

# Poultry Fortune

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December 2024

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India celebrates  
National Chicken Day

Emerging H5N1  
mutations raise risk of  
human infections



Glamac honoured with  
Veterinary Pharma  
Company of the Year  
Award

Mastering the Art of  
Hygienic Feed Milling:  
Practical Approaches  
for Quality and Safety

Effective management  
practices to reduce  
the incidence of  
Ascites in Broilers



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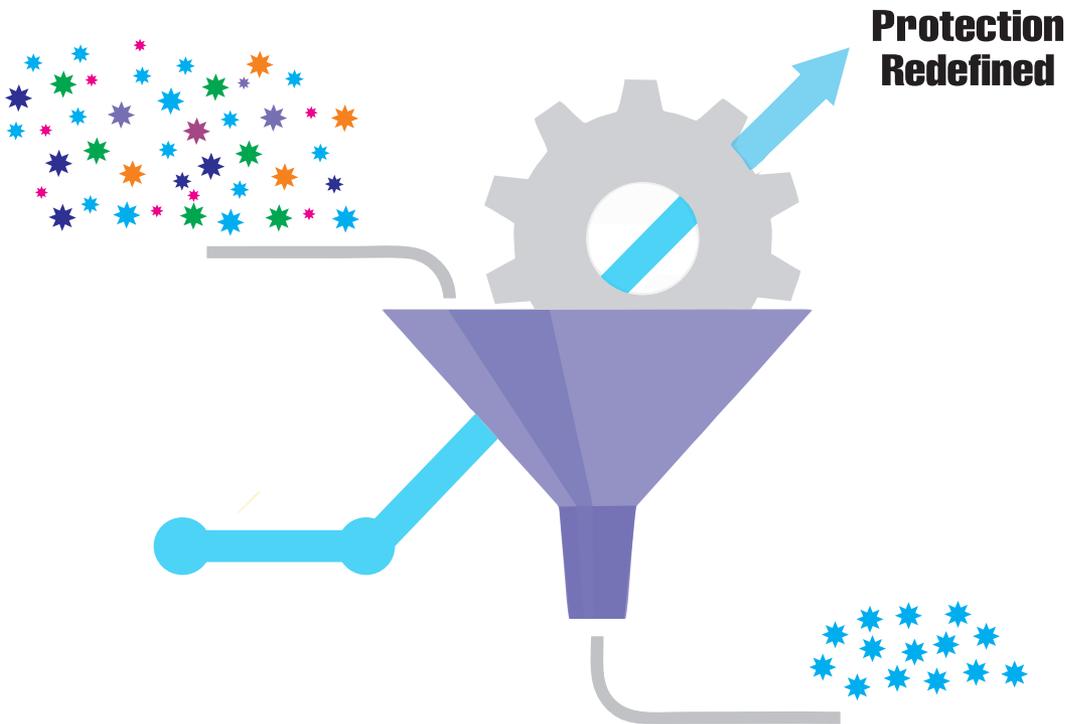
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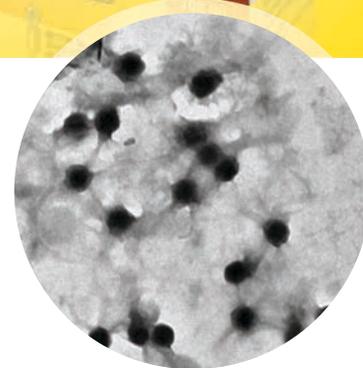


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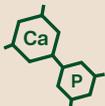
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- Editor



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## India celebrates National Chicken Day

*Poultry industry relies on the quality and safety of the feed provided to birds. Maintaining feed hygiene is essential for safeguarding poultry health, productivity and welfare. According to FAO, feed hygiene involves the "measures and conditions necessary to control hazards and ensure feed is suitable for animal consumption based on its intended use. Proper feed hygiene prevents poultry diseases like Salmonella and Mycotoxicoses.*



Dear Readers,

The December 2024 issue of Poultry Fortune is in your hands. *In the news section you may find news about...*

**Association of Assam Vets in Poultry Industry** celebrated National

Chicken Day on 16 November 2024 in Guwahati with the theme - Promoting Chicken and Egg Consumption for health building, aims to spread awareness about the health benefits of chicken and eggs. This day also commemorates the 89th Birth Anniversary of PadmaShri Dr B.V.Rao, the "Father of Indian Poultry Industry," whose immense contribution helped to uplift the Indian poultry sector. The program was inaugurated by Mr Manoj Saikia, Chairman ALPCO, by flagging off the bike rally and gave his introductory speech in the event. The bikes were loaded with Flags and Posters of chicken and Egg Consumption promotional messages.

Through the celebration of National Chicken Day, the organizers aimed to highlight the positive messages emphasizing the need to increase in chicken and egg consumption to fulfill protein needs and for different health benefits. The event also addressed and countered the common myths about chicken and egg consumption circulating in the social media platforms. More than 600 people which included farmers, students, media representatives, consumers and the public in general took part. Leaflets about health benefits of chicken and meat were distributed through local newspapers and to the general public to create awareness about chicken and egg consumption and not to believe misinformation which has no scientific basis.

**Avian influenza**, commonly known as bird flu, is a viral infection primarily affecting birds. A global outbreak of H5N1, a highly pathogenic avian influenza virus, has been spreading across the world since late 2020, driven by a new emerging lineage of the virus — 2.3.4.4b. H5N1 has been a significant concern in global public health due to its potential to cause severe disease in humans and its ability to infect a wide range of hosts, including poultry, wild birds and mammals. Since its emergence in the late 1990s, the virus has predominantly been an issue for the poultry industry, but sporadic human cases have raised alarms about its pandemic potential. However, recent human cases of H5N1 in British Columbia in Canada and California have increased concerns about the adaptability of the virus and possible mutations that could facilitate human-to-human transmission.

Testing of household contacts of the patient, pets, nearby animals and environmental samples returned negative results for influenza H5 and despite several efforts, health officials were not in November 2024, a teenager from Fraser Health, British Columbia was diagnosed with H5N1. This is the first domestically acquired case of human H5N1 infection in Canada. The teenager initially experienced conjunctivitis, fever and cough, which rapidly progressed to acute respiratory distress syndrome, requiring intensive care. Genomic sequencing revealed that the virus belonged to the 2.3.4.4b clade, genotype D1.1, consistent with strains found in wild birds in the Fraser Valley area and not directly related to outbreaks at poultry farms in British Columbia. The D1.1 is a different genotype than the one that has infected dairy workers in the U.S. and the child in California. able to identify the definitive source of the teenager's infection. In a media briefing, Bonnie Henry, British Columbia's health officer said that the "virus may have evolved after infecting the patient".

*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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While these findings underscore the urgent need for understanding and addressing the evolving epidemiology of the H5N1 virus, they also highlight the need for increased surveillance and targeted public health interventions to control the virus's spread. Continued genomic surveillance of the virus will be critical to tracking its evolution, understanding mutation patterns, and assessing its potential to adapt and spread more effectively among human populations. Such efforts are essential to guide prevention strategies and mitigate the risk of a potential H5N1 pandemic.

**Glamac International Pvt Ltd**, a leading Veterinary Formulation Company, specialised in Poultry Nutrition and Feed Additives, has been awarded the prestigious 'Veterinary Pharma Company of the Year' award at the GEEF Global Sustainable Development Summit & Awards 2024 at JW Marriott Aero City, New Delhi recognizing its excellence and contributions to the "Sustainable Veterinary Formulations" in healthcare category. This prestigious accolade underscores GLAMAC's commitment to innovation and R&D in developing sustainable Veterinary Formulations for a healthier future for all. The GEEF (Global Excellence and Eminence Forum) Awards celebrate outstanding achievements across various sectors on a global platform.

**International Health Care Limited** of PVS Group recently celebrated the launch of its innovative METABO product with two spectacular events in Namakkal and Coimbatore, Tamil Nadu. The company shared insights into the science behind METABO, introducing Symbiotic Molecule Technology and this breakthrough technology supports optimal animal health using biologically derived molecules designed to enhance growth, immune response and gut health.

In the Articles section, **Mastering the Art of Hygienic Feed Milling: Practical Approaches for Quality and Safety**, authored by Dr Badineedi Hanumanth Rao, Technical Executive – Livestock Nutrition, discussed that poultry industry relies on the quality and safety of the feed provided to birds. Maintaining feed hygiene is essential for safeguarding poultry health, productivity and welfare. According to the Food and Agriculture Organization, feed hygiene involves the "measures and conditions necessary to control hazards and ensure feed is suitable for animal consumption based on its intended use.

The article also discussed about **Disease Prevention**: Proper feed hygiene prevents poultry diseases like *Salmonella* and Mycotoxicoses.

**Productivity**: Ensures optimal feed intake and nutrient absorption for better poultry growth.

**Food Safety**: Prevents contaminants from transferring from feed to poultry and humans, ensuring safe poultry products.

**Economic Sustainability**: Reduces mortality, treatment costs, production losses and supporting economic sustainability.

**Critical Control Points**: Meticulous control of milling stages - ingredient reception, grinding, mixing, pelleting and storage - prevents contamination and ensures safe feed.

Feed hygiene is critical in poultry industry and the feed milling process is a key control point in maintaining this hygiene. A focus on feed hygiene also contributes to food safety for consumers and supports the economic sustainability of the poultry industry.

Another Article titled, **Feed Safety: Leading the way to food safety** authored by Dr Senjuti Kar, stated that Feed safety is a prerequisite to food safety and human health as well as a necessity for animal health and welfare. Since feed accounts for majority of livestock production cost it is important that the feed produced is safe for the animals that consume it as well as the animal produce, like eggs, meat and milk is safe for human consumption. Foods of animal origin have an important role in a balanced diet and must be safe for human consumption. Equally important is the need for the food to be perceived as safe by the consumer. Safe food of animal origin must be free from animal pathogens that infect man and from contamination by residues. Animal feed has been identified as a critical component of food chain considering the carryover of undesirable substances such as dioxins, mycotoxins, heavy metals, pesticides, pathogens, veterinary drugs, growth promoters, specified risk material (prions), microplastics etc. from feed to food of animal origin. If carryover is not properly managed, contaminated feed can directly harm species that are sensitive to the unintended components they consume and can result in residues in foods of animal origin such as meat, milk and eggs that render them unsafe for human consumption.

