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Excellence Awards 2026**

**23 September 2026
Hyderabad, India**

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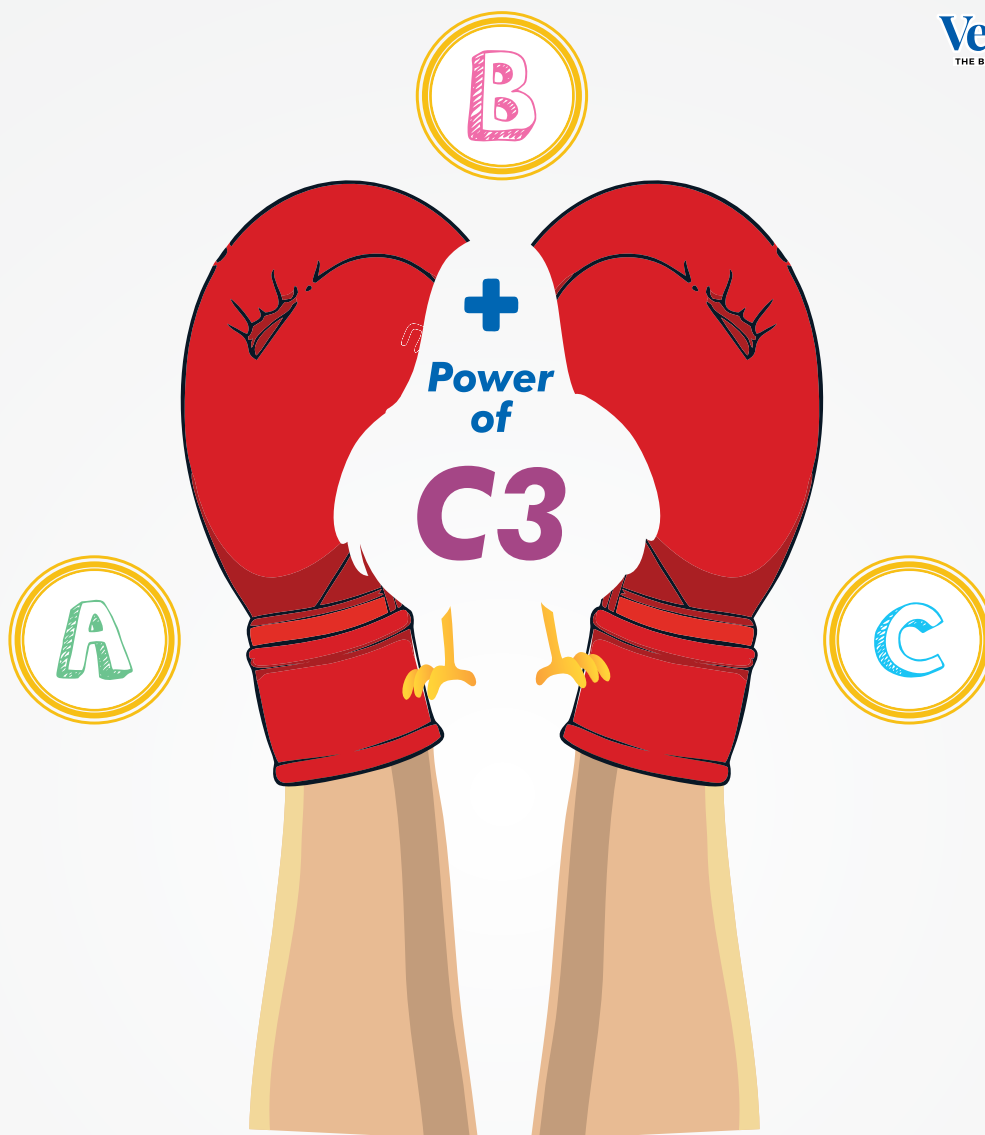
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Northern Region

COMPANY: Sampoorna Feeds FARMER NAME: Mr. Parwinder Singh	JUNE-2026	Top #1
	Farm Type	Open House
	State	PUNJAB
	Chicks Placed	5,022
	Mean Age	33
	Avg Body Wt	2,560
	FCR	1.33
	cFCR	1.20
	Livability%	94.6
	Daily Gain	77.6
	EPEF	551



Eastern Region

COMPANY: IB Group FARM NAME: SBR Farm	JUNE-2026	Top #1
	Farm Type	Closed House
	State	BIHAR
	Chicks Placed	12,544
	Mean Age	39
	Avg Body Wt	2,803
	FCR	1.50
	cFCR	1.32
	Livability%	97.9
	Daily Gain	71.9
	EPEF	468



Central Region

COMPANY: IB Group FARMER NAME: Mr. Balveer Singh	JUNE-2026	Top #1
	Farm Type	Closed House
	State	MADHYA PRADESH
	Chicks Placed	9,700
	Mean Age	40
	Avg Body Wt	2,829
	FCR	1.46
	cFCR	1.28
	Livability%	97.2
	Daily Gain	70.7
	EPEF	469



South Region

COMPANY: IB Group FARMER NAME: Mr. Manjunatha K	JUNE-2026	Top #1
	Farm Type	Closed Shed
	State	KARNATAKA
	Chicks Placed	18,290
	Mean Age	36
	Avg Body Wt	2,636
	FCR	1.36
	cFCR	1.22
	Livability%	95.3
	Daily Gain	73.2
	EPEF	512



June 2026 -Top PERFORMANCE BY AREA

Area	Chicks Placed	Mean Age(Days)	BW	FCR	cFCR(2Kg)	Livability%	Daygain	EPEF
North EC House	9,095	36	2,399	1.41	1.32	92.6	66.4	436
North Open House	5,022	33	2,560	1.33	1.21	94.6	77.6	552
East EC House	12,544	39	2,803	1.50	1.33	97.9	71.9	468
East Open House	1,015	40	2,663	1.55	1.40	95.9	66.6	411
Central EC House	9,700	40	2,829	1.47	1.28	97.2	70.7	469
Central Open House	5,389	35	2,367	1.44	1.36	95.6	68.6	455
South EC House	18,290	36	2,636	1.36	1.22	95.3	73.2	512
South Open House	2,998	35	2,273	1.49	1.43	96.5	64.9	420

June 2026 -Top 10 FIELD PERFORMANCE

Flock	Farm Type	State	Chicks Placed	Mean Age	BW	FCR	cFCR	Livability%	Day Gain	EPEF
Flock 1	OPEN HOUSE	PUNJAB	5,022	33	2,560	1.33	1.21	94.6	77.6	552
Flock 2	OPEN HOUSE	PUNJAB	9,856	36	2,653	1.36	1.21	93.3	73.4	504
Flock 3	CLOSED HOUSE	KARNATAKA	18,290	36	2,636	1.36	1.22	95.3	73.2	512
Flock 4	OPEN HOUSE	SOUTH BENGAL	810	35	2,311	1.30	1.23	95.8	66.0	488
Flock 5	OPEN HOUSE	PUNJAB	8,624	32	2,163	1.27	1.23	95.2	67.2	503
Flock 6	OPEN HOUSE	PUNJAB	4,972	33	2,292	1.30	1.24	93.2	70.2	503
Flock 7	OPEN HOUSE	PUNJAB	2,213	36	2,140	1.28	1.25	95.1	59.4	442
Flock 8	OPEN HOUSE	PUNJAB	6,865	34	2,407	1.34	1.25	95.3	70.7	503
Flock 9	OPEN HOUSE	RAJASTHAN	2,920	45	2,802	1.44	1.26	84.7	62.3	367
Flock 10	OPEN HOUSE	PUNJAB	8,497	35	2,510	1.38	1.27	91.4	72.1	477

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WOAH adopts updated Global Action Plan on Antimicrobial Resistance 2026 - 2036

The Future of Eggs is Functional: Eggs are one of the most complete and affordable sources of high-quality protein and essential nutrients. Enriched eggs are produced by supplementing the diet of laying hens with highly bioavailable nutrients that are naturally transferred into the egg.



Dear Readers,

The August 2026 issue of Poultry Fortune is in your hands. In the news section you may find news about.....

The 183 Members of the World Organisation for Animal Health

(WOAH) adopted the updated Global Action Plan on Antimicrobial Resistance (GAP-AMR) 2026–36 during WOAH's 93rd General Session on May 21. The adoption marks a significant achievement for WOAH and the Quadripartite (FAO, UNEP, WHO and WOAH) partnership on AMR, bringing the global community one step closer to a coordinated, One Health response to one of the most pressing challenges facing human, animal, plant and environmental health. Two days later, member states of the World Health Organization (WHO) also adopted the updated plan during the World Health Assembly, reinforcing a shared commitment across sectors and regions to accelerate action against AMR. A roadmap for the next decade - The updated GAP-AMR sets out a common vision and strategic direction for the period 2026–36. It reflects the commitment made by United Nations Member States in the Political Declaration of the High-level Meeting on Antimicrobial Resistance, which called for a robust and inclusive multi sectoral response through a One Health approach that aligns with current realities to drive greater impact against antimicrobial resistance.

Policymakers and Industry leaders convene in New Delhi to drive regulatory harmony, innovation, and manufacturing leadership. The Indian Federation of Animal Health Companies (INFAH) hosted its landmark National Seminar on June 12, at the India Habitat Centre, New Delhi. Anchored in the theme "Reimagining Animal Health & Nutrition in India: Driving Ease of Doing Business, Innovation & Leadership," the seminar brought together a gathering of policymakers, leading veterinary

scientists, corporate leaders, and academic stalwarts to map out a resilient growth trajectory for the country's animal healthcare and livestock ecosystem. The seminar underscored INFAH's core mission, "Healthy Animals, Healthier India," demonstrating the critical link between high-standard veterinary healthcare, rural farmer prosperity, national food safety, and public health. Key discussions focused on advancing ease of doing business through modern regulatory frameworks, collaborative governance, and scalable technological innovation. Fostering Regulatory Vision & Ease of Doing Business. The technical programme was opened by Dr Vinayak Sood, Joint Secretary, INFAH, reaffirming INFAH's guiding mission: "Healthy Animals, Healthier India." This was followed by a welcome address by Dr Manoj Sood, General Secretary and a national perspective presentation by Mr Vijay Teng, President, INFAH. Mr Teng outlined the sector's macroeconomic contributions and set strategic benchmarks for the sector's growth.

Poultry Federation of India delegation led by its President Mr Ranpal Dhanda, met Mr Mahipal Dhanda, Education Minister, Government of Haryana, and explained key issues impacting the growth and development of poultry sector in the state. The Minister extended support and facilitated a high-level meeting with Mr Anurag Rastogi, Chief Secretary, Government of Haryana and other senior officials Mr Arun Kumar Gupta, Principal Secretary to the Chief Minister, Mr Vinay Kumar, Chairman, Pollution Control Board and Dr Prem Singh, Director, Animal Husbandry, Government of Haryana. The Chief Secretary directed the concerned departments to take action on several important reforms.

Srinivasa Farms organized the Srinivasa Hy-Line Egg School 2026 in Alila Diwa, Goa on 27 and 28 July 2026. The conference focused on the latest advancements in layer genetics, nutrition, flock management, disease prevention, biosecurity, and technologies that help improve bird health, egg quality, and farm profitability. Experts from Hy-Line International - Dr Petek Settar, Director of Research Development shared the latest updates on Hy-Line's

Contd on next page



Poultry Fortune

Our Mission

Poultry Fortune will strive to be the reliable source of information to poultry industry in India.

PF will give its opinion and suggest the industry what is needed in the interest of the stakeholders of the industry.

PF will strive to be The Forum to the Stakeholders of the industry for development and self-regulation.

PF will recognize the efforts and contribution of individuals, institutions and organizations for the development of poultry industry in the country through annual Awards presentation.

PF will strive to maintain quality and standards at all times.

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breeding programme and the future development of W-80i and Brown layer birds. Dr Daniel Valbuena, Global Technical Service Director, delivered technical sessions on critical management factors affecting layer performance, including water quality, feed particle size, lighting, environmental management, and the importance of the first 27 weeks in determining a layer's lifetime productivity. Mr Vitor Arantes, Global Product Manager, discussed modern nutrition strategies that complement the latest genetic advances and improve profitability. Experts from several leading companies also shared their technical expertise.

The leader in intelligent nutrition today announced the launch of the NOVUS Raw Material Compendium, a digital platform designed to support more informed, data-driven feed formulation strategies. The platform, which is accessible at novusint.com / raw material, provides nutritionists and feed formulators with a centralized resource to evaluate ingredient variability, compare nutrient values across the most relevant databases, assess internal ingredient data, and explore alternative raw materials.

A new Polaris Market Research report shows the global feed mycotoxin detoxifiers market growing at a steady 4.06% CAGR through 2034, with Asia Pacific, poultry, and biological detoxification technologies emerging as the clearest growth signals for the animal nutrition industry. Mycotoxin contamination has quietly become one of the animal nutrition industry's most persistent operational threats and the market built to solve it is scaling accordingly. The market is expected to touch USD 2.40 billion already in 2026, underscoring how quickly demand is compounding. A Trouw Nutrition study cited in the report found that nearly 80% of maize samples tested across India in Q2 2025 were positive for both aflatoxins and fumonisins, a striking illustration of how widespread the exposure risk has become even in a single harvest cycle.

In the Articles section, **Functional Enriched Eggs: A Smart Nutritional Innovation for Improved Poultry Performance and Human Health** authored by Dr Hanumant Dahiphale says that the Role of Organic Selenium, Organic Zinc, Vitamin E and Vitamin D₃ in Producing Premium Value-Added Eggs. The Future of Eggs Is Functional: Eggs are one of the most complete and affordable sources of high-quality protein and essential nutrients. Today, with increasing consumer awareness about preventive healthcare, the demand is rapidly shifting from conventional foods to functional foods that provide additional health benefits beyond basic nutrition. Enriched eggs are produced by supplementing the diet of laying hens with highly bioavailable nutrients that are naturally transferred into the egg. Laboratory analyses confirmed enrichment levels of 4.6-fold for vitamin D, 3.5-fold for vitamin E, approximately 3-fold for selenium and nearly 2-fold for zinc compared with conventional eggs.

Another Article titled, **Mycotoxin-Induced Hepatic and Renal Stress Limits Vitamin D Activation** by Avitech Nutrition Pvt Ltd discussed that Vitamin D is one of the most critical nutrients influencing skeletal development, eggshell quality, immunity, hatchability, and overall productivity in poultry. However, the biological effectiveness of dietary Vitamin D depends on its successful conversion into active metabolites through hepatic and renal hydroxylation. Under commercial production conditions, mycotoxin exposure, among other stressors, can impair liver function and compromise this activation process, resulting in functional Vitamin D insufficiency despite adequate dietary supplementation.

