting on his appointment, Wellock said: “It is a pleasure to be joining the team at Premier Nutrition, it is a thriving business within the AB Agri group and I look forward to being part of its ongoing success.”

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Alltech sells Agolin products in the US and Canada

Alltech, one of the global leaders in agriculture and animal nutrition, began serving as the primary importer and distributor of Agolin® products in the United States and Canada effective May 1, 2024. In its statement, Alltech pointed out that Agolin’s high-quality essential oil blends are scientifically proven to optimize feed intake and performance, including improved milk and meat production, for both ruminant and non-ruminant animals.

“We are dedicated to supporting producers with the best available nutritional technologies to achieve more milk and meat while reducing their environmental footprint,” said Martha Baker, Alltech lead for Agolin.

Agolin® Ruminant was the first feed additive certified by The Carbon Trust for methane reduction in ruminants (2018). Today, Agolin Ruminant is included in the diets of more than 2 million dairy cows worldwide, and leading carbon methodology owners like Verra and Gold Standard recognize it in their international climate protection project registries. Concord Agriculture Partners has also chosen Agolin Ruminant to create a new carbon inset project, which guarantees that participating dairy producers will receive an industry-leading 85% of the gross value of the carbon asset, Alltech notes.

Feedworks USA introduced Agolin products to the North American market and has led the adoption and growth of these landmark nutritional technologies. Alltech added that in 2022, the company introduced the first enteric carbon project using Agolin in the U.S., not only reducing the carbon footprint of those dairies but providing a significant additional income to those farms. The Feedworks team will continue to support and distribute Agolin in partnership with Alltech.

“We are all excited to have Alltech partner with us in continuing to grow the market for these exciting products,” said Peter Williams, one of the partners with Feedworks USA. “Agolin ruminant products, in particular, are heavily researched and show productivity and efficiency benefits to U.S. dairies worth more than $10 per $1 cost. In addition, farmers can cover most of the cost with carbon credits. At present, well over half a million dairy cows are being fed Agolin Ruminant in the U.S., and this number is set to continue to grow rapidly.”

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BioZyme unveils Nuproxa Colombia as its South American distributor

BioZyme® Inc. unveiled Nuproxa Colombia S.A.S. as the newest distribution partner for its line of fermentation products, AO-Biotics®. Nuproxa Colombia is part of the Nuproxa Switzerland distributor network, offering its clients natural products and solutions.

“The AO-Biotics® portfolio aligns well with our mission and vision of providing the highest-quality, natural products to our customers,” said Alvaro Ospina, General Manager of Nuproxa Colombia.

“We are very honored to have such great partners as Nuproxa. With care that comes full circle at the core of everything we do, their commitment to innovative products that provide health and nutrition solutions for animals is a perfect fit,” emphasized Fernando Bargo, Ph.D., Senior Manager of Business Development and Innovation at BioZyme. “We are excited to partner with this progressive company to distribute AO-Biotics products to customers in Colombia.”

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