Another Article titled, **The Advantages Of Plant Derived 1, 25 (OH)<sub>2</sub> D<sub>3</sub> Glycoside Over Other Metabolites Of Vitamin D** authored by Avitech Nutrition discussed that glycosylated 1,25-dihydroxyvitamin D<sub>3</sub> (1,25(OH)<sub>2</sub>D<sub>3</sub>-gly) offers significant advantages over traditional Vitamin D metabolites, such as 25-hydroxyvitamin D<sub>3</sub> (25(OH)D<sub>3</sub>) and 1-alpha-hydroxyvitamin D<sub>3</sub> (1α(OH)D<sub>3</sub>).

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Another Article titled, **Effective management practices to reduce the incidence of Ascites in Broilers** authored by Aviagen Indian Poultry Breeding Co Pvt Ltd stated that ascites is a multi-factorial syndrome caused by interactions between physiological, environmental and management factors. Its presence in a broiler flock will have a significant effect on the biological and economical performance of the flock. The key to preventing Ascites is ensuring that good basic management is adhered to, particularly with regards to ventilation. If incubating at high altitudes ensure adequate ventilation is achieved. Achieving appropriate ventilation in the poultry house from placement through to depletion is essential, particularly at high altitudes; ventilation rates must supply enough air to replenish the oxygen consumed and ensure the adequate removal of waste gases. Check ventilation rates and equipment regularly making any adjustments as required.

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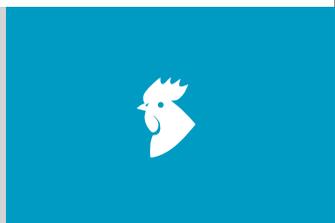
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## Emerging H5N1 mutations raise risk of human infections

*Genome sequencing identified the PB2-E627K mutation in the British Columbia teenager, which is linked to faster replication in human cells and greater severity of illness, and likely emerged during the infection*

Avian influenza, commonly known as bird flu, is a viral infection primarily affecting birds. A global outbreak of H5N1, a highly pathogenic avian influenza virus, has been spreading across the world since late 2020, driven by a new emerging lineage of the virus — 2.3.4.4b. H5N1 has been a significant concern in global public health due to its potential to cause severe disease in humans and its ability to infect a wide range of hosts, including poultry, wild birds and mammals. Since its emergence in the late 1990s, the virus has predominantly been an issue for the poultry industry, but sporadic human cases have raised alarms about its pandemic potential. However, recent human cases of H5N1 in British Columbia in Canada and California have increased concerns about the adaptability of the virus and possible mutations that could facilitate human-to-human transmission.

In November 2024, a teenager from Fraser Health, British Columbia was diagnosed with H5N1. This is the first domestically acquired case of human H5N1 infection in Canada. The teenager initially experienced conjunctivitis, fever, and cough, which rapidly progressed to acute respiratory distress



***A highly pathogenic avian influenza virus has been spreading across the world since late 2020 driven by a new virus 2.3.4.4b***

syndrome, requiring intensive care. Genomic sequencing revealed that the virus belonged to the 2.3.4.4b clade, genotype D1.1, consistent with strains found in wild birds in the Fraser Valley area and not directly related to outbreaks at poultry farms in British Columbia. The D1.1 is a different genotype than the one that has infected dairy workers in the U.S. and the child in California. Testing of household contacts of the patient, pets, nearby animals, and environmental samples returned negative results for influenza H5 and despite several efforts, health officials were

not able to identify the definitive source of the teenager's infection. In a media briefing, Bonnie Henry, British Columbia's health officer said that the "virus may have evolved after infecting the patient". The reason for suspecting this is because the teenager's symptoms began with conjunctivitis and then rapidly progressed to acute respiratory distress syndrome. Serial samples from the patient have been collected to identify any mutations that may have occurred over the course of the infection.

### **Genomic analysis**

While no further cases

were detected, genomic analysis of the viral isolate identified mutations in the virus that are potentially linked to increased adaptation to human hosts, including enhanced cell-receptor binding and deeper lung penetration. Genome sequencing identified the PB2-E627K mutation in the sample, which is linked to faster replication in human cells and greater severity of illness, and likely emerged during the infection. These findings raise concerns about the potential of the virus to cause more severe respiratory illness in humans. However, there is the H5N1 virus infecting the teenager in Canada has been transmitted to other people. Concurrently, the U.S. CDC confirmed the first human case of H5N1 avian influenza in a child from Alameda County, California. The child experienced mild respiratory symptoms and is recovering after antiviral treatment. Health officials have found no evidence of human-to-human transmission, as family members tested negative for the virus. Although over 50 cases of human H5N1 infections have been reported from the U.S. in 2024, this patient is the second child in North America to be infected with H5N1.

The two cases are particularly concerning because their transmission routes differ significantly from the other cases of H5N1 that have been reported from North America in 2024. Previous infections primarily involved people who

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were in close contact with infected birds, including dairy or poultry farm workers. According to the CDC, human H5N1 infections without a clear link to exposure to affected animals are rare and have predominantly been reported in other countries. These recent cases, therefore, underscore the importance of understanding the virus's evolving genomic characteristics, which may allow it to bypass traditional transmission barriers. Researchers are particularly vigilant for mutations that could enable the virus to spread more easily among humans, as such changes could pose a significant public health risk.

While these findings underscore the urgent need for understanding and addressing the evolving epidemiology of the H5N1 virus, they also highlight the need for increased

surveillance and targeted public health interventions to control the virus's spread. Continued genomic surveillance of the virus will be critical to tracking its evolution, understanding mutation patterns, and assessing its potential to adapt and spread more effectively among human populations. Such efforts are essential to guide prevention strategies and mitigate the risk of a potential

H5N1 pandemic. (Bani Jolly is a senior scientist and Vinod Scaria is a senior consultant at Karkinos Healthcare.

## New NOVUS Leader says Reliability Matters to Customers in South Central Asia

**BENGALURU, INDIA:** The NOVUS commercial team in South Central Asia has one of its own leading the way. Dr Koushik De, who has been with the intelligent nutrition company for 12 years, was recently named sales director for the poultry business in South Central Asia. Working from the office in Bangalore, India, he is charged with driving sales and strategy, working closely with the technical services and sales teams on how to best support customers with solutions like MINTREX Bis-Chelated Trace Minerals, CIBENZA Enzyme Feed Additive and AVIMATRIX Feed Solution among others.

My aim is for customers to understand that NOVUS is a reliable partner, ready to address key industry challenges like meat quality and getting more from raw feed, he says. By providing solutions that show clear value and benefit to our customers, we can be the ones they turn to, helping them meet their goals and have their animals meet their growth potential.

Having most recently spent his career at NOVUS as technical services director, Koushik has a deep understanding of the poultry industry in South Central Asia. He recognizes the unique position



*Dr Koushik De*

producers, nutritionists and feed mills face in the region.

On one side, there is the growing middle class that demands high-quality meat, which is a good thing but can be difficult to achieve when faced with disease, feed quality and meat quality issues, he says. Education and science have never been more important for the industry. Producers, nutritionists and feed mills need to understand the nutrition options when it comes to addressing these issues while also ensuring the additives they choose are backed by scientific results to ensure positive results.

In his new role, Koushik says the commercial team will understand the addressable challenges NOVUS can aid in, providing guidance on both nutrition and management.

For instance, feed

quality and cost are a concern. Our CIBENZA DP100 Enzyme Feed Additive is shown to enhance digestibility and nutrient absorption, which helps lower the cost of feed. We also offer support and training to optimize feed formulations and manage ingredient variability," he says.

"This is just one example of how the team in South Central Asia is offering more to our poultry customers.

Manish Singh, NOVUS Regional Director-South Central Asia, says, with nearly two decades of experience, Dr Koushik brings a wealth of technical, commercial and customer service experience to the role.

"I'm thrilled to have Dr Koushik onboard as sales director for the poultry segment for South Central Asia," he said. "With his deep industry knowledge and proven track record in driving sales and fostering customer relationships, I am confident that he will make a significant impact on our poultry business and help us continue to deliver value to our customers and partners through our intelligent nutrition solutions across the region.

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## International Health Care of PVS Group launches METABO in Tamil Nadu

Vijayawada: International Health Care Limited of PVS Group recently celebrated the launch of its innovative METABO product with two spectacular events in Namakkal and Coimbatore, Tamil Nadu. Attended by a remarkable gathering of poultry customers, consultants and nutritionists, the launch generated an engaging and collaborative atmosphere centered on pioneering advancements in animal nutrition.

Dr Amit Patra, Business Head, International Health Care Ltd, hosted the event skillfully guiding



**Dr Pamulapati presenting Memento to Dr Chandrasekar**

attendees through each segment of the program. The formal product launch was led by renowned experts Dr D. Chandrasekar and Dr Pamulapati, who spotlighted METABO's potential to reshape veterinary nutrition with its unique and advanced formulation.

The event commenced with an inspiring welcome address from Chairman and Managing Director, Dr Pamulapati Venkata



**Launching of Metabo brochure**

Seshaiah, setting an enthusiastic tone for METABO's anticipated impact in the industry.

Following this, Dr Niranjan Jadhav, General Manager – Techno-Commercial, International Health Care Ltd delivered a compelling presentation



**Dr Amit Patra addressing the participants**

on the company's profile, highlighting PVS Group's commitment to innovation and excellence in animal health.

Adding to the excitement, Dr Rajesh

Buti, Director & Chief Scientist – R & D Head, IHCL shared insights into the science behind METABO, introducing the revolutionary Symbiotic Molecule Technology. This breakthrough technology supports optimal animal health



**Dr Niranjan Jadhav presenting company profile**

using biologically derived molecules designed to enhance growth, immune response and gut health.