Another Article titled, **Elucidating AGP Mechanisms of Action:**

A Blueprint for Developing Next-Generation Alternatives authored by Dr Prasanna Venkatesh said that The Global Pivot: Navigating the Post-AGP Landscape: The global poultry industry is currently undergoing a fundamental transformation that transcends simple regulatory adherence. For decades, Antibiotic Growth Promoters (AGPs) were the cornerstone of production efficiency; however, the strategic landscape has shifted toward a precision physiological model. Producers who move beyond traditional antibiotics are not just complying with the law they are securing their position in a market where "clean" production is the new baseline for commercial viability.

Another Article titled, **Bacillus Subtilis PB6 – A Reliable and Optimal Solution for Dysbacteriosis in Broilers** by Ajay Kumar, Venket M Shelke, Partha Das, and R Chanthirasekaran discussed that modern broilers achieve high body weight and improved Feed Conversion Ratio (FCR), but this performance places significant stress on the gut, making them susceptible to bacterial enteritis, dysbacteriosis, necrotic enteritis (NE), and coccidiosis. Poor gut health elevates FCR and leads to wet litter, respiratory stress, increased litter handling needs, and higher treatment costs. In India, a considerable cost per ton of feed is incurred for the management and treatment of gut health disorders, particularly dysbacteriosis.

Another Article titled, **Stress Starts in the Cell, Shows Up in the Meat** by Neotle Global Pvt Ltd discussed that modern poultry have been genetically selected for exceptional growth rates, superior feed efficiency, and high production performance. While these genetic advancements have significantly improved productivity, they have also increased the bird's metabolic demands and reduced their capacity to tolerate environmental and physiological stress. Consequently, even short periods of stress can trigger profound metabolic changes that divert nutrients and energy away from growth and production toward survival.

Another Article titled, **Impact of Pre-Slaughter Factors on Meat Quality** authored by Preethi, V discussed that poultry meat quality is determined by several factors acting before and after slaughter. Among these, ante-mortem factors have a major influence on meat colour, tenderness, water-holding capacity, pH, carcass yield, and shelf life. These factors also affect bird welfare, processing efficiency, and microbial safety. Proper management during the pre-slaughter period helps reduce mortality, carcass defects, and economic losses while producing high-quality poultry meat. Antemortem factors affecting poultry meat quality may be divided into two categories.

Another Article titled, **Moisture Optimization and Mold Control: An Integrated Approach to Improving Feed Quality, Shelf Life, and Feed Mill Profitability in Tropical Climates**, authored by Dr Maloshrie Bora discussed that Across India and South Asia, feed manufacturers today face a common challenge: producing safe, stable, high-quality feed while navigating increasingly variable climate conditions, fluctuating raw material quality, rising production costs, and greater demands for feed efficiency. Among the many factors that influence feed quality, moisture management remains one of the most underestimated. Yet moisture directly impacts pellet quality, nutrient preservation, feed hygiene, shelf life, production through put, and overall profitability. Conversely, optimized moisture control can generate significant economic returns while improving feed quality throughout the supply chain.

M.A.Nazeer
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WOAH Members adopt updated Global Action Plan on Antimicrobial Resistance

The adoption brings the global community one step closer to a coordinated, One Health response to one of the most pressing challenges facing human, animal, plant and environmental health.



Source: kentoh | BigStock.com

Press release - July 23, 2026:

The 183 Members of the World Organisation for Animal Health (WOAH) adopted the updated Global Action Plan on Antimicrobial Resistance (GAP-AMR) 2026–36 during WOAH's 93rd General Session on May 21.

The adoption marks a significant achievement for WOAH and the Quadripartite (FAO, UNEP, WHO and WOAH) partnership on AMR, bringing the global community one step closer to a coordinated, One Health response to one of the most pressing challenges facing human, animal, plant and environmental health.

Two days later, member

states of the World Health Organization (WHO) also adopted the updated plan during the World Health Assembly, reinforcing a shared commitment across sectors and regions to accelerate action against AMR.

As the first of the Quadripartite organizations to formally adopt the updated Global Action Plan through its governing body, WOAH demonstrated its leadership and commitment to advancing a coordinated global response to antimicrobial resistance.

A roadmap for the next decade

The updated GAP-AMR sets out a common vision and strategic direction for the period 2026–36. It reflects the commitment

made by United Nations Member States in the Political Declaration of the High-level Meeting on Antimicrobial Resistance, which called for a robust and inclusive multi sectoral response through a One Health approach that aligns with current realities to drive greater impact against antimicrobial resistance.

The plan has six strategic objectives:

- Strengthen awareness and promote appropriate social and behavioral change.
- Strengthen surveillance systems and laboratory networks to support evidence-based policies and action.
- Intensify infection prevention and control

to reduce the burden of infectious diseases and the need for antimicrobials.

- Ensure equitable access, appropriate use and safe disposal of antimicrobials, diagnostics and other health products.
- Accelerate antimicrobial resistance research and innovation.
- Strengthen multi sectoral governance, sustainable financing and accountability for a coordinated AMR response.

By addressing AMR through a One Health approach, the Plan recognizes the interconnectedness of human, animal, plant and environmental health and the need for collective action to preserve the effectiveness of antimicrobials for future generations.



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INFAH National Seminar Charts a New Blueprint for India's Animal Health and Nutrition

Polymakers and Industry Leaders Convene in New Delhi to Drive Regulatory Harmony, Innovation, and Manufacturing Leadership



A view of participants in The Indian Federation of Animal Health Companies (INFAH) National Seminar held on June 12, 2026 at India Habitat Centre, New Delhi.

NEW DELHI - June 12, 2026:

The Indian Federation of Animal Health Companies (INFAH) successfully hosted its landmark National Seminar today at the India Habitat Centre, New Delhi.



Vijay Teng

Anchored in the theme "Reimagining Animal Health & Nutrition in India: Driving Ease of Doing Business, Innovation & Leadership," the seminar brought together a gathering of policymakers, leading veterinary scientists, corporate leaders, and academic

stalwarts to map out a resilient growth trajectory for the country's animal healthcare and livestock ecosystem.

The seminar underscored INFAH's core mission, "Healthy Animals, Healthier



Dr Vinayak Surve

India," demonstrating the critical link between high-standard veterinary healthcare, rural farmer prosperity, national food safety, and public health. Key discussions focused on advancing ease of doing business through modern regulatory frameworks, collaborative governance,

and scalable technological innovation.

Fostering Regulatory Vision & Ease of Doing Business

The technical programme was opened by Dr Vinayak Surve, Joint Secretary, INFAH, reaffirming INFAH's guiding mission: "Healthy Animals, Healthier India." This was followed by a welcome address by Dr Manoj Sood, General Secretary and a national perspective presentation by Mr Vijay Teng, President, INFAH. Mr Teng outlined the sector's macroeconomic



Dr Manoj Sood



Dr Pravin Malik

contributions and set strategic benchmarks for the sector's growth.

Delivering the keynote on the regulatory roadmap, Dr Praveen Malik, CEO of Agrinnovate India and former Animal Husbandry Commissioner (Govt. of India), highlighted the need for a seamless government-industry partnership. Dr Malik detailed how proactive and transparent governance is turning administrative ease into commercial reality, enabling rapid market launches for vital veterinary therapeutics.

Addressing National Priorities: Disease Mitigation and Food Security

Emphasizing systemic



Dr J P S Gill



Dr Naveena B. Maheswarappa

public health resilience, Dr J.P.S. Gill, Vice Chancellor of GADVASU, delivered a keynote on national disease mitigation. Dr Gill outlined actionable approaches to reduce the livestock disease burden and championed a comprehensive 'One Health' framework to counter antimicrobial resistance (AMR) and zoonotic vulnerabilities.

A major highlight was the felicitation of Dr Naveena B. Maheswarappa, Animal Husbandry Commissioner at DAHD, following his election as Chairperson of the FAO COAG Subcommittee on Livestock. In his address, "India's Opportunity through Reform & Innovation," Dr Naveena presented a roadmap demonstrating how the animal health industry serves as an engine for GDP growth and Atmanirbhar Bharat.

Dr Raghvendra Bhatta, Deputy Director General (Animal Sciences) at ICAR, presented animal nutrition as a strategic national priority, outlining how optimized livestock health

and nutrition enhances productivity, secures consumer food safety, and directly elevates smallholder farmer incomes across rural India.

Publications Launch and Multi-Sectoral Policy Dialogues

During the event, Dr Arun Atrey and Dr Nitin Bhatia, alongside senior dignitaries, officially released INFAH's comprehensive report on Indian animal healthcare antibiotic usage in 2025.

Distributed as part of official delegate kits, the publication highlights that while India's livestock sector's steady annual growth rate is over 5%, prevalent infectious



Dr Raghavendra Bhatta

diseases remain a critical productivity challenge. In 2025, total antibiotic consumption reached 1,075 tons, reflecting a 5.7% growth over 2024's 1,017 tons. Fluoroquinolones were found to be the country's most utilized antimicrobial class. Overall annual industry usage has grown at a stable five-year CAGR of 2.8%. This full report is available for

download from the official INFAH website.

Following a global macro-perspective virtual address by Carel du Marchie Sarvaas, Executive Director of HealthForAnimals, the seminar moved into four technical policy panel sessions:

- **Policy Session 1: Regulatory Framework for Animal Health Drugs and Biologicals** – Chaired by Dr Naveena B. Maheswarappa and co-chaired by Dr Arun Atrey, with panellists Dr Rubina Bose, Dr Aruna Sharma, Dr P. Dhar, Dr M. Kalaivani, Dr Vijay Makhija, and Dr Sanjay Gavkare. The session examined science-based regulatory alignment with CDSCO, DAHD, IVRI, and IPC for fast-tracked, compliant approvals.
- **Policy Session 2: Animal Health and Nutrition as a National Priority** – Chaired by Dr Ashis Kumar Samanta (ADG, ICAR) and co-chaired by Mr Deepak Khosla, with panellists Dr N.K. Mahajan, Dr Gagan Garg, Dr Hundal, Mr Pradeep Sharma, Mr Arun Sharma, and Dr Raja Mukherjee. Discussions centred on BIS standards and enhanced livestock nutrition.
- **Policy Session 3: From Reform to Leadership** – Chaired by Dr Praveen Malik and co-chaired by Dr Yash Goyal, with panellists Dr Sindura
- **Policy Session 4: Innovation and Focus on Ayurveda and Phytogenics** – Chaired by Dr Ashok Kumar (Former ADG (AH), ICAR) and co-chaired by Dr Anup Kalra, with panellists Dr Raman Singh, Dr Hari Kumar, Dr Shivi Maini, and Dr Divya Divakaran. The session



Dr Arun Atrey

Ganapathi, Dr Annie Jacob, Ms. Pushpa Vijayaraghavan, Mr Gaurav Marathe, and Mr Rajaram Narayanan. The session built an industrial blueprint to accelerate infrastructure development and high-value domestic manufacturing under 'Make in India'.



Dr Nitin Bhatia



From left: Gaurav Marathe, Dr Ani Bency Jacob, Dr Yash Goyal, Dr Praveen Malik, Ms Pushpa Vijayaraghavagad and Rajaram Narayanan.

pioneered integration of traditional Indian scientific knowledge with modern validation methods for global export excellence.

The seminar culminated in a Valedictory Session

and a Vote of Thanks delivered by Dr Nitin Bhatia, who acknowledged the collective commitment of government ministries, academic institutions, and private organizations in advancing veterinary

standards across India.

About INFAH

The Indian Federation of Animal Health Companies (INFAH) is the apex industry body representing the animal health, therapeutics, and

biologicals sector in India. Dedicated to its mission of "Healthy Animals, Healthier India," INFAH bridges government bodies, research institutes, regulatory authorities, and industry to advance world-class veterinary care, ease of doing business, and science-based nutrition.



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NOVUS Brings Global Feed Ingredient References together in One Digital Tool

CHESTERFIELD, MO (July 23, 2026): The leader in intelligent nutrition today announced the launch of the NOVUS® Raw Material Compendium, a digital platform designed to support more informed, data-driven feed formulation strategies.

The platform, which is accessible at [novusint.com / raw material /](https://novusint.com/raw-material/), provides nutritionists and feed formulators with a centralized resource to evaluate ingredient variability, compare nutrient values across the most relevant databases, assess internal ingredient data, and explore alternative raw materials. By bringing multiple data sources into one tool, NOVUS is helping to simplify a process that

is often complex and time intensive.

"When formulating, nutritionists normally work with one unique database or source of nutrient information for each of their ingredients. But it is well known that there is ingredient variability based on the database used, as well as geographic origin, crop conditions, processing differences, supplier variations, and other factors," says NOVUS Global Swine Solutions Executive Manager Marisol Castillo, DVM, Ph.D. "Unfortunately, nutritionists haven't had the time or easy access to examine the differences between those ingredient nutrient variations to ensure optimized formulation. This new digital platform from

NOVUS puts data from various sources at their fingertips."

The digital platform includes nutrient composition details for plant and animal protein ingredients, such as palm kernel meal, soybean meal, dried distillers' grains, feather meal, fish meal, and others. The raw material data was authorized for use from established global references, including the National Research Council (NRC), Association Française de Zootechnie (AFZ), French National Research Institute for Agriculture, Food, and Environment (INRAE), Fundación Española para el Desarrollo de la Nutrición Animal (FEDNA), Centraal Veevoeder Bureau (CVB), and the Brazilian Tables for

Poultry and Swine.

After creating an account at [novusint.com / raw material /](https://novusint.com/raw-material/) users can select feed ingredients and nutrients, compare values across datasets, and export comparison charts and tables for further analysis. The tool also allows users to upload their own ingredient datasets to compare them against available references within a private, secure environment.

"Bringing these datasets together in one place supports more consistent evaluation of raw materials and can help streamline formulation decisions," Castillo says. "It allows nutritionists to work more efficiently while maintaining ownership and confidentiality of their own data."

The NOVUS® Raw Material Compendium builds on the company's history

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of providing technical resources to the industry. NOVUS previously offered a printed version of the data; the new digital format makes it easier to visualize and compare data, and expands accessibility, allowing users to access information across mobile devices, computers and tablets.

"As the industry continues to evolve, providing accessible tools and insights is essential," says NOVUS Global Ruminant Solutions Executive Manager Ricardo Teles. "Nutritionists and producers are under increasing pressure to optimize performance and efficiency. Solutions that support strategic decision-making can play an important role in meeting those expectations."

The compendium is part of NOVUS' broader commitment to advancing knowledge and supporting the animal agriculture industry. Earlier this year, the company published a white paper called Outsmarting Trypsin Inhibitors that summarized the findings from a decade of its global research on soybean meal quality. The paper is available for download at novusint.com/TIwhitepaper26.