Mr Palaniswamy concluded the event, with



**Welcome address by CMD Dr Pamulapati**

heartfelt appreciation extended to all attendees for making the launch an overwhelming success.

The METABO launch events marked a milestone for PVS Group, demonstrating its dedication to advancing veterinary science and promoting animal well-being across India. The enthusiastic response



**Dr Rajesh Buti sharing insights**

from the poultry and nutrition communities underscores METABO's potential to make a transformative impact in the field, said a note from the company.



**IHCL team with participants**



## Association of Assam Vets in Poultry Industry celebrates National Chicken Day in Guwahati

Guwahati: The theme of the event, Promoting Chicken and Egg Consumption for Health Building, aims to spread awareness about the health benefits of chicken and eggs. This day also commemorates the 89th Birth Anniversary of PadmaShri Dr B.V.Rao, the "Father of Indian Poultry Industry," whose immense contribution helped to uplift the Indian poultry sector. The program was inaugurated by Mr Manoj Saikia, Chairman ALPCO, by flagging off the bike really and gave his introductory speech in the event. The bikes were loaded with Flags and Posters of chicken and Egg Consumption promotional messages. The following dignitaries have also joined the program and gave their encouraging speeches on this occasion.

Dr B.N. Saikia, Dean, College of Veterinary Science, Khanapara; Dr Prabodh Borah, Director



of Research (Vety) AAU; Dr Dandeswar Deka, DDO; Dr Anil Ch. Deori (ACS), Director, Animal Husbandry and Veterinary Chenikuthi; Dr Hiranya Bhattacharya, Associate Director of Extension Education (Vety), AAU.

All the dignitaries offered their homage to Dr B.V. RAO on this special occasion by remembering his contribution to the Indian poultry industry.

The program ended with a vote of thanks given by Dr Purnananda Konwar, GM, ALPCo. The event was held in collaboration with Poultry Development Forum (PDF), Assam Livestock and Poultry Cooperative (ALPCO), and the College of Veterinary Science, Khanapara, who were all working together to make the celebration a success.

Through the celebration

of National Chicken Day, the organizers aimed to highlight the positive messages emphasizing the need to increase in chicken and egg consumption to fulfill protein needs and for different health benefits. Dr L.N Saikia, President and Dr Chambal Konch, Secretary of AAVPI gave their briefing to the media persons about the program. The event also addressed and countered the common myths about chicken and egg consumption circulating in the social media platforms.

The program was very much successful with the presence of more than 600 people which included farmers, students, media representatives, consumers and the public in general. Leaflets about health benefits of Chicken and meat were distributed through local newspapers and to the general public to create awareness about chicken and egg consumption and not to believe misinformation which has no scientific basis, according to the note received from Dr M. P. Hazarika, Madhya Pradesh Women Poultry Producer Company (MPWPCL).





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## Glamac honoured with Veterinary Pharma Company of the Year at Geef Global Sustainable Development Summit & Awards 2024 supported by Dept of Science & Technology, Govt of India

**Delhi, 8 November 2024:**

Glamac International Pvt Ltd, a leading Veterinary Formulation Company, specialised in Poultry Nutrition and Feed Additives, has been awarded the prestigious 'Veterinary Pharma Company of the Year' award at the GEEF Global Sustainable Development Summit & Awards 2024 at JW Marriott Aero City, New Delhi recognizing its excellence and contributions to the "Sustainable Veterinary Formulations" in healthcare category. This prestigious accolade underscores GLAMAC's commitment to innovation and R&D in developing sustainable Veterinary Formulations for a healthier future for all. The GEEF (Global Excellence and Eminence Forum) Awards celebrate outstanding achievements across various sectors on a global platform, informed a note from Glamac International Pvt Ltd.

The summit and award



*Abir Mukharjee receiving Geef Award at New Delhi on November 8, 2024*

ceremony held at JW Marriott Aero City in Delhi was attended by over 200 participants, bringing together senior government officials, leading industry figures, policymakers and technocrats on a common platform to discuss the vital role of modern healthcare infrastructure in shaping India's sustainable development goals (SDGs) vision for 2047.

Two things will define how the progress towards journey of humanity will

unfold in the times to come. First is the health of our people. Second is the health of our planet. Both are inter-linked. The event was organised by The GEEF Foundation with the support of Department of Science & Technology, Government of India.

The highlight of the evening was the prestigious GEEF Global Awards 2024 in Sustainability & Healthcare. The GEEF announced a total of 26 winners, including joint winners, across 14 diverse categories. Each award winner was honoured with a trophy and a citation recognizing their exceptional contributions for sustainable development goals (SDGs). GLAMAC proudly shared the platform with other awardees like ONGC, Reliance Industries, HP, NTPC, CESC, Zydus, Cadila, Aditya Birla, HONDA etc. The awards were given by

Dr Lalit Varma, IAS, Former Additional Chief Secretary to the UP Government, Dr Bibek Bandyopadhyay, Former Senior Advisor to the Government of India, Mr Nico Schiettekatte, Counsellor for Health, Welfare & Sport, Embassy of the Kingdom of the Netherlands in India and Mr Punit Singh Nagi, Director Project The GEEF.

For GLAMAC, the prestigious event was proudly attended by Mr Abir Mukherjee, Managing Director and Mr Vinod Mishra, AGM- Sales (North & South). On receiving the award

Mr Mukherjee said, This award reflects our unwavering dedication to innovation and excellence. We are honoured by this



recognition and remain committed to leveraging our technical expertise to deliver groundbreaking formulations. Glamac sustainable formulation drive started with **Panbonis**- a Vitamin D3 metabolite from Natural source in partnership with Herbonis, Switzerland followed by **CYNKA HBR & FENVI**-Natural Antidiarrheal. Our nature's blend **CYNKA HBR** -Antidiarrheal & Antimicrobial is a game





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Geef Award winners

changer and already an award winner as Veterinary Pharma Innovation of The Year by The Economic Times at the beginning of 2024 which now draws the attention of GEEF

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eggs & chicken in India and across the globe and emerges as the successful alternative of HALQUINOL & Conventional Antibiotics (AGP) for sustainable poultry farming.

## CLFMA appoints Commander S. Jaikumar, Retd as its Executive Director



Mumbai Commander S. Jaikumar, Retd, Indian Navy, has joined CLFMA of India as its Executive Director w.e.f 28 November 2024. He comes with a rich experience of 15 years in heading various associations and industry bodies, informed its Chairman, Divya Kumar Gulati.

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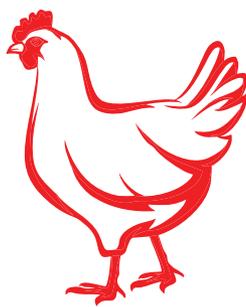
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## Glocrest launches Calcitriol-D

**Mumbai:** Glocrest Pharmaceutical Pvt Ltd unveiled Calcitriol-D, their revolutionary product from The Netherlands at Hotel Novotel on 27 November 2024. This launch marks a new era in poultry nutrition, empowering better health and productivity for flocks worldwide.

The event witnessed the grand presence of renowned consultants, breeders, integrators and layer farmers from across India, Nepal and Sri Lanka, who were the key witnesses of the remarkable launch.

The company and its product profile was eloquently presented by Dr Ramdas S Kambale, CEO, Glocrest Pharmaceutical, while the keynote speaker Dr S.V. Rama Rao, a



*Madan Maity and Rajesh Babu, Chairman, GLOCREST taking participation in the discussion.*

renowned scientist, shared invaluable perspectives on various derivatives of Vitamin-D<sub>3</sub>. Calcitriol-D, the nutritional revolution is set to benefit all stakeholders in the poultry industry. Together, we are shaping a healthier future in poultry industry.

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is a global animal health venture of Krishna Group - prestigious poultry and agricultural conglomerate. Being an industry

pioneer, GLOCREST and its peers, has more than half a century of combined expertise in the development and manufacturing of nutrition products. Our customers include everyone from small to large farmers, to integrators and dealers. We aim to provide them with nutritional solutions that ensure maximum animal health and performance. Revolutionizing animal nutrition globally through innovation and technology. GLOCREST is combining decades of experience with unparalleled research capabilities. helping you achieve optimal animal nutrition, feed quality, pathogen control, pharmaceutical solutions and more.



*Dr Pattabhirama, chief nutritionist of the Nanda group, shares his experience with the results of Calcitriol-D*



*Dr Ramdas Kambale presenting technical specialties to the guests.*



*Dr Ramdas Kambale, CEO of GLOCREST giving his inaugural speech.*



*VVIP guests lighting the lamp*



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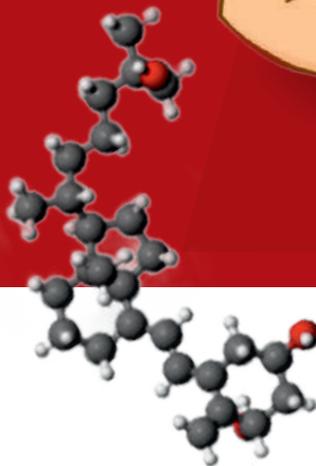
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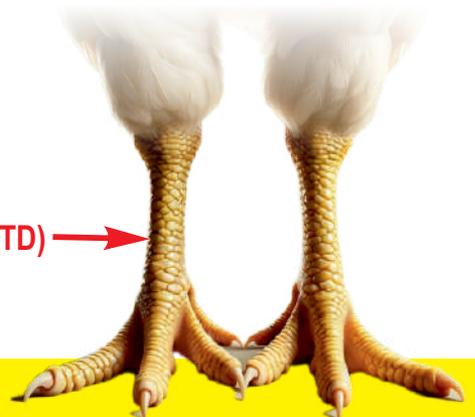


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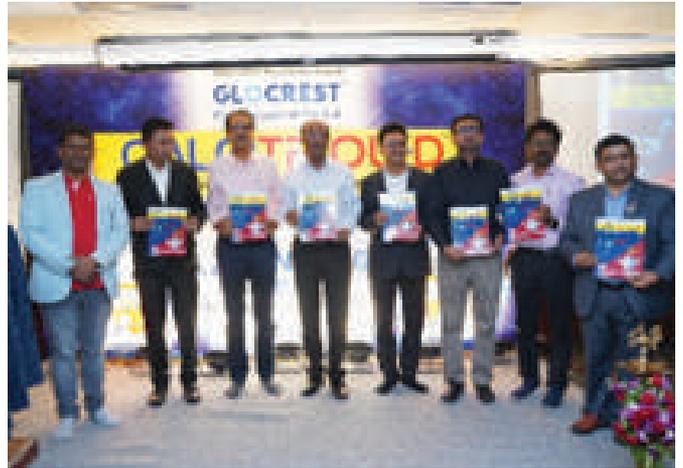
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Madan Maity and Rajesh Babu, Chairman, GLOCREST taking participation in the discussion.



VVIP guests displaying the Calcitriol-D brochure.



Madan Maity and Rajesh Babu, Chairman, GLOCREST taking participation in the discussion.



Dr U.C. Patel and Dr Sutipto Halder taking part in the technical discussion.



Dr S.V. Rama Rao the keynote speaker and renowned scientist presented various derivatives of Vitamin D3.



Guests from Nepal during the launch program.



Guests from Sri Lanka during the launch program.

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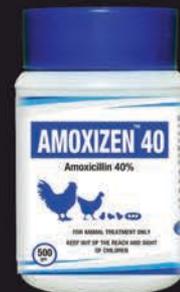
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## Srinivasa Farms makes an Indelible mark at the Poultry India Expo

**Hyderabad:** Srinivasa Farms, one of India's leading integrated poultry companies, showcased its commitment to innovation, sustainability and customer engagement at the Poultry India Expo held on 27 to 29 November 2024 at Hyderabad.

The event recognized as one of the largest platforms for the poultry industry in South Asia, brought together farmers, industry leaders, consultants and technology innovators from across the country. Srinivasa Farms' participation highlighted its comprehensive range of solutions across the Layer, Broiler, Feed, Soya and Commercial Egg segments. **A Hub of Innovations and Engagement**, the Srinivasa Farms stall was a hub of activity, attracting a diverse audience from across the country evincing a keen interest to learn about the company's latest advancements in poultry farming from hatching and breeding to commercial sales with interactive



**Suresh Chitturi,**  
MD, Srinivasa Farms.

displays, live product demonstrations and technical consultations, the team provided valuable insights to both seasoned farmers and new entrants.

Speaking at the event, Mr Suresh Chitturi, Managing Director of Srinivasa Farms, said, the Expo has been an exceptional opportunity for us to engage with all stakeholders, understand emerging trends and showcase our solutions tailored to meet the evolving needs of the industry. We are committed to supporting farmers with innovative products and sustainable practices that drive profitability and



**Jagapati Rao Chitturi,**  
Chairman, Srinivasa Farms.

efficiency."

### Strengthening partnerships

Srinivasa Farms also recognized its longstanding collaboration with Hy-Line International, a global leader in layer genetics, which has been instrumental in introducing the high-performance breed - Hy-Line W-80i in the Indian market.

Srinivasa Farms extends its gratitude to the organizers of the Poultry India Expo 2024 for providing an excellent platform to connect with industry leaders and exchange knowledge.

### Looking Ahead

As the poultry industry continues to grow, Srinivasa Farms remains dedicated to driving innovation, enhancing productivity and supporting farmers through cutting-edge technology, superior genetics and expert technical guidance across the life cycle.

### About Srinivasa Farms:

Established in 1965, Srinivasa Farms is a pioneer in India's poultry industry, offering a range of solutions from breeding to retail. With a focus on innovation, quality and sustainability, Srinivasa continues to empower farmers and contribute to the growth of the poultry sector in India and beyond.



**Jahnvi Chitturi,** Whole time Director, Srinivasa Farms receiving memento from Chakradhar Rao.



**Srinivasa & Hy-Line Team.**



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A view of Srinivasa Farms Stall in the Expo.



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**Bahadur Ali, Zoya Alam and others at IB Group Stall in the Poultry India Expo**



**Ranpal Dhanda, President, PFI and the team at the Expo at Hyderabad. PFI extended invitations to participate in its 35th Annual General Meeting scheduled to be held at Hotel Leela Ambience, Gurgaon on December 27- 29.**



## Lumis Enzymes at Eurotier, Germany

**Mumbai:** Lumis Enzymes recently exhibited at Eurotier, Germany. Eurotier is one of the leading international trade fair for professional animal farming and livestock management. Exhibiting year after year at Eurotier has allowed us to nurture relationship with existing clients while also helping us to expand our market reach. Overall, the exhibition was a resounding success, said a note from Mr Kartikey Shah,

Vice President – Marketing, Lumis Biotech Pvt Ltd.

Our team had the opportunity to present our unique enzyme portfolio directly to visitors, showcasing the technical features and outstanding benefits of our products. The feedback was overwhelmingly positive, with visitors expressing strong interest in how our enzymes could solve specific challenges in the feed industry.

Visitors to our booth were highly satisfied with the technical benefits of our

products, particularly their sustainability and the value they provide in addressing industry challenges. Many attendees remarked on how our solutions are well-positioned to support the feed industry's shift toward more sustainable practices. A key focus of our exhibition was highlighting how our sustainable enzyme solutions are designed to improve feed efficiency, reduce waste and optimize animal nutrition. This resonated with many visitors, who are increasingly focused on sustainability within their operations. By offering solutions that support both economic and environmental goals, we positioned ourselves as a key partner in the future of the feed industry. The feedback we received about our products will be integrated into our R&D efforts, ensuring that we remain at the forefront of innovation in the feed industry, particularly in areas related to sustainability and efficiency".



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The event commenced with a welcome note from Mr. Rahul Kapur, Managing Director of Avitech Nutrition. Mr Kapur presented a detailed overview of the company's future plans. This was followed by an insightful presentation by Dr. Dinesh T Bhosale, a renowned industry professional with over 22 years of experience. Dr Bhosale elaborated on the

role of leadership and the importance of teamwork.

The second day of the conference focused on product training.

The conference concluded with an awards distribution ceremony, celebrating the individual and team achievements of Avitech's sales team over the past year.

The retreat offered a perfect balance of work and pleasure. Attendees had the opportunity to unwind in Goa's beautiful surroundings, engaging in team-building activities and networking in a relaxed setting.



Avitech Nutrition team during Annual Sales Retreat event held in Goa, India

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# Effective management practices to reduce the incidence of Ascites in Broilers

Avaigen India Poultry Breeding Co Pvt Ltd

## Introduction

Ascites is a multi-factorial syndrome caused by interactions between physiological, environmental and management factors. Its presence in a broiler flock will have a significant effect on the biological and economical performance of the flock. The key to preventing Ascites is ensuring that good basic management is adhered to, particularly with regards to **ventilation**.

## What is Ascites?

Factors that increase the workload of the heart, by increasing the demand for oxygen (such as fast growth rate, cold stress, low partial pressure of oxygen or respiratory diseases) can lead to Ascites.

Increased metabolic requirements  
(due to cold temps, low partial pressure of O<sub>2</sub> etc)



Increased demand for O<sub>2</sub>



Increased cardiac output



Enlargement and partial failure of the heart



Leakage of fluid from the liver into the abdominal cavity



Ascites

Leakage of fluid from the liver into the abdominal cavity eventually restricts breathing, and ultimately can lead to death.

## Reducing the Incidence of Ascites in Broiler Flocks

### 1. Ensure adequate ventilation from placement to depletion.

Ventilation rates should be linked to house biomass, supplying enough air to replenish the oxygen consumed and ensure the adequate removal of waste gases. Providing sufficient oxygen is vital at high altitudes. Oxygen is a constant percentage of air, but at low atmospheric pressures associated with altitude, the absolute levels of oxygen may predispose birds to Ascites, particularly when other factors increase metabolic rate.

### 2. Maintain air quality.

This is linked to good ventilation and appropriate litter management. High levels of air contaminants (e.g. carbon monoxide, carbon dioxide and dust) cause respiratory damage. This reduces respiratory efficiency and blood oxygen levels increasing the risk of Ascites.

### 3. Avoid periods of cold stress particularly during the brooding period.

Exposure to cold periods increases the metabolic rate (oxygen demand) and can predispose/lead to Ascites later in the production period. At placement floor temperatures should be 28-30°C (82-86°F), air temperature should be 30°C (86°F), and relative humidity between 60 and 70%.

### 4. Feed programmes to control early growth.

Well managed feed programmes to control early growth (e.g reducing the nutrient density of the diet, changing feed form) may help reduce Ascites. Implement programmes **after 7 days** of age to ensure chicks get a good start.

### 5. Lighting Programmes.

An additional 1-2 hrs of dark added to the recommended 4hrs for



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broilers <2.5kg/5.5lbs (from 8 days of age to slaughter) or 6 hrs for broilers > 2.5kg/5.5lbs (from 8 days of age to slaughter) may help reduce Ascites. **Do not implement lighting programmes before 7 days of age.**

### 6. Incubation and Ascites.

Ensure adequate ventilation is achieved during the latter stages of incubation, particularly if incubation occurs at high altitudes.

#### Key Points

- If incubating at high altitudes ensure adequate ventilation is achieved.
- Achieving appropriate ventilation (based on house biomass) from placement through to depletion is essential (particularly at high altitudes). Check ventilation rates and equipment regularly.
- Prevent unnecessary increases in metabolic rate due to periods of cold stress, particularly during the brooding period.
- Well managed growth control programmes implemented **after** 7 days of age may also help where the incidence of Ascites is high.

#### Introduction

Ascites, water belly, or pulmonary hypertension syndrome, is a disease of broiler chickens which can occur worldwide but tends to be most prevalent at high altitudes. Its presence in a broiler flock will have a significant effect on the performance of the flock both biologically and economically.