NOVUS is the leader in intelligent nutrition, supporting poultry, swine, and dairy producers around the world. Guided by science, NOVUS delivers solutions that are Made of More™ to help animals reach their full potential. Learn more at novusint.com.

Haryana Govt assures major reforms for Poultry sector, its a Positive step towards Ease of Doing Business in Poultry: PFI President

Delhi: Poultry Federation of India delegation led by its President Mr Ranpal Dhanda, met Mr Mahipal Dhanda, Education Minister, Government of Haryana, and explained key issues impacting the growth and development of the poultry sector in the state. The delegation highlighted Haryana's vital contribution to India's poultry industry and submitted several recommendations aimed at improving the ease of doing business for poultry farmers.

The Minister extended proactive support and facilitated a high-level meeting with Mr Anurag Rastogi, Chief Secretary, Government of Haryana and other senior officials Mr Arun Kumar Gupta, Principal Secretary to the Chief Minister, Mr Vinay Kumar, Chairman, Pollution Control Board and Dr Prem Singh, Director, Animal Husbandry, Government of Haryana.

The Chief Secretary responded positively and directed the concerned departments to take action on several important reforms, including:

- Simplification of Pollution Control Board guidelines for poultry farms.
- Removal of Market Committee Fee on



PFI delegation led by its President Ranpal Dhanda explaining poultry issues to Mahipal Dhanda, Education Minister, Government of Haryana.

Maize and Bajra procured from other states with an assurance of resolution within 10 to 15 days.

- Exemption from Change of Land Use (CLU) requirements for poultry farms.
- Promotion of egg consumption through the Sports Department and other government departments.
- Formation of a Poultry Development Committee with representation from poultry industry to strengthen policy formulation and address sectoral challenges.

Speaking on the occasion, Mr Ranpal Dhanda, President, PFI, expressed gratitude to the Education Minister and the Chief Secretary for their positive and constructive approach. These initiatives will reduce unnecessary regulatory

hurdles, improve the ease of doing business, encourage investment, create employment opportunities, and further strengthen Haryana's poultry sector.

PFI looks forward to working closely with the Government of Haryana to translate these commitments into meaningful reforms that will benefit poultry farmers and contribute to the sustainable growth of one of the state's most important agricultural sectors. Together, we are building a stronger, more progressive, and farmer-friendly poultry industry, he said.

The Poultry Federation of India team included Mr Ranpal Dhanda, Mr Ravinder Sandhu, Mr Rahul Khatri, Mr Azad Rathi, Mr Satish Garg, Dr Manoj Kumar, Mr Dilbag Sandhil, Mr Satbir Lakra, Dr Rakesh Gupta, Dr Deepak Singh,



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PFI delegation with senior officials of Haryana Government submitting poultry sector problems.

Mr Subhash Narwal, Mr Rajesh, Mr Lakhmi, Mr Dharmbhir Lather, Mr Jagdish Kadyan and Mr Rithik.

Mr Ravinder Sandhu, Secretary, PFI said that the meeting with Minister and the senior officials of Haryana government was very positive and meaningful that will benefit poultry farmers of Haryana State and shall contribute to the sustainable growth of one of the state's most important sectors.

PFI delegation team also met with Mr Vinay Pratap Singh, IAS, Commissioner for issues related to

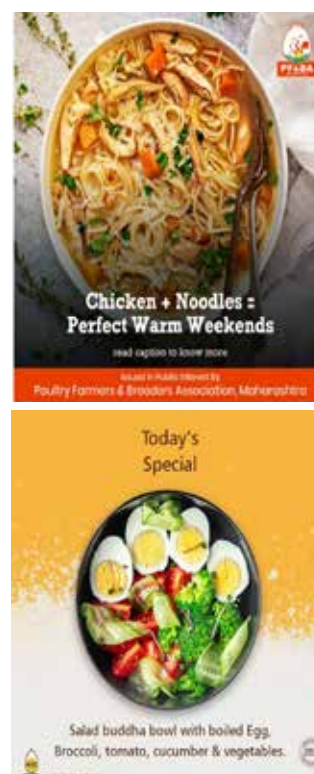
Pollution Control Board to remove a few guidelines which were not related to poultry, received a very positive attention from the Commissioner.

All the meetings with officials in Chandigarh were positive and focused on improving the ease of doing business for poultry farmers to strengthen Haryana's position as a leading poultry-producing state, said a note from PFI.

The PFI delegation met Mr Vedpal, Chairman, Market Committee, Haryana.

PFI is optimistic that the concerns of poultry sector

will be addressed through a practical and regulatory approach. PFI requested the Chairman, Market Committee that the 1% market committee fee levied on Maize and Bajra arriving from other states should be abolished. Also the 2% market committee fee levied on eggs and cull layer birds should be abolished. This decision will play a significant role in reducing production costs for poultry farmers in Haryana, enhancing their competitiveness, and promoting the sustainable development of the state's poultry sector as well as employment generation.



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| 4 Best Broiler Chicken. | 12. Best Diagnostic Lab. | 20 Best Feed Company. |
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| 7 Best Sales & Customer Service. | 15 Best Marketing Man. | |
| 8 Best Technical Service Provider. | 16 Best Executive with Long Service. | |

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Srinivasa Hyline Egg School -2026



*Suresh Chitturi, Chairman,
Srinivasa Farms Pvt Ltd*

Alila Diwa, Goa | July 28, 2026: Srinivasa Farms successfully organized the Srinivasa Hy-Line Egg School 2026 in Alila Diwa, Goa on July 27 and 28, 2026. The two-day technical conference brought together poultry farmers, layer consultants, veterinarians, nutritionists, and poultry industry professionals from across India to discuss the latest developments in commercial layer farming.

The programme began with the traditional Lamp



*Ernst Van Gulijk, Field Support
Specialist, Nova-Tech Poultry*



*Harsha Chitturi, President,
Srinivasa Farms Pvt Ltd*

Lighting Ceremony by Mrs Jahanavi Chitturi, Mr Suresh Chitturi, Mr Harsha Chitturi and Mr Jonathan Cade



*Vitor Arantes, Global Product
Manager, Hy-Line International*

Followed by welcome addresses by Mr Harsha Chitturi, President, Srinivasa Farms, Mr Suresh Chitturi, Chairman, Srinivasa Farms, and Mr Jonathan Cade, President, Hy-Line International.

The conference focused on the latest advancements in layer genetics, nutrition, flock management, disease



*Jonathan Cade, President,
Hy-Line International*

prevention, biosecurity, and technologies that help improve bird health, egg quality, and farm profitability.



*Michele Muccio, Regional
Technical Manager - Asia Pacific,
Innovad Group, Vets Pharma*

Experts from Hy-Line International - Dr Petek Settar, Director of Research Development, shared the latest updates on Hy-Line's breeding programme and the future development of W-80i and Brown layer birds. Dr Daniel Valbuena, Global Technical Service Director,



*Dr Daniel Valbuena,
Global Technical Service
Director, Hy-Line International*

delivered technical sessions on critical management factors affecting layer performance, including water quality, feed particle size, lighting, environmental management, and the importance of the first 27 weeks in determining a layer's lifetime productivity. Mr Vitor Arantes, Global Product Manager, discussed modern nutrition strategies that complement the latest genetic advances and improve profitability.

Experts from several leading companies also shared their technical expertise. Dr Ganesh Darban, Vaksindo



*Dr Pushparaj Chaudhuri,
Technical Manager - Poultry,
Boehringer Ingelheim*

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*Dr Vaibhav M. Gawande,
Regional Category Manager
(South Asia), EW Nutrition*

Animal Health presented strategies for controlling respiratory diseases, with special emphasis on Avian Influenza and Infectious Bronchitis. Mr Michele Muccio, Innovad Group, represented by Vets Pharma, highlighted the importance of biomonitoring and data-driven mycotoxin management to improve



*Dr Dinesh Reddy,
Business Head - Gut Health,
CPBIO-MTS*



Dr Jayaraman, Moderator



*Dr Ohri Krishnan, Poultry
Technical Services Specialist,
Eco Animal Health*

flock performance.

Dr Pushparaj Chaudhuri, Boehringer Ingelheim explained the importance of establishing a strong immune foundation in commercial layers, while Dr Neerad Khuje, Elanco presented an integrated approach to protecting long-term respiratory health in poultry flocks. while Dr Vaibhav M.



Gawande, EW Nutrition explained strategies for effective mycotoxin monitoring and control. Mr Ernst van Gulijk, Nova-Tech Poultry shared the benefits of Infrared BeakTreatment and practical guidelines for successful implementation. Dr Hanumant Karne, Intas Pharmaceuticals presented innovative solutions for managing multiple mycotoxins in poultry production.



Vitor, Daniel, Jonathan Cade of Hyline International, Suresh Chitturi, Mrs Jahanavi Chitturi, Harsha Chitturi and Senthil of Srinivasa Farms



A view of participants in Srinivasa - Hyline Egg School 2026

Feed Mycotoxin Detoxifiers Market Size to Reach USD 3.30 Billion by 2034 at a 4.06% CAGR from 2026 to 2034



A new Polaris Market Research report shows the global feed mycotoxin detoxifiers market growing at a steady 4.06% CAGR through 2034, with Asia Pacific, poultry, and biological detoxification technologies emerging as the clearest growth signals for the animal nutrition industry.

Mycotoxin contamination has quietly become one of the animal nutrition industry's most persistent operational threats — and the market built to solve it is scaling accordingly. According to the latest Feed Mycotoxin Detoxifiers Market report from Polaris Market Research, the global market was valued at USD 2.30 billion in 2025 and is on track to reach USD 3.30 billion by 2034, growing at a CAGR of 4.06% between 2026 and 2034. The market is expected to touch USD

2.40 billion already in 2026, underscoring how quickly demand is compounding.

A Market Driven by Contamination, Not Convenience

Unlike many feed additive categories that grow on the back of performance marketing, the mycotoxin detoxifiers market is expanding out of necessity. Fungal species such as *Aspergillus*, *Fusarium*, and *Penicillium* contaminate staple feed crops — corn, wheat, soybean meal, barley — at levels that are rising alongside climate volatility and shifting humidity patterns. A Trouw Nutrition study cited in the report found that nearly 80% of maize samples tested across India in Q2 2025 were positive for both aflatoxins and fumonisins, a striking illustration of how widespread the exposure risk has become even in a single harvest cycle.

Regulatory bodies are responding in kind. The report notes that the U.S. government introduced a 5% maximum limit on botanical impurities in animal feed raw materials in 2024, while the European Food Safety Authority continues to enforce some of the world's strictest permissible toxin thresholds. For feed manufacturers, that means detoxifiers are increasingly a compliance requirement, not just a productivity tool — a shift that's reshaping procurement priorities across poultry, swine, dairy, and aquaculture operations alike.

Where the Growth Is Concentrated

The report's segmentation data points to a market in transition between legacy solutions and next-generation biology:

- Binders remain the

workhorse of the industry, holding a 67.0% share in 2025 thanks to the low cost and reliable adsorption performance of clay minerals like bentonite and activated charcoal. But deactivators — enzymatic and microbial solutions that biologically degrade toxins rather than simply binding them — are the fastest-growing product category, expanding at a 4.6% CAGR as multi-toxin contamination becomes more common.

- Poultry is the largest livestock segment at 38.0% share, a function of high feed volumes and the species' acute sensitivity to aflatoxin exposure. Swine, however, is growing fastest at 3.6% CAGR, as producers respond to zearalenone and fumonisin risks that directly hit fertility and reproductive performance.
- Inorganic sources still dominate at 59.0% share on cost and availability, but the organic segment is the standout growth story, projected at a 4.9% CAGR as sustainability and multi-toxin efficacy become procurement priorities.
- By form, dry detoxifiers hold 84.0% share for their storage and handling advantages, while liquid formats are growing fastest at 5.0% CAGR, aligned with the

rise of precision feeding systems.

- Direct sales remains the leading distribution channel at 54.0% share, but online distribution is accelerating fastest at 5.6% CAGR — consistent with the broader shift toward B2B agricultural e-commerce, a channel the International Trade Administration expects to help drive global B2C e-commerce revenue to USD 5.5 trillion by 2027.

For more information, visit @ <https://www.polarismarketresearch.com/industry-analysis/feed-mycotoxin-detoxifiers-market>

Regional Momentum:

Asia Pacific Leads, Europe Regulates, North America Innovates

Geographically, Asia Pacific commands the largest share at 33.0%, powered by expanding poultry and aquaculture production in China, India, Vietnam, and Indonesia. India's meat production alone reached 10.5 million tons in 2024-2025, up 2.46% year-over-year, making the region both a major consumption base and a high-humidity risk zone for fungal contamination.

Europe follows at 29.0% share, where stringent EFSA oversight and mature livestock industries in Germany, France, the Netherlands, and Spain sustain steady detoxifier demand — European poultry meat production hit 14.1 million tons in 2024, a 6% increase over 2023.

North America holds 27.0% share, with growth linked to advanced production systems and an 18% rise in U.S. aquaculture farms since 2018. Latin America and the Middle East & Africa remain smaller but strategically important growth frontiers, as countries like Brazil, Saudi Arabia, and South Africa modernize feed safety infrastructure to meet export standards.

Competitive Landscape: Consolidation Meets Innovation

The report identifies a moderately fragmented competitive field anchored by global players including ADM, BASF SE, Cargill, Kemin Industries, Olmix Group, Impextraco, Special Nutrients, Amlan International, Perstorp, Cenzone Tech, Alltech, and dsm-firmenich. Recent moves illustrate where investment is headed: dsm-firmenich opened an 11,200-square-meter animal nutrition and health plant in Hyderabad in August 2025, expanding its footprint in one of the market's fastest-growing regions, while Cargill introduced its Notox AMA mycotoxin-binding technology in March 2025 to strengthen its animal health portfolio.

The report also flags emerging trends worth watching: AI-powered contamination detection systems, precision livestock nutrition tools that tailor detoxifier dosing to exposure severity, and a broader industry pivot toward biological detoxification as multi-

toxin contamination becomes the norm rather than the exception.

What This Means for the Animal Nutrition Industry

For feed manufacturers, integrators, and nutrition strategists, the data points to a clear playbook: cost-effective binders will keep the lights on, but competitive differentiation over the next decade will come from biological and organic detoxification capabilities, precision dosing technology, and regional manufacturing presence in high-growth markets like South and Southeast Asia. Rising global protein demand — the UN projects a 14% increase in agriculture and fish production by 2034 — only raises the stakes further.

Stakeholders evaluating supplier partnerships, product roadmaps, or regional expansion strategies can access the full segmentation, ten-year forecasts, and detailed competitor profiling in the complete Feed Mycotoxin Detoxifiers Market Report from Polaris Market Research.