Ascites is a multi-factorial syndrome caused by interactions between physiological (e.g.  $O_2$  demand), environmental, (e.g. altitude) and management (e.g. ventilation, disease status) factors. Although Ascites may be most common at high altitudes, broilers grown at low altitudes with substandard environmental conditions and poor brooding techniques can also have higher mortality and processing downgrades as a result of increased Ascites incidence.

This article aims to give an overview of the factors that can predispose

to Ascites and the effective management practices that can be put in place to reduce its incidence in broiler flocks.

#### What is Ascites?

Understanding Ascites is the first step to reducing or stopping its incidence in broiler flocks.

Any factors that increase the workload of the heart, by increasing the demand for oxygen (e.g. fast growth, reduced environmental temperatures, low partial pressure of oxygen or respiratory diseases) can lead to Ascites. When the workload on the heart and lungs is increased a chain of events is triggered (Figure 1) which leads to reduced levels of oxygen in the blood. In the initial stages this can be detected by a slight darkening of the comb and wattles. As the disease progresses fluid (leaked from the liver) accumulates in the abdominal cavity. Eventually this restricts breathing (it is at this stage that the comb and wattles exhibit a dark blue), ultimately this restriction can lead to death.

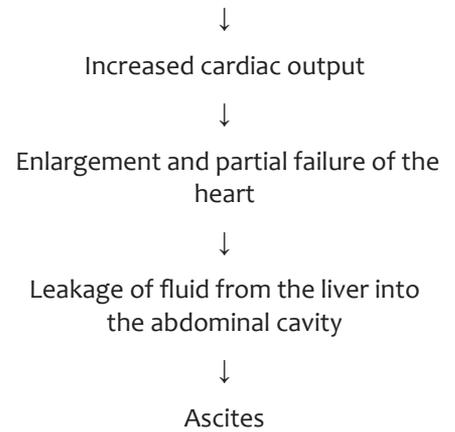


**Figure 1. Chain of events leading to Ascites**

Increased metabolic requirements (due to cold temps, low partial pressure of  $O_2$  etc)



Increased demand for  $O_2$



#### Reducing the Occurrence of Ascites in Broiler Flocks

##### Genetic Factors

Historically broilers with faster growth rates were more likely to develop Ascites due to the increased demand that this fast growth placed on the heart. However, with appropriate selection strategies the predisposition of fast growing broilers to Ascites has been reduced. As a direct response to the concerns of the poultry industry for the last two decades Aviagen has incorporated the routine assessment of birds for the oxygen saturation level in blood ( $SaO_2$ ) into its selection strategy. Birds with high levels of  $SaO_2$  have a reduced susceptibility to Ascites and Sudden Death Syndrome. The Aviagen breeding programme has an ongoing focus on improving the cardiovascular health of its pedigree populations and hence their products. This is done by discarding individuals and families with below average levels of  $SaO_2$ . Over time this has led to a significant increase in the  $SaO_2$  levels of the blood (Figure 2), reducing the susceptibility of our products to Ascites. This selection policy has allowed a long-term genetic trend of improvement in key broiler traits while at the same time reducing the incidence of metabolic disorders and improving livability.

##### Influence of Environment on Ascites

#### Ventilation and Ascites

The most influential environmental factor affecting Ascites in broilers is the oxygen content of air brought into the poultry house.

Growing at higher altitudes (1000m or above) is common place in

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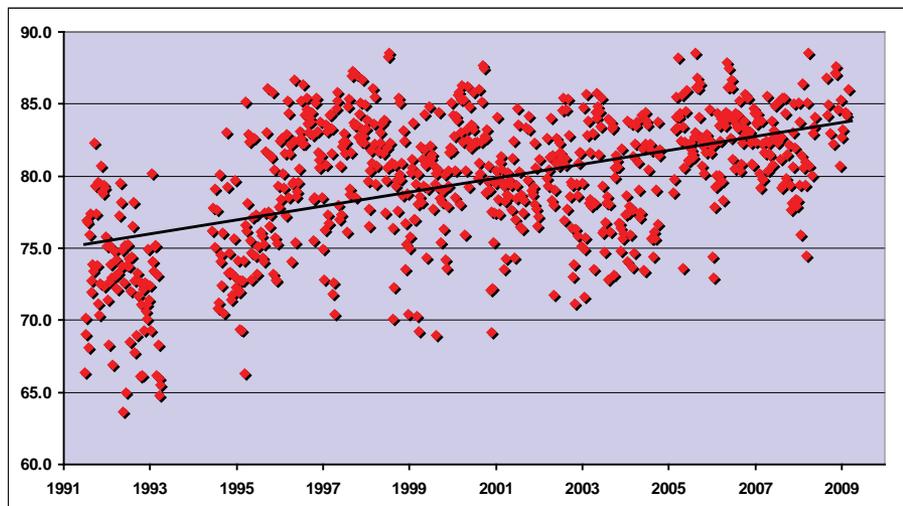


Figure 2. Changes in percentage oxygen saturation in the blood over time

Figure 4. Methodology for calculating minimum ventilation rates based on house biomass and percentage time for running fans to achieve that ventilation rate at sea level.

Live Weight kg (lbs)	Minimum Ventilation Rate m <sup>3</sup> /hour (ft <sup>3</sup> /min)	Maximum Ventilation Rate m <sup>3</sup> /hour (ft <sup>3</sup> /min)
0.050 (0.110)	0.074 (0.044)	0.761 (0.448)
0.100 (0.220)	0.125 (0.074)	1.280 (0.754)
0.200 (0.441)	0.210 (0.124)	2.153 (1.268)
0.300 (0.661)	0.285 (0.168)	2.919 (1.719)
0.400 (0.882)	0.353 (0.208)	3.621 (2.133)
0.500 (1.102)	0.417 (0.246)	4.281 (2.522)
0.600 (1.323)	0.479 (0.282)	4.908 (2.891)
0.700 (1.543)	0.537 (0.316)	5.510 (3.245)
0.800 (1.764)	0.594 (0.350)	6.090 (3.587)
0.900 (1.984)	0.649 (0.382)	6.653 (3.919)
1.000 (2.205)	0.702 (0.413)	7.200 (4.241)
1.200 (2.646)	0.805 (0.474)	8.255 (4.862)
1.400 (3.086)	0.904 (0.532)	9.267 (5.458)
1.600 (3.527)	0.999 (0.588)	10.243 (6.033)
1.800 (3.968)	1.091 (0.643)	11.189 (6.590)
2.000 (4.409)	1.181 (0.696)	12.109 (7.132)
2.200 (4.850)	1.268 (0.747)	13.006 (7.661)
2.400 (5.291)	1.354 (0.798)	13.883 (8.177)
2.600 (5.732)	1.437 (0.846)	14.42 (8.683)
2.800 (6.173)	1.520 (0.895)	15.585 (9.180)
3.000 (6.614)	1.600 (0.942)	16.412 (9.667)
3.200 (7.055)	1.680 (0.990)	17.226 (10.146)
3.400 (7.496)	1.758 (1.035)	18.028 (10.618)
3.600 (7.937)	1.835 (1.081)	18.817 (11.083)
3.800 (8.377)	1.911 (1.126)	19.596 (11.542)
4.000 (8.818)	1.986 (1.170)	20.365 (11.995)
4.200 (9.259)	2.060 (1.213)	21.124 (12.442)
4.400 (9.700)	2.133 (1.256)	21.874 (12.884)

some regions of the world. Ascites symptoms are more acute at high altitudes as the air has a lower partial pressure of oxygen than that at sea level. Exposure to a lower partial pressure of oxygen will lead to an increased workload on the heart. In this situation it is critical to ventilate correctly and provide as much oxygen to the flock as possible.

Suboptimal ventilation in broiler houses leads to low environmental oxygen and higher toxic gases such as carbon monoxide, carbon dioxide and ammonia. This will put extra pressure on the cardio vascular system, reducing its capacity to carry oxygen and increasing Ascites. Ventilation rates must supply enough air to replenish the oxygen consumed and ensure the adequate removal of waste gases. Managers who run a constantly increasing, pro-active ventilation programme, linked with total house biomass, have no or much reduced levels of Ascites in their flocks.

A good way to manage the ventilation programme is by using fan cycle timers, increasing “On” time as the flock gets older and house biomass increases. The example below (Figure 4) explains how this can be done. Often fans can be inefficient compared to the declared ratings (due to baffles, age etc). Fans should be checked regularly and the ventilation programme adjusted accordingly.

**Air Quality and Ascites**

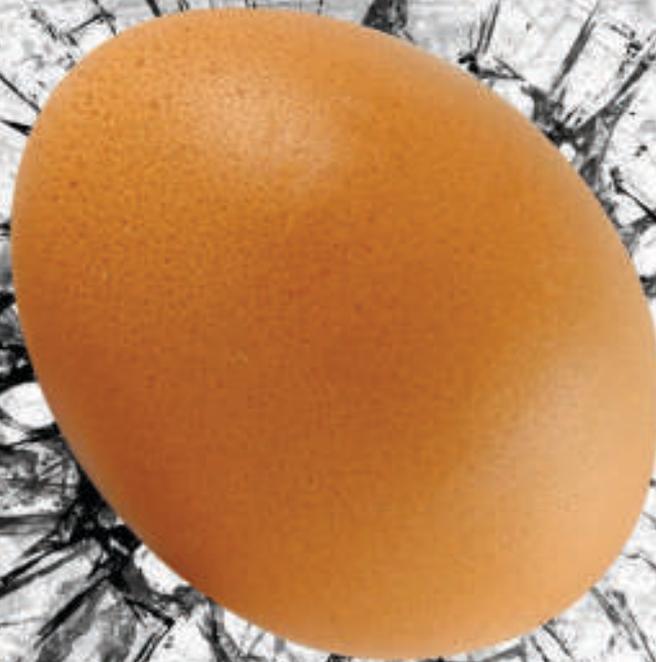
Correct litter management in conjunction with appropriate ventilation, helps to maintain air quality. Suboptimal ventilation and inadequate litter management leads to problems of wet litter, and increased ammonia levels. Dust within the environment will be inhaled by the birds, leading to irritation and reduced efficiency of the airways.

Poor air quality, dust and respiratory diseases all predispose birds to Ascites by causing respiratory damage, thereby reducing the efficiency of respiration and blood oxygen levels. For the same reasons it is important that the litter material is clean and free from mould or contamination at time of placement.

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Using the table (left) Calculate the total ventilation rate required for the house (Total cubic meters per hour (cmh) or Total cubic feet per minute (cfm)) as:

Total minimum = minimum ventilation X number of birds in house rate per bird (from table)

Calculate the percentage time for running the fans as:

$$\text{Percentage of Time} = \frac{\text{total ventilation needed}}{\text{total capacity of the fans used}}$$

Multiply the percentage of time needed by the total fan timer cycle to give the time that the fans require to be on in each cycle

**Temperature and Ascites**

Maintaining adequate brooding temperatures are critical to the prevention of Ascites. Exposure to cold periods which place birds outside their thermo-neutral zones will increase the demand for oxygen as birds are forced to use energy to keep warm. This increase in metabolic rate can lead to Ascites later in the production period. Correct and monitored temperature during brooding, linked with a good minimum ventilation programme from placement, will help reduce and in some cases eliminate any Ascites problems seen later in the grow-out period.

At placement floor temperatures should be 28-30°C (82-86°F), and air temperature (measured at bird level) should be 30°C (86°F), with relative humidity between 60 and 70%. Table 2 below shows a good brooding temperature profile for the broiler house. The temperatures recommended in Table 2 assume an ideal relative humidity (RH) of 60-70%. If RH is outside this ideal range the temperature of the house at bird level should be adjusted. For example, if RH is below 60% or above 70%, the dry bulb temperature may need to be increased or decreased respectively.

Table 1 shows the common air contaminants present in the poultry house and the effect that they have on bird health. All the contaminants listed below either predispose or lead directly to Ascites.

**Table 1.** Common house air contaminants that can increase Ascites susceptibility

Contaminant	Effect
Ammonia	Can be detected by smell at 20ppm or above >10ppm will damage lung surface >20ppm will increase susceptibility to respiratory diseases >50ppm will reduce growth rate
Carbon Dioxide	>3500ppm causes Ascites and is fatal at high levels
Carbon Monoxide	100ppm reduces oxygen binding and is fatal at high levels
Dust	Damage to respiratory tract lining and increased susceptibility to disease
Humidity	Effects vary with temperature. At >29°C (84°F) and >70% relative humidity, growth will be affected

**Table 2.** Correct brooding temperature profiles assuming an ideal RH of 60-70%

Age (days)	Whole-house Brooding Temp	Spot Brooding Temp	
		Brooder Edge (A')	2 m (6.6 ft) From Brooder Edge (B')
Day Old	30°C	32°C	29°C
	86°F	90°F	84°F
3	28°C	30°C	27°C
	82°F	86°F	81°F
6	27°C	28°C	25°C
	81°F	82°F	77°F
9	26°C	27°C	25°C
	79°F	81°F	77°F
12	25°C	26°C	25°C
	77°F	79°F	77°F
15	24°C	25°C	24°C
	75°F	77°F	75°F
18	23°C	24°C	24°C
	73°F	75°F	75°F
21	22°C	23°C	23°C
	72°F	73°F	73°F
24	21°C	22°C	22°C
	70°F	72°F	72°F
27	20°C	20°C	20°C
	68°F	68°F	68°F

*\*These brooding temperatures are a recommendation. Actual brooding temperatures will depend on environmental and management conditions in the house. For more information on brooding temperatures consult your local Aviagen field representative.*

Duration of cold stress is much more critical than temperature itself. Metabolic stress and risk of Ascites will be increased with duration of cold stress. It is therefore vital that if periods of cold stress do occur they are rectified as quickly as possible.

**Influence of Growth Rate on Ascites**

There is a direct correlation between metabolic rate and Ascites levels. A fast growth rate increases the demand for oxygen and hence the workload of the heart. Therefore adapting good management practices is vital for fast growing broilers.

Growers who have recurring problems with Ascites may find it beneficial to control early growth rates. The first 3 weeks of a bird's life are metabolically stressful as bone and muscle growth are greatest at this time. If growth is reduced during this period oxygen demand will also be reduced. Birds whose growth is controlled early on may have a stronger cardiovascular system going into the finisher phase. However, any restriction



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of early growth should be exercised with caution. Achieving adequate growth during the first 7 days is vital and so any growth control should be implemented **after** 7 days of age. Starter diets should remain unchanged to ensure that the day-old chick has the best possible start.

Effective control of growth rate after 7 days of age can be achieved by reducing nutrient intake either by reducing the nutrient density of the diet or by changing feed form from a pellet to a mash. Any feed programme must be managed properly and should only be considered once optimal management is assured. It is also important to consider that feed

control may result in an overall reduction in growth rate. Any management strategy aimed at reducing early growth is therefore only likely to be economically viable when it is properly managed and where the occurrence of Ascites is severe.

#### Lighting and Ascites

Many growers in high altitude areas use lighting programmes to help reduce early body weights and hence Ascites levels in their flocks. However, lighting programmes are often too severe (e.g. the use natural daylight only).

At low altitudes lighting programmes to control Ascites are unnecessary

for Aviagen products, having a negative impact on growth rate and breast meat yield. High altitude does change the situation however, with lower partial pressures of oxygen and absolute humidity levels. Examples of typical good lighting programmes are given in Table 3. If Ascites is a problem under high altitude conditions, some increase in the dark period (an additional 1-2 hrs added to those recommended in Table 3) may help reduce Ascites mortality. To help ensure proper heart and lung development in growing birds, it is essential that 7-day body-weight targets are achieved; lighting programmes should not be implemented until **after** 7 days of age.

**Table 3.** Basic light intensity and photoperiod recommendations to optimise live performance.

Live weight at slaughter	Age (days)	Intensity (lux/ftc)	Day length (hours)
Less than 2.5kg/5.5lb	0-7	30-40/3-4	23 light 1 dark
	8-slaughter	5-10/0.5-1	20 light 4 dark*
More than 2.5 kg/5.5lb	0-7	30-40/3-4	23 light 1 dark
	8-slaughter	5-10/0.5-1	18 light 6 dark*

\*The EU Broiler Welfare Directive requires a total of six hours darkness, with at least one uninterrupted period of darkness of at least four hours.

#### Incubation and Ascites

It has already been mentioned that an increased metabolic rate, paralleled with a shortage in oxygen supply will lead to Ascites. One of the most demanding stages of chicken development is in the incubator. Chickens incubated at high altitudes may be predisposed to Ascites because the partial pressure of oxygen is lower. It is therefore important that adequate ventilation in the incubator is achieved. Achieving adequate ventilation may be a particular issue in single stage machines; in the setter the air vents should be left fully opened for the last three days to ensure that ventilation, and hence oxygen levels are optimal.

#### Conclusions

In conclusion, Ascites is a multi-factorial syndrome caused by interactions between physiological, environmental and management factors. The incidence of Ascites can be reduced by ensuring that good basic management practices are adhered to.

- If incubating at high altitudes ensure adequate ventilation is achieved.
- Achieving appropriate ventilation in the poultry house from placement through to depletion is essential, particularly at high altitudes; ventilation rates must supply enough air to replenish the oxygen consumed and ensure the adequate removal of waste gases. Check ventilation rates and

equipment regularly making any adjustments as required.

- Preventing unnecessary increases in the birds' metabolic rate due to periods of cold stress, particularly during the brooding period, will help reduce or even eliminate the occurrence of Ascites later on in the growing period.
- Well managed growth control programmes implemented **after** 7 days of age may also help where the incidence of Ascites is high.

A better understanding of what Ascites is and how it is caused, and the implementation of management factors that reduce the predisposing factors to Ascites will ultimately help to control the occurrence of Ascites in broiler flocks.

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# The Advantages of Plant Derived 1, 25 (OH)<sub>2</sub> D<sub>3</sub> Glycoside over other Metabolites of Vitamin D

Source: **Avitech Nutrition**

## Introduction: -

Vitamin D is a fat-soluble vitamin critical for maintaining calcium and phosphorus balance, promoting proper bone development and eggshell integrity, supporting muscle function and modulating the immune system of animals and birds. Vitamin D is absorbed from the digestive tract and requires the presence of bile salts for absorption (Braun, 1986). Cholecalciferol (Vitamin D<sub>3</sub>), occurring in animals and Ergocalciferol (Vitamin D<sub>2</sub>), occurring in plants are the two main natural sources of Vitamin D.

Compared to cholecalciferol (Vitamin D<sub>3</sub>), its metabolites 25 (OH) D<sub>3</sub>, 1-α (OH) D<sub>3</sub> and 1, 25 (OH)<sub>2</sub> D<sub>3</sub> are more effective because all the cholecalciferol entering the system is not converted into active metabolites. Active metabolites may directly reach the target tissue by bypassing hydroxylation in liver and kidney or both, hence have more efficacy than Vitamin D<sub>3</sub> (Goodgame et al., 2011).

Supplementing Vitamin D metabolites in addition to cholecalciferol ensures that animals receive the active or near-active forms of Vitamin D,

enhancing their ability to regulate calcium and phosphorus metabolism efficiently. This is particularly important in fast-growing species like poultry and livestock, which have high nutrient demands.

1,25(OH)<sub>2</sub>D<sub>3</sub> is the biologically active form of Vitamin D. It is beneficial as it bypasses the need for metabolic conversion, making it a preferred choice for supplementation. Plants in the Solanaceae family contain 1,25(OH)<sub>2</sub>D<sub>3</sub> as an active compound, and in these plants, 1,25(OH)<sub>2</sub>D<sub>3</sub> is found in glycosidic form.