G.C. Shekar Reddy, Chairman, NECC, Hyderabad Zone honoured for achieving ₹ 710 per 100 Eggs



G.C. Shekar Reddy, Chairman, NECC, Hyderabad Telangana Zone.

National Egg Coordination Committee and Telangana Poultry Federation felicitated Mr G.C. Shekar Reddy, Chairman, NECC, Hyderabad Telangana Zone for his leadership in achieving a historic NECC

Egg Rate of ₹ 710 per 100 eggs in Hyderabad. This milestone as a means to boost confidence and prosperity among poultry farmers in Telangana region.

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Commencement of Pre-Operations of IB Group's State-of-the-Art Abis Chicken Processing Plant in Andhra Pradesh

Chief Minister N. Chandrababu Naidu inaugurates the facility and hands over appointment letters to 150 youth



Bahadur Ali receiving A.P. Chief Minister N. Chandrababu Naidu

Pugurupalli (Andhra Pradesh): The country's leading integrated protein leader, IB Group, has commenced the pre-operation phase of its state-of-the-art ABIS Chicken Processing Plant established at Pugurupalli in Andhra Pradesh. On this occasion, the Hon'ble Chief Minister of Andhra Pradesh, Shri N. Chandrababu Naidu, attended the event as the Chief Guest. He inaugurated the pre-operations of the plant and described it as a significant step towards industrial development, investment, and employment generation in the state.



During the programme, the Hon'ble Chief Minister handed over appointment letters (offer letters) to 150 selected youth, providing them with employment opportunities. This initiative reflects IB Group's commitment to generating employment for local youth and contributing to the overall economic development of the region.

On this occasion, Mr. Bahadur Ali, Managing Director, IB Group; Ms. Tanaz Aziz, Director (HR); along with the company's senior officials, Mr. Junaid Qazi – Project Head, Mr. Ajit Mani – HR Head, Mr. Saurabh Nagpal – Broiler Integration Head, Mr. Prateek Kumar – Sales Head, and other employees were present. The programme was also attended by public representatives, members of the industry, farmers, and a large number of distinguished citizens.

Addressing the gathering, Mr. Bahadur Ali, Managing Director of IB Group, said that the state-of-the-art processing plant has been developed using modern technology while adhering to high-quality standards and international food safety norms. He stated that the plant will have a processing capacity of 12,000 birds per hour, ensuring the maximum availability of safe, high-quality, and nutritious chicken protein to consumers across the country. He further said that the operation of this project will provide new momentum to the poultry industry in Andhra Pradesh, offer better

market opportunities to local farmers, and create large-scale employment opportunities. The project will also play an important role in strengthening the state's industrial progress and rural economy.

The objective of Abis Pro, the traceable chicken brand, is to provide consumers across the country with high-quality, safe, and reliable protein products. This state-of-the-art Abis Chicken Processing Plant established in Andhra Pradesh is an important milestone in the company's growth journey, further strengthening IB Group's presence in South India and giving new momentum to India's protein mission.





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Functional Enriched Eggs: A Smart Nutritional Innovation for Improved Poultry Performance and Human Health

The Role of Organic Selenium, Organic Zinc, Vitamin E and Vitamin D₃ in Producing Premium Value-Added Eggs

Dr Hanumant Dahiphale, Poultry Nutritionist, Uttara Impex Pvt. Ltd. (A Venky's Group Company)

The Future of Eggs Is Functional

Eggs are one of the most complete and affordable sources of high-quality protein and essential nutrients. Today, with increasing consumer awareness about preventive healthcare, the demand is rapidly shifting from conventional foods to **functional foods** that provide additional health benefits beyond basic nutrition.

Enriched eggs are produced by supplementing the diet of laying hens with highly bioavailable nutrients that are naturally transferred into the egg. Among the most important nutrients are organic selenium, **organic zinc, vitamin E, and vitamin D₃**, which not only enhance the nutritional value of eggs but also improve bird health, immunity, and productivity.

Considering that deficiencies of selenium, zinc, and vitamin D remain common worldwide, enriched eggs provide a simple, natural, and cost-effective solution to improve daily nutrient intake without changing eating habits.

Why Are Enriched Eggs Needed?

Micronutrient deficiencies continue to be a major global public health challenge.

- Nearly **2 billion people** suffer from micronutrient deficiencies.
- Selenium deficiency affects approximately **0.5–1 billion** people worldwide.
- Global zinc deficiency is estimated at **17–31%**.
- In India, vitamin D deficiency



Dr Hanumant Dahiphale

About Author:

Dr Hanumant Dahiphale is a veterinary pharmacologist and technical services specialist with expertise in animal nutrition, veterinary therapeutics, biologicals, clinical research, and regulatory affairs. Currently serving as Manager (Technical & Product Development) at Uttara Impex (Venky's) Pvt Ltd. He specializes in advanced feed additive technologies, organic trace minerals, and scientifically validated livestock health and productivity solutions.

has been reported in **70–100%** of certain population groups despite abundant sunshine.

A conventional egg contains only modest quantities of these nutrients. By improving hen nutrition with highly bioavailable organic minerals and vitamins, eggs can naturally become an excellent vehicle for delivering these essential micronutrients to consumers.

How Egg Enrichment Works

The enrichment process is completely natural.

After ingestion, nutrients are absorbed through the intestine, transported via the bloodstream to the liver, and subsequently deposited into the developing egg yolk during egg formation.

Organic mineral sources such as **Hydroxy-Selenomethionine** and **Zinc Glycinate** possess superior bioavailability compared with conventional inorganic mineral sources, resulting in greater nutrient deposition while reducing mineral excretion into the environment.

Laboratory Confirmation of Enriched Eggs

Egg samples collected from hens receiving UT- Selway Gold supplemented program, enriched nutrition were analysed by four independent NABL-recognized laboratories.

Benefits for Poultry

Supplementation with organic selenium, organic zinc, vitamin E and vitamin D₃ provides multiple benefits to laying hens.

- Improved antioxidant protection and reduced oxidative stress
- Enhanced immune response and better vaccine performance
- Stronger eggshell quality and improved shell strength
- Better reproductive performance and hatchability
- Improved flock uniformity and persistency of lay
- Reduced environmental mineral excretion through improved mineral utilization



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Nutrient Enrichment Compared with Ordinary Eggs

Nutrient	Ordinary Egg (per 100 g)	Enriched Egg (Average)	Improvement
Vitamin D	2.0 µg	9.13 µg	4.6×
Vitamin E	1.08 mg	3.75 mg	3.5×
Selenium	25–30 µg	84.0 µg	~3×
Zinc	~1.0 mg	1.99 mg	~2×

The laboratory results clearly demonstrate that nutritional enrichment significantly increases the concentration of all four key micronutrients in eggs, creating a premium functional food with enhanced nutritional value.

Scientific studies have consistently shown that the synergistic action of selenium and vitamin E enhances antioxidant defence, while zinc and vitamin D₃ support skeletal health, eggshell formation, immunity and overall productivity.

Benefits for Consumers

Enriched eggs offer a convenient way to increase the intake of essential micronutrients through a commonly consumed food.

A single enriched egg can provide approximately:

- 37% of the daily vitamin D requirement
- 22% of the daily vitamin E requirement
- **Over 90%** of the daily selenium requirement
- 11–15% of the daily zinc requirement

Regular consumption of enriched eggs may help support:

- Healthy immune function
- Antioxidant defence against oxidative stress
- Normal thyroid hormone metabolism
- Bone and muscle health
- Healthy ageing
- Reproductive health

Unlike dietary supplements, enriched eggs deliver these nutrients through a natural food matrix with excellent consumer acceptance.

Economics for Poultry Producers

Producing enriched eggs requires only a modest investment in feed supplementation.

Supplementing layer feed with a special program of **UT- Selway Gold** at design dose size per tonne of feed increases feed cost by only ₹0.15–0.22 per egg, depending on flock performance.

Enriched eggs typically command a retail premium over conventional eggs in the Indian market. Even a modest premium of ₹1–3 per egg can yield farmers an additional gross return. Offering producers an attractive opportunity to improve profitability while delivering additional nutritional value to consumers.

A Growing Opportunity for the Poultry Industry

The global market for functional and fortified eggs is estimated to be about **USD 4.0 billion in 2026** and is expected to grow to **USD 8.6 billion by 2036**, with an annual growth rate of about 7.9% (CAGR). Feed-based fortification is expected to remain the most widely used method for producing enriched eggs (Future Market Insights, 2026). In the future, eggs enriched for specific nutrient deficiencies may become important products alongside staple-food fortification programs. However, their use should be supported by population-level safety evaluations, especially for **vitamin D₃**, because of regulatory limits on feed additives. India's large organized egg industry, along with the high prevalence of **zinc and vitamin D deficiencies**, provides a strong opportunity for the growth of enriched eggs. More human clinical

studies and harmonized regulations will be important to support their wider adoption (Kamboj et al., 2018; Wessells & Brown, 2012). The use of highly bioavailable organic minerals together with antioxidant vitamins, enables poultry producers to produce premium eggs without changing existing management practices. As awareness of preventive nutrition grows, enriched eggs are expected to become an important premium category within the Indian egg industry.

Conclusion

Enriched eggs represent the next generation of value-added poultry products. Scientific evidence demonstrates that dietary supplementation with organic selenium, organic zinc, vitamin E and vitamin D₃ can substantially increase the concentration of these essential nutrients in eggs while simultaneously supporting bird health, immunity and egg quality.

Laboratory analyses confirmed enrichment levels of 4.6-fold for vitamin D, 3.5-fold for vitamin E, approximately 3-fold for selenium and nearly 2-fold for zinc compared with conventional eggs. Enriched eggs provide a practical and economically viable opportunity for poultry producers to differentiate their products while contributing to improved consumer nutrition.

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Mycotoxin-Induced Hepatic and Renal Stress Limits Vitamin D Activation

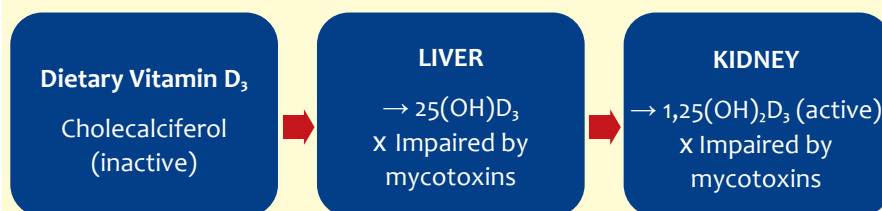
By Avitech Nutrition Pvt Ltd

Vitamin D is one of the most critical nutrients influencing skeletal development, eggshell quality, immunity, hatchability, and overall productivity in poultry. However, the biological effectiveness of dietary Vitamin D depends on its successful conversion into active metabolites through hepatic and renal hydroxylation. Under commercial production conditions, mycotoxin exposure, among other stressors, can impair liver function and compromise this activation process, resulting in functional Vitamin D insufficiency despite adequate dietary supplementation.

Conventional dietary Vitamin D₃ (cholecalciferol) is biologically inactive when consumed. Before it can exert a physiological effect, it must undergo two sequential hydroxylation reactions: first in the liver, where it is converted to 25-hydroxycholecalciferol [25(OH)D₃], and then in the kidney, where it is further converted to 1,25-dihydroxycholecalciferol [1,25(OH)₂D₃], the biologically active form that binds to Vitamin D receptors and initiates cellular responses. This pathway depends entirely on healthy liver and kidney function, is metabolically time-intensive, involves conversion-associated nutrient losses, and becomes markedly less efficient under physiological stress. As a result, the amount of Vitamin D formulated into feed does not necessarily reflect the amount ultimately available to the bird in active form.

These risks are compounded by the nature of mycotoxin contamination itself. Mycotoxins are heat-stable and survive pelleting and feed processing, so they are not eliminated in the

THE ACTIVATION PATHWAY



Two sequential, organ-dependent steps stand between feed and biologically active Vitamin D and both are vulnerable to mycotoxin damage.

mill. Commercial feed ingredients commonly carry more than one mycotoxin simultaneously, and the resulting performance losses are frequently subclinical eroding productivity well before any visible disease appears and often being misattributed to management or formulation inconsistencies. The following sections examine how specific mycotoxins disrupt the Vitamin D activation pathway, and how a bioactive Vitamin D source can offset that risk.

01 • The Science Mycotoxin Effects on Vitamin D Metabolism

Mycotoxins are toxic secondary metabolites produced by fungi belonging primarily to the genera

Aspergillus, *Fusarium*, and *Penicillium*. Due to their heat stability and resistance to feed processing, they remain one of the most persistent challenges in poultry nutrition. Subclinical exposure has been associated with reduced feed efficiency, poor nutrient utilization, compromised bone mineralization, inferior eggshell quality, reduced hatchability, increased susceptibility to disease, and poor flock uniformity. The challenge intensifies when multiple mycotoxins occur together a situation commonly observed in commercial feed ingredients. Among the organs affected, the liver is particularly vulnerable, and it is also the first and most critical site of Vitamin D activation.

Mycotoxin	Organ(s) Targeted	Effect on Vitamin D Metabolism
Aflatoxins	Liver	Oxidative stress, hepatocellular damage, suppressed hepatic enzymes
Ochratoxin A	Liver + Kidney	Effects both activation organs simultaneously
Fumonisin	Liver / bile flow	Impaired bile flow reduces absorption of fat-soluble Vitamin D
Trichothecenes (T-2, DON)	Liver	Impaired hepatic protein synthesis, inflammatory damage



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As liver function declines under this toxic burden, the efficiency of Vitamin D activation decreases correspondingly. Birds may therefore experience reduced availability of active Vitamin D despite receiving adequate dietary supplementation a condition best described as functional Vitamin D insufficiency: Vitamin D is present in the diet but cannot be efficiently activated and utilized by the bird.

The consequences of this insufficiency are often progressive and difficult to diagnose. They include reduced bone mineralization and increased incidence of tibial dyschondroplasia and rickets, poor eggshell quality and shell strength, reduced hatchability and chick quality, impaired calcium and phosphorus utilization, reduced immune competence, poor growth performance, and reduced flock uniformity. In many commercial operations, these issues are attributed to management or nutritional inconsistencies while the underlying limitation in Vitamin D activation goes unrecognized.