**Glycoside form of 1,25(OH)<sub>2</sub>D<sub>3</sub> :-** 1,25-dihydroxy Vitamin D<sub>3</sub> Glycosides (1,25(OH)<sub>2</sub>D<sub>3</sub>-gly) are the active compounds in plants responsible for their Vitamin D-like activity. In addition to these 1,25(OH)<sub>2</sub>D<sub>3</sub>-gly, plants also contain free 1,25(OH)<sub>2</sub>D<sub>3</sub>, along with 25-hydroxycholecalciferol, 7-dehydrocholesterol and cholecalciferol (EFSA, 2015, Jäpelt, & Jakobsen 2013). The glycosylation pattern of 1,25(OH)<sub>2</sub>D<sub>3</sub> includes a distribution of 1 to 12 hexose units per aglycone, with mono-, di-, and tri-glycosides being identified (Bachmann et al., 2013). This glycosylation forms a protective structure that serves as a natural slow-release source of 1,25(OH)<sub>2</sub>D<sub>3</sub>

and creates the high storage and processing stability of the active molecule (Klis, 2024).

## Benefits of 1,25(OH)<sub>2</sub>D<sub>3</sub>-gly over other metabolites of Vitamin D

1,25-dihydroxyvitamin D<sub>3</sub> (1,25(OH)<sub>2</sub>D<sub>3</sub>-gly) is the biologically active form of Vitamin D, and it offers several advantages over other Vitamin D metabolites like 25-hydroxyvitamin D<sub>3</sub> (25(OH)D<sub>3</sub>) and 1-α-hydroxyvitamin D<sub>3</sub> (1α(OH)D<sub>3</sub>) due to its direct physiological roles and bypass of metabolic conversion. Here is a detailed comparison:

### 1. Bypasses Metabolic Activation in Liver and Kidneys

- Studies (Christakos et al., 2016; Soares et al., 1976; Stevens & Blair, 1987) have shown that animals or birds with chronic kidney disease, liver dysfunction, or advanced age, the hydroxylation of 25(OH) D<sub>3</sub> into 1,25(OH)<sub>2</sub>D<sub>3</sub> is impaired. This hydroxylation is crucial for intestinal calcium absorption, and its disruption negatively affects calcium and phosphorus homeostasis, bone quality, eggshell formation and immunity against infection.
- The ability of glycosidic 1,25(OH)<sub>2</sub>D<sub>3</sub> to bypass these steps ensures sufficient active Vitamin D levels for physiological functions.

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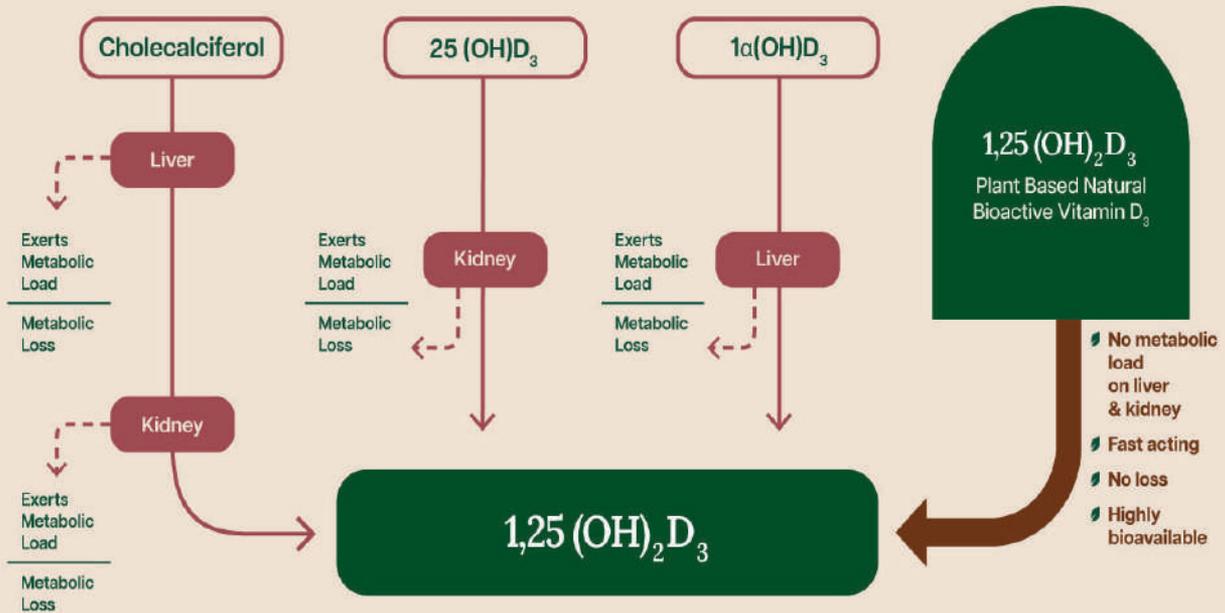
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## Variants of Vitamin D<sub>3</sub>



### 2. Metabolism:

- Gly-1,25(OH)<sub>2</sub>D<sub>3</sub> exhibits delayed absorption and elimination due to the slow and sustained de-glycosylation, resulting in an extended half-life (T<sub>1/2</sub>) of approximately 30 hours (EFSA, 2015).
- In contrast, 1α-hydroxyvitamin D<sub>3</sub> (1α(OH)D<sub>3</sub>) is metabolized in the liver to form 1,25(OH)<sub>2</sub>D<sub>3</sub>, which has a significantly shorter half-life, ranging from 6 to 8 hours (Garcia et al, 2013).
- Sustained activity of Gly-1,25(OH)<sub>2</sub>D<sub>3</sub> enhances calcium metabolism, leading to improved calcium absorption and strengthening immune function.

### 3. Shelf life and stability:

- Available data show that the content of Gly-1,25(OH)<sub>2</sub>D<sub>3</sub> remains stable even after extended storage periods of 12, 36, and 66 months and different conditions (4–8 °C, at 20–26 °C or at 37 °C), with no significant reduction in its potency (EFSA, 2015).
- This long-term stability offers a major commercial advantage compared to other synthetic forms such as 25(OH)D<sub>3</sub> and 1α(OH)D<sub>3</sub>.

Particulars	Metabolites of Vitamin D		
	Plant origin 1,25(OH) <sub>2</sub> D <sub>3</sub>	25(OH) D <sub>3</sub>	1α(OH)D <sub>3</sub>
Principal molecule	Gly-1,25(OH) <sub>2</sub> D <sub>3</sub>	25(OH) D <sub>3</sub>	1α(OH)D <sub>3</sub>
Origin	Natural	Synthetic/ Fermented	Synthetic
Shelf life	24 Month	06-24 Months	18 Months

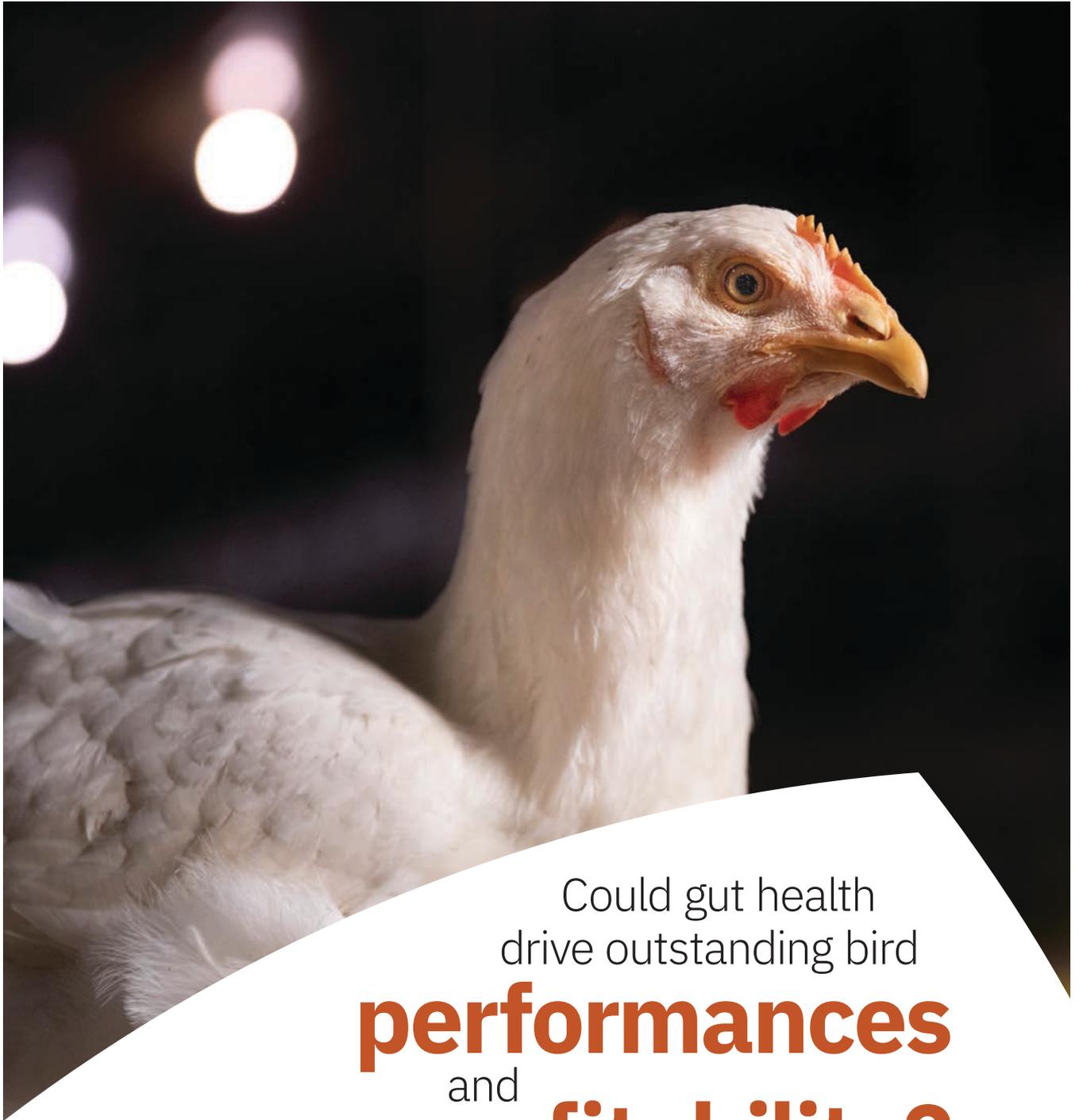
### 4. Safety profile and reduced risk of toxicity

- 1,25(OH)<sub>2</sub>D<sub>3</sub>-gly exhibit water solubility, which influences their absorption and metabolism in the body. Unlike fat-soluble vitamins, which can be stored in fatty tissues. This mechanism helps to prevent the accumulation of potentially toxic levels of Vitamin D in the body, thereby reducing the risk of hypervitaminosis D and associated complications such as hypercalcemia.
- Thus, 1,25(OH)<sub>2</sub>D<sub>3</sub>-gly offers a safer profile compared to its fat-soluble counterparts, ensuring that adequate levels can be maintained without the risk of over accumulation.