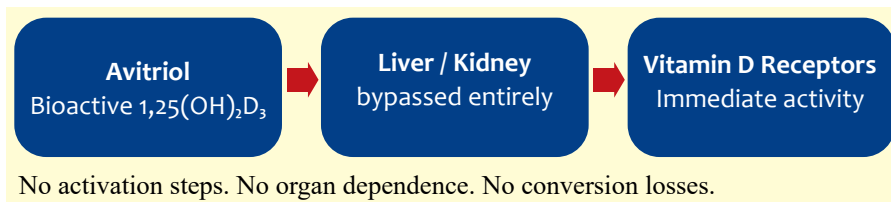
The takeaway

Adding more dietary cholecalciferol does not fix a damaged activation pathway. If the liver cannot convert it, the extra Vitamin D₃ is simply unused - the bird needs the active metabolite delivered directly.

02 • The Solution

Avitriol— Plant-Based Bioactive Vitamin D₃

Avitriol is a natural phytogenic feed supplement containing 1,25-dihydroxycholecalciferol [1,25(OH)₂D₃], the metabolically active form of Vitamin D₃, in plant-derived glycosidic form. Unlike conventional Vitamin D sources, Avitriol is already present in its active form and interacts directly with Vitamin D receptors without requiring prior activation in the liver or kidney. Because it bypasses both organs, its performance does not depend on hepatic health making it particularly



relevant for flocks under mycotoxin pressure, disease challenge, or intensive production stress.

Avitriol is already present in its active form, birds do not need to wait for hepatic and renal conversion before receiving Vitamin D activity supporting a rapid biological response and immediate nutritional support. It also removes the metabolic load that conventional Vitamin D sources place on the liver and kidney, organs that may already be challenged by mycotoxins, disease pressure, oxidative stress, or intensive production. The final active metabolite is delivered directly, Avitriol eliminates the conversion-associated losses that occur at each hydroxylation step in conventional metabolism.

The glycosidic form of Avitriol also enables a controlled, gradual release of the active metabolite, supporting consistent biological activity over time, while the product retains strong stability through pelleting and feed manufacturing preserving efficacy from feed mill to feeder.

03 • Trial Evidence in Broilers

Avitriol benchmarked against 25-OH D₃ and α-OH D₃

Modern poultry production faces multiple challenges that can compromise nutrient utilization, with mycotoxin-induced hepatic stress representing one of the most significant yet often overlooked factors affecting Vitamin D metabolism. While conventional Vitamin D supplementation depends heavily on efficient liver and kidney function, Avitriol delivers a fundamentally different approach: as a plant-based source of bioactive 1,25(OH)₂D₃, it bypasses metabolic activation pathways, eliminates conversion-associated losses, imposes no metabolic burden on the liver and kidney, and provides immediate biological activity. In an era where maximizing nutrient efficiency is essential for profitability and sustainability, Avitriol ensures that birds receive not just Vitamin D, but the active Vitamin D they need to achieve optimal skeletal health, immunity, productivity, and overall performance.

↑ **EPEF**
EPEF improvement

↓ **FCR**
Improved feed conversion

↑ **Serum Concentration**

↑ **VDR**
Receptor gene expression

Birds receiving Avitriol also showed significantly higher antibody titres against Newcastle Disease Virus than control and partially activated Vitamin D groups — evidence of stronger immune resilience under commercial conditions.

Source: Agrivet Research and Advisory Pvt. Ltd., Kolkata, India, Available on request.

BENEFITS

Broilers

- Skeletal development & bone strength
- Lower tibial dyschondroplasia incidence
- Better growth & feed efficiency

Layers

- Improved egg production
- Stronger eggshell quality
- Better laying persistency

Breeders

- Improved hatchability & chick quality
- Stronger reproductive performance
- Better maternal immunity transfer

Avitriol — Plant-Based Bioactive Vitamin D₃ Bypassing Hepatic and Renal Conversion



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Elucidating AGP Mechanisms of Action: A Blueprint for Developing Next-Generation Alternatives

Dr Prasanna Venkatesh, M.V.Sc (Animal Nutrition), Senior Technical Manager-Key Clients, Rossari Biotech Limited

The Global Pivot: Navigating the Post-AGP Landscape

The global poultry industry is currently undergoing a fundamental transformation that transcends simple regulatory adherence. For decades, Antibiotic Growth Promoters (AGPs) were the cornerstone of production efficiency; however, the strategic landscape has shifted toward a precision physiological model. Transitioning away from AGPs is no longer merely a response to a regulatory burden, but a critical evolution necessary for maintaining global competitiveness. Producers who move beyond traditional antibiotics are not just complying with the law—they are securing their position in a market where "clean" production is the new baseline for commercial viability.

The Five Drivers of Changes

The shift away from traditional AGPs is mandated by several critical factors:

- **Consumer Demand for Clean Meat:** Modern consumers are increasingly sophisticated and demand protein raised without traditional antibiotics.
- **Export Market Access:** Major global regions, including the EU, Middle East, and South Asia, now enforce strict "Zero Tolerance" policies regarding AGP use.
- **Antibiotic Efficacy and AMR:** The preservation of antibiotic efficacy for human and veterinary medicine is a global priority to combat Antimicrobial Resistance (AMR).
- **Regulatory Bans:** We are seeing a progressive global phase-out of critical substances, such as

Colistin and Bacitracin Methylene Disalicylate (BMD) etc.

- **Elimination of Withdrawal Periods:** Transitioning to alternatives eliminates the legal "withdrawal period" required before processing, greatly enhancing farm logistical efficiency.

To innovate the future, we must first master the history. We cannot effectively replace AGPs until we understand exactly why they were so successful for so long.

The "Unquestionable Results" of Traditional Growth Promoters

The success of AGPs was never in doubt because the results were measurable on the balance sheet. For several decades, the poultry industry has relied on AGPs to deliver consistent production

results, specifically in improving Feed Conversion Ratios (FCR), enhancing nutrient utilization, and ensuring effective disease control. These benefits collectively contribute to better litter quality, carcass quality, and overall farm profitability.

The Big Question:

We have seen these results for decades, but do we actually understand the science of how they were achieved?

Traditional Model:

The traditional "Textbook Model" of AGPs assumed they worked entirely through microflora management: killing pathogens to reduce microbial "nutrient theft" and toxins, resulting in a thinner intestinal wall and enhanced nutrient uptake. Modern genomic and physiological evidence has presented several paradoxes that render this model obsolete:

Paradox Category	Traditional Expectation	Scientific Reality
The Dosology Disconnect	AGPs function by bactericidal action against pathogens in the gut.	Doses used for growth promotion are significantly below the Minimum Inhibitory Concentration (MIC) required to kill bacteria.
The Spectrum Paradox	Antibiotics with distinct targets (e.g., Gram-positive vs. Gram-negative) should produce different growth outcomes.	Antibiotics with completely different antimicrobial spectra often yield identical growth enhancement results.
The Cross-Species Paradox	AGPs target specific microbiota compositions unique to the host species.	The same AGPs are effective in both pigs and poultry, despite these species possessing vastly different intestinal microbiota.
The Ineffective Paradox	Any antibiotic that significantly alters the gut microbiota should promote growth.	Many antibiotics cause massive shifts in microbiota composition but fail to produce any measurable growth enhancement.

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The Eubiosis Trap: The industry often pursues "eubiosis"—a theoretical microbial balance—as a strategic goal. However, "eubiosis" is frequently a marketing construct rather than a biological reality. The exact composition of a "perfect" microbiota is unknown and completely undefined. Furthermore, genomic evidence confirms that major microbial shifts occur naturally during growth phases regardless of intervention. Relying on microflora management alone is a strategic trap;

This realization, coupled with the global imperative for Antimicrobial Resistance (AMR) stewardship, is driving the industry toward "Total AGP Replacers." The goal is not merely to eliminate antibiotics to meet consumer demand for "clean meat," but to ensure the Preservation of Antibiotic Efficacy for human and veterinary medicine by mitigating the selection pressure that creates resistant pathogens.

Advanced Mechanism of Action: Host-Centric Physiological Modulation

The new scientific consensus indicates that AGPs work primarily as physiological modulators of the bird rather than simple bactericides.

A. Immune Pacification and Anti-Inflammation

AGPs act as potent anti-inflammatory agents. At sub-therapeutic doses, they are selectively taken up by and accumulate inside local gut inflammatory cells (e.g., macrophages and heterophils). They down-regulate pro-inflammatory cytokines (IL-1, TNF-alpha) at the source, cooling the "inflammatory fire". This modulates the gut immune system to a quiescent resting state, redirecting metabolic energy that would have been wasted on inflammation back into growth and production.

B. The Nrf2 Pathway and Physical Barrier Protection

Sub-therapeutic doses of certain antibiotics (e.g., BMD, Tetracyclines) trigger a mild production of Reactive Oxygen Species (ROS). This acts as a cellular stress signal that releases Nrf2 (Nuclear factor erythroid 2-related factor 2) from its tether (KEAP1). Nrf2 then moves into the nucleus to initiate the transcription of critical antioxidant enzymes like Superoxide Dismutase (SOD), Catalase, and Glutathione Peroxidase (GSH-Px). These endogenous antioxidants protect the structural integrity of the gut wall by shielding tight junction proteins (Claudins and Zonula Occludens-1), thereby preventing "Leaky Gut Syndrome".

C. Bile Salt Hydrolase (BSH) Inhibition

Certain AGPs physically bind to and inhibit the BSH enzyme produced by bacteria like *Clostridium perfringens*. In an antibiotic-free environment, high BSH production leads to unconjugated bile acids, which impairs fat absorption. AGPs preserve the Conjugated Bile Acid (CBA) pool, ensuring optimal lipid digestion and absorption.

D. Mitochondrial Hormesis and the "Cellular Vaccine"

AGPs cause a small, temporary slowdown in mitochondrial energy (ATP) production. This mild disruption triggers the Mitochondrial Unfolded Protein Response (UPRmt) and the production of mitokines. These signals permanently raise the bird's systemic threshold for future immune and inflammatory responses, acting as a form of cellular "vaccination" that optimizes cell health. This occurs within the "Hormetic Zone", where low-level stressors act as beneficial signals for intestinal resilience.

Anti-Virulence Mechanisms: Disrupting Gut Pathogens

When AGPs interact with bacteria,

they do so by disarming them/ reduces their virulence rather than eradicating them.

- **Quorum Sensing (QS) Inhibition:** Pathogens like *C. perfringens* use QS to sense population density via autoinducers. AGPs disrupt the synthesis or binding of these signals, forcing bacteria to act as isolated individuals rather than a coordinated army, preventing synchronized attacks on gut tissue.
- **Toxin Gene Downregulation:** Sub-lethal AGP concentrations stall bacterial ribosomes, altering mRNA stability. This suppresses the transcription of *plc* genes, directly reducing the production of alpha-toxin and NetB toxin, which are the primary drivers of Necrotic Enteritis.
- **Impairment of Adhesion and Motility:** AGPs cause flagellar paralysis (turning off genes for bacterial "propellers") and fimbrial mutilation (disabling the "velcro" hooks used for anchoring). Lacking these, pathogens are safely swept out of the gut by normal peristalsis.

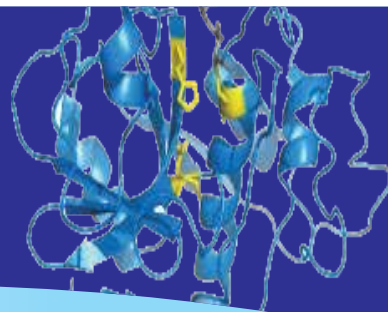
The Challenge of Alternatives: Searching for Consistency

Many tools have been trialed to replace AGPs, primarily focusing on "Eubiosis" (gut balance). These include Probiotics, Prebiotics, Organic Acids, Enzymes, Bacteriophages etc. However, the central frustration of modern veterinary science is that "variable results are the norm." Most alternatives fail because they only address one side of the dual-action mechanism. A "Total AGP Replacer" must be efficient, consistent, and reproducible.

The future lies in Phytobiotics—specialized plant-based compounds that target multiple pathways simultaneously. Key ingredients in the innovator's toolkit include:

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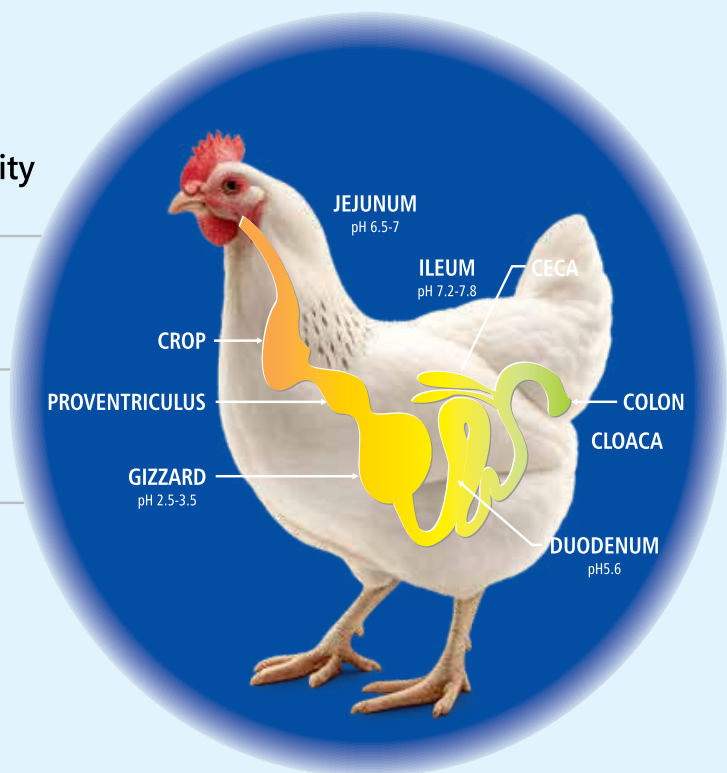
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Thyme (<i>Thymus vulgaris</i>)	Thymol, Carvacrol, P-Cymene, G-Terpinene, and other phenolic compounds
Cinnamon (<i>Cinnamomum zeylanicum</i>)	Cinnamaldehyde
Indian Barberry (<i>Berberis aristata</i>)	Berberine
BSH Inhibitors	Natural Compounds

Molecular Targets

The active compounds of Garlic, Turmeric, Thyme, Cinnamon and Indian Barberry can exhibit all the functions of AGP which includes the immune pacifiers, Nrf2 regulators, mitochondrial hormesis, BSH inhibition and also reduces the virulence of the bacteria by inhibiting the quorum sensing and also downgrade the toxin and mobility genes.

Berberine employs multiple molecular mechanisms to inhibit *C. perfringens* spore germination (interfering with germinating receptors and blocking Ca-DPA efflux) and vegetative growth (inhibiting DNA replication, RNA transcription, and protein synthesis).

Our Product Solution

PhyGuard AR is a next-generation phytogenic solution developed by the Rossari Biotech R&D division. It serves as a comprehensive, viable alternative to traditional Antibiotic Growth Promoters (AGPs) in poultry production.

By utilizing a proprietary, synergistic blend of bioactive botanical extracts—including Garlic, Turmeric, Thyme, Cinnamon, and Indian Barberry—PhyGuard AR replicates the complete biological efficacy of AGPs. This advanced formulation shifts the therapeutic paradigm away from a narrow "kill-only" antimicrobial mechanism. Instead, it

adopts a host-centric, multi-modal approach.

And because PhyGuard AR target a vast array of essential proteins and enzymes simultaneously rather than a single specific target, it is incredibly difficult for bacteria to evolve resistance.

This strategic shift ensures the consistent, reproducible performance metrics required for modern, intensive, antibiotic-free production cycles, directly supporting global mandates for clean meat production.

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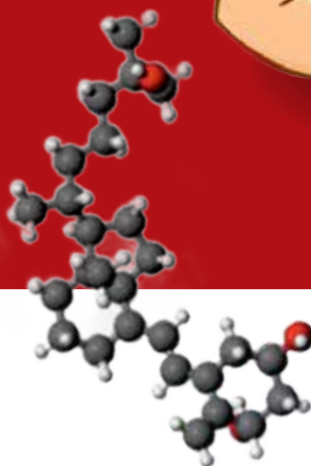
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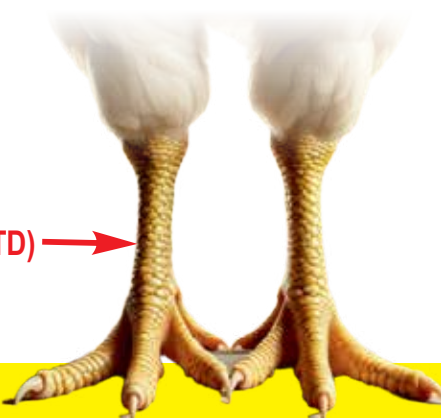


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Bacillus Subtilis PB6 – A Reliable and Optimal Solution for Dysbacteriosis in Broilers

Ajay Kumar, Venket M Shelke, Partha Das, and R Chanthirasekaran, Kemin Industries South Asia Pvt Ltd

Introduction

Modern broilers achieve high body weight and improved Feed Conversion Ratio (FCR), but this performance places significant stress on the gut, making them susceptible to bacterial enteritis, dysbacteriosis, necrotic enteritis (NE), and coccidiosis. Poor gut health elevates FCR and leads to wet litter, respiratory stress, increased litter handling needs, and higher treatment costs. In India, a considerable cost per ton of feed is incurred for the management and treatment of gut health disorders, particularly dysbacteriosis. Subclinical necrotic enteritis (NE) arises when intestinal dysbiosis facilitates the overgrowth and upward migration of *Clostridium perfringens* from the hindgut to the upper gastrointestinal tract, resulting in substantial but often undetected economic losses. Predisposing factors include coccidiosis, high protein diets, abrupt feed transitions, prolonged off feeding, poor shed management, and immunosuppression. Rising conventional feed ingredient prices and subsequent increased inclusion of non-conventional raw materials, recurrent viral outbreaks, and non-judicious antibiotic use further weaken intestinal health.

In recent years, the broiler industry has been experiencing coccidiosis and subclinical NE as two primary diseases for intestinal health upset. Next to these two diseases, nonspecific bacterial enteritis/dysbacteriosis occurs, caused by an imbalance in the nonspecific bacterial population in the poultry gut. Sometimes it is also called SIBO (Small Intestinal Bacterial Overgrowth), manifested

as undigested feed particles in droppings (Fig. 3a,b), diarrhea, wet litter, watery intestinal content (Fig. 4a), thin intestinal membrane (Fig. 4b) & dilated serosal blood vessels (Fig. 5a), resulting in poor performance of broiler birds. So, to analyze the severity of dysbacteriosis and coccidiosis in the Indian context, macroscopic observation of the intestinal tract of broiler chicken across the country was performed in the year 2024 as a regular annual program by the Kemin Technical Services team. Macroscopic dysbacteriosis and coccidiosis scores were assigned to commercial broilers

by experienced veterinarians during necropsy across Indian states. *Bacillus subtilis* PB6, a patented organism, has an active microbial property that can specifically show inhibitory action on the *Clostridium perfringens* population and promote the growth of other beneficial bacteria. The present study evaluated the efficacy of *Bacillus subtilis* PB6 in 2024 in Indian states. The study was conducted among Indian broiler producers, both PB6 users and non-users. Assessment of the prevalence of dysbacteriosis and coccidiosis in Indian broiler farms was done and analyzed to see the effect of PB6 in

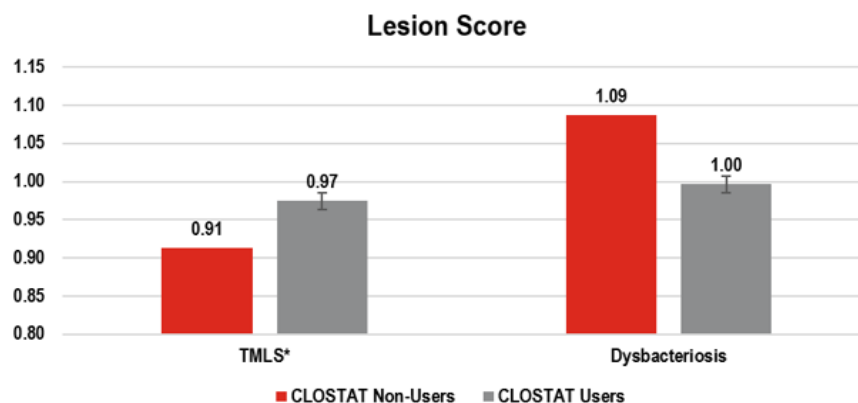


Figure 1: Dysbacteriosis lesion score and Total mean lesion score (TMLS) of coccidiosis at *Bacillus subtilis* PB6 users and non-users during the year 2024

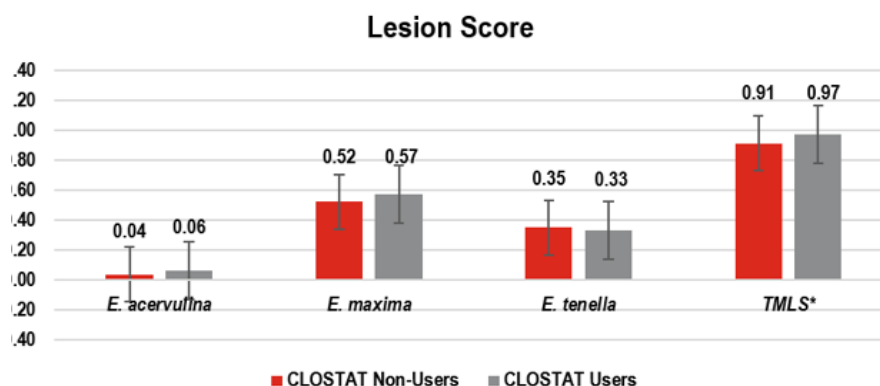


Figure 2: Mean lesion score of coccidiosis and TMLS at *Bacillus subtilis* PB6 users and non-users during the year 2024



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Figures 3a and b: Undigested particles with orange mucus in feces.



Figures 4a and b: Watery intestinal content and thin intestinal membrane



Figures 5a and b: Dilated serosal blood vessels and orange intestinal content with undigested feed particles

controlling dysbacteriosis.

Trial design / method

Johnson & Reid's lesion-scoring procedure for coccidiosis was carried out during the study. A dysbacteriosis scoring system, developed by the Kemlin technical team and in line with the method described by Teirlynck et al., 2011, was used in this study. During the year 2024, 499 Indian broiler farms were analyzed from 71 broiler integrators across different regions. From each broiler farm, 3-5 healthy live birds were sacrificed by cervical dislocation by an expert veterinarian and immediately necropsied. Intestinal lesion scoring was conducted and recorded immediately at farms. A total of 1513

broiler birds with a mean age of 26 days and an age range between 15 and 45 days were selected based on dysbacteriosis and coccidiosis prevalence during the year 2024.

Results & discussion

The intestinal health monitoring in 71 broiler integrations across different regions of India in the year 2024 resulted in an average dysbacteriosis score of 1.00 in PB6 users, which was numerically lower than that of non-PB6 users, which was 1.09. The average coccidiosis score was more than 0.9 in both PB6 users and non-users. The results showed that PB6 users had numerically lower dysbacteriosis scores than non-users, while the prevalence of coccidiosis

was the same in PB6 users and non-users across the country during the year 2024. The mean lesion score of coccidiosis and TMLS in *Bacillus subtilis* PB6 users and non-users during the year 2024 is shown in the figure. 2. Regional variation was also observed across India for both total mean lesion score (TMLS) and dysbacteriosis.

- TMLS by region: West (1.77; highest), East (1.43), North (1.07), South (0.60; lowest).
- Dysbacteriosis score by region: West (1.25; highest), South (1.08), East (0.89), North (0.67; lowest).

Nowadays, the poultry industry faces multiple challenges, like improper raw material quality with higher fungal contamination, along with various adulterations of feed raw materials and their inferior quality, leading to immunosuppression, which results in various disease outbreaks, and environmental challenges, which have a direct adverse impact on productivity. Over the last 2-3 years, it has been found that the incidence of subclinical coccidiosis is increasing year-round, regardless of season. The major reasons are resistance to commonly used anticoccidials due to improper anticoccidial rotation that does not follow the golden rules of rotation, immunosuppression due to inferior-quality raw materials, and emerging diseases and environmental variations, etc. As coccidiosis is a major predisposing factor for NE or dysbacteriosis, its incidence has become more prevalent, which is shown in the lesions in the figures above (Figs. 1 & 5b). Several feed additives, like organic acids, probiotics, prebiotics, essential oils, etc., were tried to control gut health issues as an alternative to AGP. Among these alternatives, probiotics have gained worldwide recognition for managing gut health effectively. In the present study, we have also observed numerically better control of dysbacteriosis in the CLOSTAT™ user group. PB6 is a natural strain



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isolated from the healthy chicken gut, and it is known to secrete surfactins and other secondary bacterial peptides, which have antibacterial activity against common pathogens like Clostridium spp. Although the TMLS of coccidiosis is numerically higher in CLOSTAT™ users than non-users, Bacillus subtilis PB6 is still helping to minimize dysbacteriosis more efficiently in CLOSTAT™ users than non-users, as evidenced by a numerically lower dysbacteriosis score in Bacillus subtilis PB6 users than NON-users.

Conclusion

The findings of the 2024 study indicate that coccidiosis and dysbacteriosis occurred consistently across all regions of India's broiler market, irrespective of seasonal variations. Gut health challenges are aggravated by extreme day-night temperature variations, poor/compromised ventilation, and the use of foggers or water spraying during extreme summer conditions. During this study, we found that Bacillus subtilis PB6 users were able to maintain better intestinal health than non-users during the year 2024. The study concluded that Bacillus subtilis PB6 is a reliable and sustainable solution for managing dysbacteriosis, even in challenging situations such as coccidiosis, pressure from non-conventional raw materials, indiscriminate use of AGPs, and AGP bans. So, Bacillus subtilis PB6 can maintain intestinal health not only by its direct killing action on Clostridium perfringens but also by maintaining the harmony of intestinal microbiota. Bacillus subtilis PB6 can be used as a unique tool to maintain gut health, as a complete replacement for AGPs, or with AGPs, at a subtherapeutic dosage by poultry producers. Hence, Bacillus subtilis PB6 will help to manage gut health & protect gut health from the deleterious effects of necrotic enteritis and dysbacteriosis.

References are available upon request

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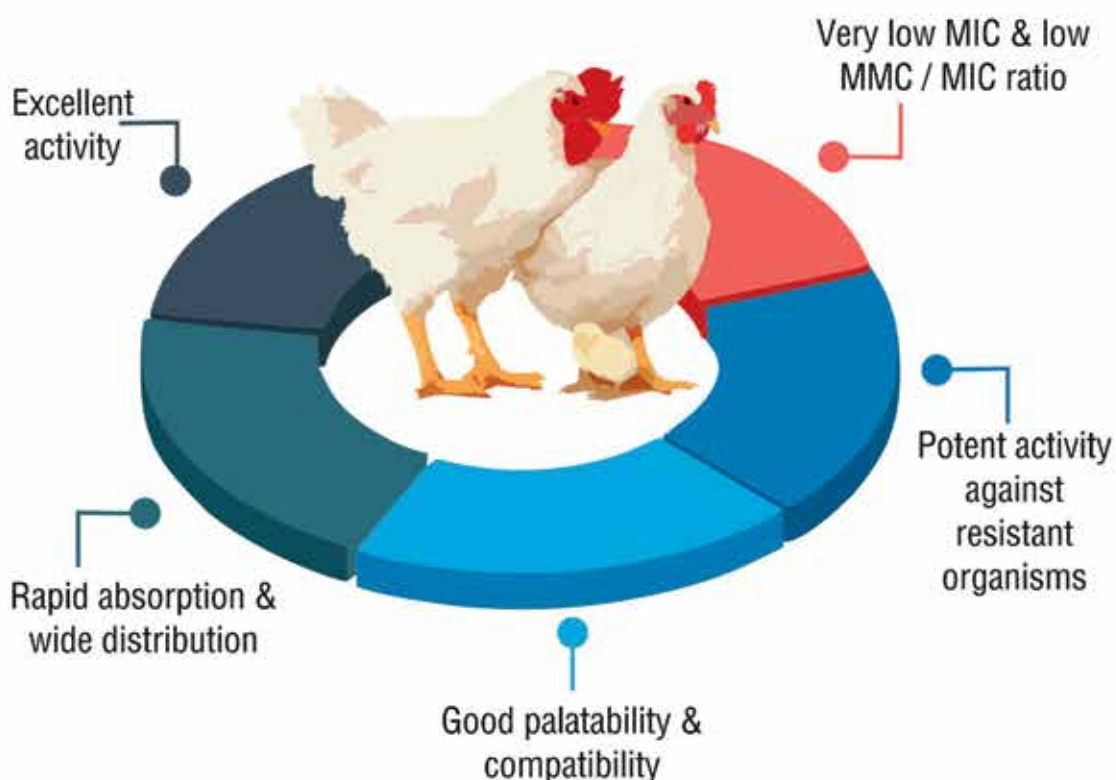
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Stress Starts in the Cell, Shows Up in the Meat

By Neotle Global Pvt Ltd

Modern poultry have been genetically selected for exceptional growth rates, superior feed efficiency, and high production performance. While these genetic advancements have significantly improved productivity, they have also increased the bird's metabolic demands and reduced their capacity to tolerate environmental and physiological stress. Consequently, even short periods of stress can trigger profound metabolic changes that divert nutrients and energy away from growth and production toward survival. Understanding these cellular events helps explain why stress management has become one of the most critical factors influencing poultry performance and profitability.

1. How Stress Disrupts Cellular Metabolism in Modern Poultry

The stress response begins with activation of the Hypothalamic–Pituitary–Adrenal (HPA) axis, the body's primary neuroendocrine system responsible for responding to stress. Environmental and physiological stressors such as heat, disease, transportation, vaccination, overcrowding, poor nutrition or management errors stimulate the hypothalamus to release corticotropin-releasing hormone (CRH). This initiates a hormonal cascade that culminates in the secretion of corticosterone, the principal stress hormone in birds, together with catecholamines such as epinephrine and norepinephrine.

These hormones are essential for immediate survival because they rapidly mobilize energy reserves. However, when stress is prolonged, they induce several metabolic changes that negatively affect productivity.

1.1 Mitochondrial Dysfunction and Oxidative Stress

During stress, corticosterone markedly increases metabolic activity, forcing mitochondria to operate beyond their optimal capacity. As electrons pass through the electron transport chain at an accelerated rate, many escape prematurely and react with oxygen molecules, generating excessive amounts of reactive oxygen species (ROS). Although reactive oxygen species (ROS) are naturally produced during normal cellular metabolism, stress increases their production beyond normal levels.

The body's natural antioxidant enzymes, including superoxide dismutase (SOD), catalase, and glutathione peroxidase (GPx), work to neutralize these harmful molecules. However, when ROS production exceeds the capacity of these antioxidant defenses, oxidative stress occurs. This excess ROS damages proteins, lipids, DNA, and cellular membranes, impairing normal cell function and reducing overall bird performance.

1.2 Protein Catabolism Replaces Protein Synthesis

Under normal conditions, dietary amino acids are primarily utilized for muscle protein synthesis and tissue growth. During stress, however, elevated corticosterone alters protein metabolism by suppressing protein synthesis and activating the ubiquitin–proteasome pathway, the cell's major protein degradation system. As a result, skeletal muscle proteins are broken down, and the released amino acids are transported to the liver, where they are converted into glucose through gluconeogenesis to meet the

bird's increased energy demands. This shift from muscle building to energy production reduces lean muscle deposition, leading to lower breast meat yield, slower growth, poorer feed conversion, and reduced carcass quality.

1.3 Altered Lipid Metabolism

Stress not only affects protein metabolism but also alters lipid metabolism. During acute stress, catecholamines stimulate the breakdown of stored fat to meet the bird's immediate energy requirements. However, prolonged elevation of corticosterone shifts metabolism toward fat storage by promoting triglyceride synthesis and increasing lipid deposition. Consequently, nutrients that would normally support lean muscle growth are diverted toward adipose tissue accumulation, particularly in the abdominal region. These metabolic changes result in increased abdominal fat, reduced breast muscle yield, lower dressing percentage, and inferior carcass quality.

2. How Stress Negatively Affects Muscle Quality in Modern Poultry

The metabolic disturbances initiated by stress at the cellular level do not remain confined to the mitochondria or biochemical pathways; they ultimately manifest as visible defects in muscle tissue. In modern broilers, where rapid muscle accretion has been achieved through decades of genetic selection, skeletal muscle is particularly vulnerable to metabolic stress. The pectoralis major (breast muscle) is the most affected because of its exceptionally fast growth rate, high metabolic demand, and relatively limited blood supply. When the supply of oxygen and nutrients

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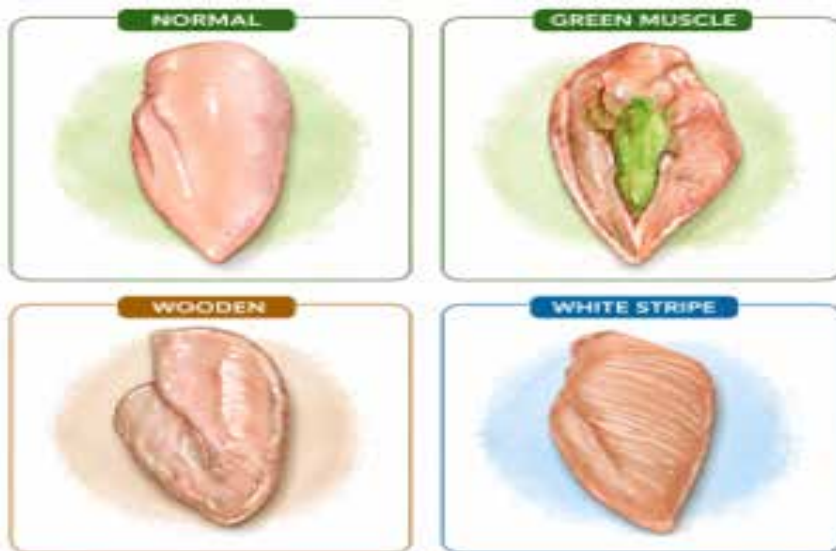
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fails to keep pace with the muscle's rapid development, a cascade of structural and biochemical changes occurs, resulting in poor meat quality, increased processing losses, and significant economic losses for the poultry industry.

2.1 Pale, Soft and Exudative (PSE) Meat

One of the most common stress-induced meat quality defects is the development of PSE meat. This condition is primarily associated with acute pre-slaughter stress, including catching, loading, transportation, crating, prolonged feed withdrawal, rough handling, and exposure to high environmental temperatures.

Acute stress immediately before slaughter triggers a series of biochemical events that can culminate in the development of PSE (Pale, Soft, and Exudative) meat. The stress response accelerates the breakdown of muscle glycogen through anaerobic glycolysis, resulting in rapid accumulation of lactic acid within the muscle. Consequently, muscle pH declines sharply while the carcass temperature remains elevated. This combination of low pH and high temperature promotes denaturation of muscle proteins, particularly the myofibrillar proteins such as myosin, which are essential for maintaining muscle structure and retaining

intracellular water.

Once these proteins are denatured, their ability to bind water is significantly reduced, compromising the water-holding capacity of the muscle. Water is displaced from the myofibrils into the extracellular spaces and subsequently lost as drip during storage and processing. This leads to increased drip loss, greater cooking losses, and reduced processing yield. The altered protein structure also changes the optical properties of the muscle, causing greater light scattering and giving the meat a pale appearance. Furthermore, the disruption of the muscle protein matrix results in a soft, exudative texture, while excessive moisture loss during cooking produces meat that is dry, less juicy, and less palatable. Collectively, these changes reduce both the commercial value and consumer acceptability of poultry meat.

2.2 Chronic Stress and Muscle Myopathies

Unlike PSE, which results from acute stress immediately before slaughter, White Striping and Woody Breast develop gradually during the bird's growth. These disorders are collectively referred to as growth-related muscle myopathies and have become increasingly common in modern fast-growing broilers.

The primary reason is that genetic improvement has dramatically accelerated breast muscle growth, but the supporting vascular network has not expanded proportionately. Consequently, rapidly enlarging muscle fibers often experience periods of inadequate oxygen and nutrient supply.

2.2.1 White Striping

White Striping is characterized by the appearance of white parallel streaks running along the direction of the breast muscle fibers. These white bands are not simply cosmetic defects; they represent areas where healthy muscle tissue has been replaced by fat and connective tissue.

Persistent oxidative stress damages muscle fibers through lipid peroxidation, mitochondrial dysfunction, and chronic inflammation. As muscle cells die, the body's repair mechanisms are unable to regenerate functional muscle completely. Instead, damaged fibers are progressively replaced by adipose tissue and fibrous connective tissue.

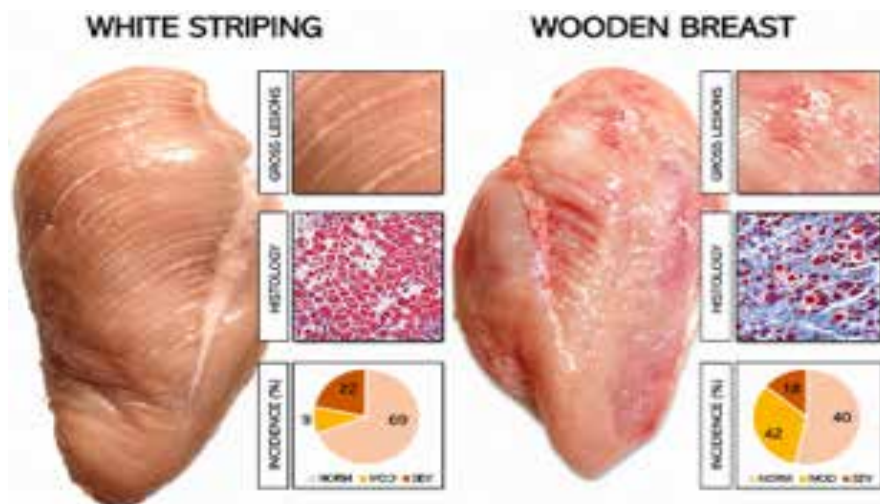
Although White Striping does not necessarily render meat unsafe, it significantly reduces visual appeal and market value while negatively affecting processing efficiency.

2.2.2 Woody Breast

Woody Breast represents a more advanced and severe manifestation of chronic muscle degeneration. Birds affected by this condition exhibit breast muscles that are unusually hard, rigid, and difficult to compress.

The disorder begins with prolonged metabolic stress and insufficient oxygen delivery to rapidly growing muscle fibers. Chronic hypoxia causes mitochondrial dysfunction and oxidative damage, eventually disrupting calcium regulation within muscle cells.

Normally, intracellular calcium concentrations are tightly controlled. Under chronic stress, however, excessive calcium accumulates inside



muscle cells, activating enzymes that degrade cellular proteins and membranes. The damaged muscle fibers undergo extensive necrosis.

The immune system attempts to repair this injury by replacing dead muscle fibers with dense collagen-rich connective tissue rather than functional muscle.

Because fibrotic tissue lacks the elasticity and water-holding capacity of healthy muscle, the meat becomes dry, tough, and less desirable for both fresh and processed poultry products.

2.3 Deep Pectoral Muscle Disease (DPMD), Commonly known as Green Muscle Disease, is a stress-related myopathy affecting the supracoracoideus (deep pectoral) muscle. It is typically triggered by vigorous wing flapping during catching, transportation, or sudden disturbances.

During intense muscle activity, the deep pectoral muscle swells within a rigid compartment that cannot expand. The resulting increase in pressure restricts blood flow, causing ischemia and subsequent muscle necrosis. As the damaged tissue degenerates, it develops the characteristic green discoloration.

The condition is characterized by localized muscle necrosis, green or brown discoloration, fibrotic tissue replacement, and shrinkage of the affected muscle. Although

it does not affect food safety, the damaged muscle is condemned during processing, leading to reduced carcass value and economic losses.

3. Selenium: Preserving Muscle Integrity Through Antioxidant Defence

Selenium is an essential trace mineral that plays a pivotal role in protecting skeletal muscle against oxidative damage. It is incorporated into several selenoproteins, most notably glutathione peroxidases (GPx) and thioredoxin reductases, which constitute key components of the endogenous antioxidant defence system. These enzymes detoxify hydrogen peroxide and lipid hydroperoxides generated during normal metabolism and further elevated under stress conditions.

Production stress increases mitochondrial generation of reactive oxygen species (ROS), leading to lipid peroxidation, protein oxidation, and disruption of muscle cell membranes. Oxidative injury impairs mitochondrial function, accelerates muscle protein degradation, and compromises the structural integrity of muscle fibres, ultimately reducing meat quality.

By strengthening the antioxidant defence system, selenium limits oxidative damage, preserves mitochondrial function, and maintains cellular membrane stability. Consequently, selenium helps improve water-holding capacity, reduce drip

and cooking losses, enhance colour stability, delay oxidative deterioration, and extend the shelf life of poultry meat.

Sustained mitochondrial energy production and reduced oxidative injury promote efficient muscle protein accretion and normal tissue repair.

Furthermore, by limiting chronic inflammation, chromium may reduce excessive collagen deposition and fibrosis associated with growth-related muscle myopathies such as Woody Breast, thereby helping preserve muscle elasticity, tenderness, and overall meat quality.

Collectively, chromium supports muscle growth, improves cellular bioenergetics, enhances stress resilience, and contributes to improved processing characteristics and meat quality in modern poultry production.

4. Chromium: Enhancing Cellular Energy Metabolism and Stress Adaptation

Chromium is a metabolically important trace mineral that supports glucose metabolism and cellular energy production. It potentiates insulin signalling through the chromodulin-insulin receptor complex, enhancing glucose uptake and utilization by skeletal muscle cells. Improved glucose availability supports efficient ATP synthesis, enabling muscle tissue to meet its metabolic demands while reducing reliance on muscle protein catabolism for energy.

In addition to its role in energy metabolism, chromium modulates the physiological response to stress by reducing circulating corticosterone concentrations and improving antioxidant status. Lower corticosterone reduces muscle protein degradation, while decreased oxidative stress and inflammation help preserve mitochondrial function and muscle fibre integrity.

Sustained mitochondrial energy

production and reduced oxidative injury promote efficient muscle protein accretion and normal tissue repair. Furthermore, by limiting chronic inflammation, chromium may reduce excessive collagen deposition and fibrosis associated with growth-related muscle myopathies such as Woody Breast, thereby helping preserve muscle elasticity, tenderness, and overall meat quality.

Collectively, chromium supports muscle growth, improves cellular bioenergetics, enhances stress resilience, and contributes to improved processing characteristics and meat quality in modern poultry production.

5. Complementary Roles in Meat Quality

Although selenium and chromium function through different biological pathways, their actions are complementary. Selenium primarily protects muscle tissue against oxidative damage by strengthening endogenous antioxidant systems, whereas chromium enhances cellular energy metabolism and improves the bird's metabolic response to stress. Together, these trace minerals help maintain mitochondrial function, preserve muscle cell integrity, reduce oxidative deterioration, and support desirable meat quality characteristics, including improved water-holding capacity, lower drip loss, better tenderness, enhanced colour stability, and extended shelf life.

6. Conclusion

Production stress is no longer an occasional challenge it is a constant reality in modern poultry production. Unless addressed at the cellular level, it silently drains energy, limits performance, and compromises meat quality. By supporting mitochondrial function, reducing oxidative stress, and optimizing cellular energy production, targeted nutritional interventions help birds convert their full genetic potential into profitable performance. Healthy cells build healthy birds, and healthy birds deliver better returns.

Impact of pre-slaughter factors on meat quality

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Preethi, V.

Introduction

Poultry meat quality is determined by several factors acting before and after slaughter. Among these, ante-mortem factors have a major influence on meat colour, tenderness, water-holding capacity, pH, carcass yield, and shelf life. These factors also affect bird welfare, processing efficiency, and microbial safety. Proper management during the pre-slaughter period helps reduce mortality, carcass defects, and economic losses while producing high-quality poultry meat.

Antemortem factors affecting poultry meat quality may be divided into two categories:

- Those having a long-term effect – Long term factors are inherent, or they occur over the entire length of the bird's life, such as genetics, physiology, nutrition, management, and disease.
- Those having a short-term effect – Short term factors affecting poultry meat quality are those that occur during the last 24 hours that the bird is alive, such as harvesting (feed and water withdrawal, catching), transportation, plant holding, unloading, shackling, immobilization, stunning, and killing.

Heredity

Genetics plays an important role in determining meat quality. Different breeds and strains differ in muscle growth, tenderness, fat deposition, muscle colour, and postmortem metabolism. Meat quality traits such as tenderness, firmness, intramuscular fat, and water-holding capacity are moderately heritable. Therefore, selection of birds with desirable genetic traits improves carcass quality and processing performance. However, environmental conditions also influence the expression of these genetic characteristics.

Physiological Age

Physiological age refers to the stage of body development rather than chronological age. As birds become older, myoglobin concentration increases, resulting in darker meat. The connective tissue becomes stronger due to increased collagen cross-linking, making the meat less tender. Older birds also develop a stronger meat flavour because of increased breakdown of muscle nucleotides after slaughter.

Muscle Location and Sex

Tenderness varies among different muscles because of differences in muscle function and connective tissue content. Muscles that contract freely during rigor mortis usually become less tender than muscles that remain stretched. Sex also influences meat quality. Male birds generally produce leaner carcasses but contain more collagen, resulting in tougher meat. Female birds usually produce more tender meat with better eating quality.

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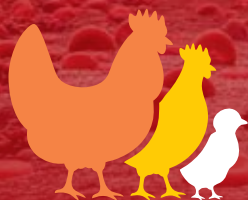
Nutrition has a direct effect on growth rate, carcass composition, and meat quality. Adequate nutrition promotes proper muscle growth and improves carcass yield. Feed restriction reduces muscle development and body weight, whereas compensatory growth after feed restriction often leads to

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excessive fat deposition. Feeding grain diets before slaughter improves meat flavour, while prolonged forage feeding may produce grassy or undesirable flavours.

Stress

Stress is one of the most important ante-mortem factors affecting poultry meat quality. Birds may experience stress due to heat, cold, rough handling, overcrowding, transportation, noise, fasting, or fear. Stress increases the secretion of adrenaline, noradrenaline, cortisol, and thyroid hormones, which accelerate glycogen breakdown and alter muscle metabolism.

Acute stress causes rapid postmortem glycolysis and a rapid decline in muscle pH, producing PSE (Pale, Soft, Exudative) meat characterized by pale colour, soft texture, poor water-holding capacity, and reduced processing yield. Prolonged stress depletes muscle glycogen before slaughter, resulting in DFD (Dark, Firm, Dry) meat with high pH, dark colour, firm texture, and increased water-holding capacity.

Feed Withdrawal

Feed withdrawal is practiced before slaughter to empty the digestive tract and reduce carcass contamination during evisceration. The recommended feed withdrawal period for broilers is 8–12 hours. During the first 4–6 hours, most weight loss occurs due to emptying of digestive contents without affecting carcass yield. Longer withdrawal causes tissue dehydration and nutrient loss. If feed withdrawal is too short, the digestive tract remains full, increasing faecal contamination during processing. Excessively long feed withdrawal weakens the intestines, enlarges the gall bladder, increases bile contamination, reduces carcass yield, and promotes the growth of pathogens such as *Salmonella* and *Campylobacter* due to an increase in crop pH.

Live Production Management

Management practices such as lighting, house temperature, litter condition, feed type, bird uniformity,

and water availability influence feed passage and digestive tract emptying. Good flock management improves processing efficiency and reduces contamination during evisceration.

Lighting and Temperature

Lighting affects bird activity and feed passage. Birds kept under light remain active and empty their crops faster than birds kept in darkness. Water should be provided for 2–4 hours after feed removal to facilitate crop emptying.

Environmental temperature is another important factor. Heat stress reduces feed intake, increases panting, accelerates glycogen depletion, lowers ultimate muscle pH, and produces pale breast meat. High temperatures during crating and transportation increase the incidence of PSE-like meat

Carcass Contamination and Live Shrink

Carcass contamination occurs when intestinal contents or bile leak during evisceration. Proper feed withdrawal minimizes this problem, whereas both inadequate and excessive withdrawal increase contamination. Live shrink refers to body weight loss between feed withdrawal and slaughter. It mainly results from loss of digestive contents and body water. Excessive live shrink reduces carcass yield and causes economic losses to producers.

Catching and Crating

Careless catching and loading expose birds to fear, stress, bruises, broken bones, wing injuries, and breast damage. Approximately 90–95% of carcass bruises occur within the last 12 hours before slaughter, mainly during catching and transportation. Older and heavier birds are more susceptible to injuries. Gentle handling significantly improves carcass quality.

Transportation

Transportation exposes birds to multiple stressors such as heat, vibration, overcrowding, fasting, water deprivation, and noise. These conditions increase mortality, glycogen depletion, live shrink, and carcass defects while reducing meat quality. Transport mortality in broilers

is generally around 0.3–0.4%, with higher losses during long journeys and hot weather. Proper ventilation, shorter transport time, and suitable stocking density reduce these adverse effects.

Lairage

Lairage is the resting period between transportation and slaughter. It allows birds to recover from transport stress and restore normal physiological conditions. Proper ventilation and cooling during lairage reduce mortality and improve meat quality. A lairage period of more than one hour is generally recommended, especially during hot weather.

Season

Seasonal changes, especially high summer temperatures, increase heat stress, reduce growth rate, increase mortality, accelerate postmortem glycolysis, and increase the occurrence of PSE meat. Proper environmental management during summer helps maintain meat quality and bird welfare.

Hanging and Stunning

Stunning is performed before slaughter to render birds unconscious and minimize pain. Electrical stunning is the most commonly used method in poultry processing. However, excessive electrical current may cause broken wings, keel bone fractures, breast haemorrhages, red wing tips, and blood vessel rupture. Correct stunning parameters improve both animal welfare and carcass quality.

Conclusion

Antemortem factors play a vital role in determining poultry meat quality, carcass yield, and processing efficiency. Proper genetic selection, balanced nutrition, effective stress management, recommended feed withdrawal (8–12 hours), careful catching, proper transportation, adequate lairage, and correct stunning practices minimize carcass defects, contamination, and economic losses while producing safe, tender, and high-quality poultry meat.

More references can be given on request.

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Moisture Optimization and Mold Control: An Integrated Approach to Improving Feed Quality, Shelf Life, and Feed Mill Profitability in Tropical Climates

Dr Maloshrie Bora, Senior Program Manager, Feed Safety and Trace Minerals, Trouw Nutrition South Asia

Across India and South Asia, feed manufacturers today face a common challenge: producing safe, stable, high-quality feed while navigating increasingly variable climate conditions, fluctuating raw material quality, rising production costs, and greater demands for feed efficiency.

Among the many factors that influence feed quality, moisture management remains one of the most underestimated. Yet moisture directly impacts pellet quality, nutrient preservation, feed hygiene, shelf life, production throughput, and overall profitability. Improper moisture management can result in shrinkage, spoilage, mold proliferation, nutrient losses, increased fines, and reduced mill efficiency. Conversely, optimized moisture control can generate significant economic returns while improving feed quality throughout the supply chain.

The Hidden Economics of Moisture Loss

During feed manufacturing, moisture is lost at several stages, including grinding, conditioning, pelleting, cooling, storage, and transportation. Industry observations indicate that feed mills can lose between 0.5% and 1.5% moisture during production, resulting in direct shrinkage and reduced profitability. A feed mill producing 500 tonnes per day can lose approximately 5 tonnes of saleable product for every 1% moisture reduction. In an industry where margins are constantly under pressure, minimizing process losses represents a substantial opportunity for value creation.



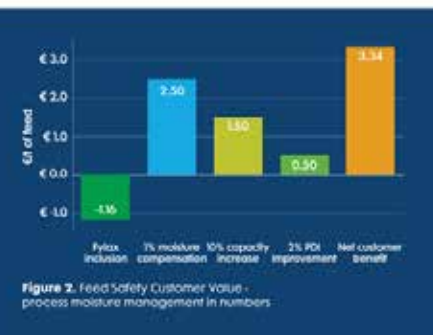
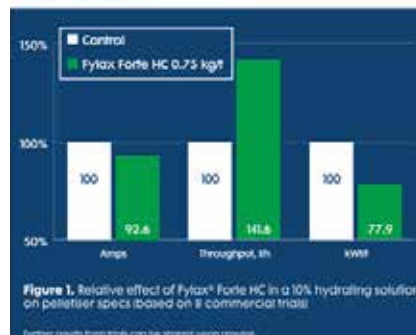
Dr Maloshrie Bora

Why Adding Water Alone Does Not Solve the Problem

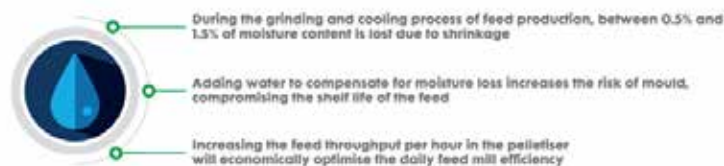
A common industry practice for compensating moisture losses is

the addition of water during feed processing. While this may appear straightforward, water possesses high surface tension and does not distribute uniformly throughout the feed matrix. Instead, free moisture often remains on the surface of feed particles, increasing water activity and creating favourable conditions for microbial growth. The challenge for the modern feed industry is therefore not simply increasing moisture content, but ensuring moisture is effectively distributed and retained throughout the feed while maintaining microbial stability.

Proven results



MOISTURE CONTENT CAN AFFECT FEED SAFETY AND FEED MILL EFFICIENCY



BUSINESS CHALLENGE

Do not let moisture loss harm your production and profitability



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Mold Growth: A Feed Quality and Profitability Threat

Molds are among the most significant biological threats to feed quality. Beyond visible spoilage, molds consume valuable nutrients, reduce energy content, affect feed palatability, shorten storage life, and create conditions favourable for mycotoxin production. The economic implications can be significant. Raw materials often constitute up to 80% of total feed production costs. Any reduction in nutritional value, shelf life, or feed volume directly impacts both manufacturers and producers downstream.

Emerging Scientific Approaches to Mold Inhibition

Advances in feed preservation technology have moved beyond conventional organic acid applications. Modern solutions increasingly combine multiple modes of action to optimize efficacy under practical feed manufacturing conditions. These technologies typically integrate:

- Organic acids
- Buffered acid systems
- Moisture management agents
- Surfactants and emulsifiers
- Synergistic bioactive compounds

Such approaches improve moisture distribution, enhance contact between active ingredients and microbial cells, and prolong

preservation effectiveness throughout storage. This scientific evolution reflects the industry's transition from simple preservation strategies toward integrated moisture and microbial management systems.

Commercial Validation: Integrating Moisture and Feed Hygiene

Research and commercial evaluations have demonstrated that moisture management and mold control must work together. In one reported study, the addition of plain water alone reduced feed shelf life by approximately 33%. However, when moisture was combined with an integrated mold inhibition program, shelf life improved compared to untreated feed while preserving feed quality and stability. Additional commercial applications have shown benefits including:

- Improved feed mill throughput
 - Enhanced pellet durability
 - Reduced reprocessed fines
 - Better moisture retention
 - Improved production efficiency
 - Greater feed stability during storage
- These findings highlight that effective moisture optimization depends on simultaneously managing microbial risks

A Modern Approach for South Asia

Recognizing the unique challenges

faced by feed manufacturers in tropical climates, Trouw Nutrition has developed integrated solutions specifically designed to optimize moisture management and feed hygiene.

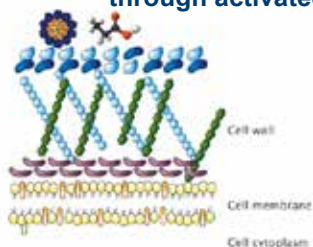
Among these solutions is the Fylax® portfolio, which combines organic acid technology, moisture management agents, surfactants, and the proprietary ActiProp® technology platform. The objective is to improve moisture distribution, enhance mold inhibition, preserve nutrient value, and support feed mill efficiency within a single integrated program. ActiProp® technology works by increasing mold cell wall permeability and improving access of active ingredients to microbial targets, resulting in enhanced preservation performance compared with conventional approaches. At the same time, moisture-management components facilitate more uniform distribution of moisture within the feed matrix, helping improve operational efficiency and shelf-life outcomes.

In today's feed industry, moisture management can no longer be viewed simply as a processing parameter—it is a critical driver of feed quality, feed safety, and profitability. As feed manufacturers across India and South Asia face increasing challenges from humidity, raw material variability, and shelf-life pressures, an integrated approach that combines moisture optimization with effective mold control is becoming essential. By preserving nutrient value, reducing shrinkage, improving pellet quality, and enhancing microbial stability, modern feed hygiene solutions can help mills achieve greater operational efficiency while delivering safer, more consistent feed to livestock producers. Ultimately, successful feed preservation is not just about preventing spoilage—it is about maximizing value throughout the feed-to-food chain.

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- 4) Decrease internal pH inhibition growth □ killing mold

'Problem talk creates problems – Solution talk creates solutions'
[Steve de Shazer]



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Protect poultry against Newcastle Disease, Infectious Bronchitis and Egg Drop Syndrome.

“

Inactivated oil-emulsion vaccine combination of Newcastle Disease virus of Genotype VII of N018 strain and Infectious Bronchitis of M-41, 771 and QX-like strain and, Egg Drop Syndrome '76 strain.

VAKSIMUNE® NDL IBplus EDS : The results of challenge test, observation for 14 days

Batch No.	Group	Protection rate		HI-GMT		NI		
		Ratio*	%	ND	EDS	IB (M41)	IB (QX)	IB (771)
272M4 OOV	Vaccinated	10/10	100	207.9	147	3.6	2.2	2.2
	Control	0/10	0	<2	<2	0	0	0

*) Number of birds survived per number of challenged birds

Egg drop syndrome – 1976 (EDS –'76) is a major cause for loss of egg production upto 40% and laying of thin shelled and shell less eggs by apparently healthy birds. The syndrome is caused by an adenovirus with transmission occurring vertically and horizontally.



Vaccination Programme:

Each bird should be given one dose at age of 16-18 weeks.

Note : The vaccination programme depends on infection pressure and local situation under supervision of poultry veterinarian

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