- Free 1,25(OH)<sub>2</sub>D<sub>3</sub> is rapidly degraded once its physiological role is fulfilled, ensuring tight regulation and minimizing the risk of prolonged activity, which might otherwise result in adverse effects such as calcium dysregulation.

### 5. Improved Immune Function

- Gly-1,25(OH)<sub>2</sub>D<sub>3</sub> has a direct immunomodulatory role as it enhances the innate immune responses by inducing antimicrobial peptides, such as cathelicidins and defensins, which are critical for fighting infections.
- 1,25(OH)<sub>2</sub>D<sub>3</sub> modulates the activity of T cells and dendritic cells, promoting a balanced immune response and preventing excessive inflammation (Nunes et al., 2020).



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- Carlberg and Haq (2020) reviewed the effects of  $1,25(\text{OH})_2\text{D}_3$  on immune system modulation, highlighting its role in reducing the risk of autoimmune disorders and enhancing pathogen defense.

### 6. Effect on Calcium and Phosphorus Homeostasis

- $1,25(\text{OH})_2\text{D}_3$  is the dominant hormonal player in regulating calcium metabolism. In conjunction with parathyroid hormone, and calcitonin it enhances the absorption of calcium and phosphorus in the intestines, which is essential for maintaining proper bone density and mineralization, eggshell formation, regulating muscle contraction, and nerve transmission.
- It directly influences calcium homeostasis by binding to the Vitamin D receptor (VDR) in intestinal epithelial cells, upregulating the expression of calcium transport proteins, such as calbindin (Lihua et al., 2022).
- Adequate levels of  $1,25(\text{OH})_2\text{D}_3$  are vital for maintaining bone density and preventing fractures (Schwartz & Lizaola, 2014). Edwards and Hardy, 1989 indicated that supplementation of  $1,25(\text{OH})_2\text{D}_3$  significant decrease in the occurrence of tibial dyschondroplasia (TD) and an increase in overall bone ash compared to  $25(\text{OH})\text{D}_3$ .  $1,25(\text{OH})_2\text{D}_3$  directly increases the synthesis of calcium-binding proteins in the intestines, facilitating more efficient mineral uptake to prevent such conditions (Dusso et al., 2005).
- Chennaiah et al. (2004) found that supplementation with  $1,25(\text{OH})_2\text{D}_3$  resulted in significantly higher specific gravity in the eggs and improved egg production (McCoy, 2009) compared to those receiving only  $25(\text{OH})\text{D}_3$  or  $1\alpha(\text{OH})\text{D}_3$ .

### 7- Phytase and $1,25(\text{OH})_2\text{D}_3$

- Recent studies have elucidated the synergistic relationship between phytase and  $1,25(\text{OH})_2\text{D}_3$  in enhancing phosphorus and calcium utilization in poultry.
- For instance, a study by Geng et al.

(2021) found that the combination of phytase and  $1,25(\text{OH})_2\text{D}_3$  significantly improved phosphorus retention and bone mineralization in broiler chickens, reducing the need for supplemental inorganic phosphorus in diets.

- Jiang et al. (2022) demonstrated that supplementing diets with phytase and  $1,25(\text{OH})_2\text{D}_3$  led to significant improvements in growth performance, and reductions in phosphorus excretion in broilers. Their findings indicate that this synergistic approach not only enhances nutrient utilization but also supports skeletal integrity and overall health in poultry.
- The study highlighted that this combination maximizes the bioavailability of phosphorus from plant-based feed ingredients, which often contain phytate-bound phosphorus that is not readily absorbable.

### Conclusion

- In conclusion, glycosylated  $1,25$ -dihydroxyvitamin  $\text{D}_3$  ( $1,25(\text{OH})_2\text{D}_3$ -gly) offers significant advantages over traditional

Vitamin D metabolites, such as  $25$ -hydroxyvitamin  $\text{D}_3$  ( $25(\text{OH})\text{D}_3$ ) and  $1$ -alpha-hydroxyvitamin  $\text{D}_3$  ( $1\alpha(\text{OH})\text{D}_3$ ).

- Its unique property of bypassing metabolic activation in the liver and kidneys along with slow and sustained release facilitates better bioavailability, making it beneficial for animals. This direct availability enhances intestinal calcium and phosphorus absorption, critical for maintaining bone health eggshell strength and overall mineral homeostasis.
- The extended half-life and stability of  $1,25(\text{OH})_2\text{D}_3$ -gly contribute to sustained physiological effects, optimizing its role in calcium metabolism and immune function while minimizing the risk of toxicity associated with excess Vitamin D.
- The synergistic interaction between  $1,25(\text{OH})_2\text{D}_3$ -gly and phytase further improves the bioavailability of phosphorus from feed, promoting enhanced growth performance, bone mineralization, eggshell strength, and overall health in poultry.

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# Mastering the Art of Hygienic Feed Milling: Practical Approaches for Quality and Safety

Dr Badineedi Hanumanth Rao, Technical Executive – Livestock Nutrition

The poultry industry relies on the quality and safety of the feed provided to birds. Maintaining feed hygiene is essential for safeguarding poultry health, productivity and welfare. According to the Food and Agriculture Organization, feed hygiene involves the “measures and conditions necessary to control hazards and ensure feed is suitable for animal consumption based on its intended use.” Ensuring feed is free from harmful biological, chemical and physical contaminants is critical for animal health, food safety and overall public health (FAO, 2010). Similarly, the Codex Alimentarius Commission underscores the importance of feed hygiene in preventing contamination throughout all stages of production and distribution (Codex, 2013).

The feed milling process is a critical control point for maintaining feed hygiene, as improper practices can result in contamination and pose health risks to poultry. Key stages in this process, such as grinding, mixing, conditioning, and pelleting, play a significant role in determining the quality and safety of poultry feed. Ensuring hygienic feed milling is essential for producing safe, high-quality, and effective animal feed. Contaminated feed can introduce harmful pathogens (such as *Salmonella* and *Escherichia coli*),

molds, mycotoxins, and chemical residues (FAO/WHO, 2010), which can negatively impact poultry health, leading to severe diseases, reduced performance, and financial losses.

## Importance of Feed Hygiene

Feed hygiene is essential for the following reasons:

1. **Disease Prevention:** Contaminated feed is a significant source of disease transmission in poultry,

contributing to illnesses like *Salmonella*, *Campylobacter* and Mycotoxicoses (Jones, F. T., 2011). Implementing proper feed hygiene practices is crucial to disrupting these pathways and preventing the spread of disease.

2. **Productivity:** Poor feed hygiene results in reduced feed intake, impaired nutrient absorption, and overall poor growth performance in poultry (Vieira, S. L, 2007).

- ▶ **Disease Prevention:** Proper feed hygiene prevents poultry diseases like *Salmonella* and Mycotoxicoses.
- ▶ **Productivity:** Ensures optimal feed intake and nutrient absorption for better poultry growth.
- ▶ **Food Safety:** Prevents contaminants from transferring from feed to poultry and humans, ensuring safe poultry products.
- ▶ **Economic Sustainability:** Reduces mortality, treatment costs, and production losses, supporting economic sustainability.
- ▶ **Critical Control Points:** Meticulous control of milling stages—ingredient reception, grinding, mixing, pelleting, and storage—prevents contamination and ensures safe feed.



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- 3. Food Safety:** Ensuring feed hygiene helps to maintain the safety of poultry products for human consumption. Contaminants like mycotoxins and pathogens can transfer from feed to poultry and, subsequently, to humans (Gaggia, F., 2010).
- 4. Economic Implications:** Feed contamination leads to higher mortality rates, increased treatment costs and production losses, making feed hygiene crucial for economic sustainability in poultry production (Koutsoumanis, K., 2004).

### Feed Milling Process and its Impact on Feed Hygiene

The feed milling process is central to the production of poultry feed, involving several stages where contamination may occur if not properly controlled. The key stages include:

- 1. Ingredient Reception and Storage:** Raw materials are the initial entry points for contaminants, including pathogens, mycotoxins, and pests. Ensuring proper storage conditions, such as dry and cool environments, is vital to prevent mold growth and bacterial contamination.

- 2. Grinding:** During grinding, ingredients are reduced in size, increasing the surface area available for microbial activity. To prevent cross-contamination from previous batches, maintaining equipment cleanliness is essential. Regular maintenance, inspection of the dust control system and removal of leftover feed and ingredients from the grinder are critical practices for ensuring feed hygiene.

- 3. Mixing:** In the context of feed hygiene, the blending of ingredients is a key point where cross-contamination can occur. To minimize this risk, it is essential to ensure that the feed mill mixer and related equipment are thoroughly cleaned. Implementing proper sequencing practices, such as flushing systems between batches, further helps reduce the chances of contamination.

- 4. Pelletizing:** Pelletizing, which includes steam treatment, is an effective method for microbial control, as the heat generated during the process can eliminate many pathogens, including *Salmonella*. However, inadequate maintenance of the pelletizing unit or insufficient conditioning

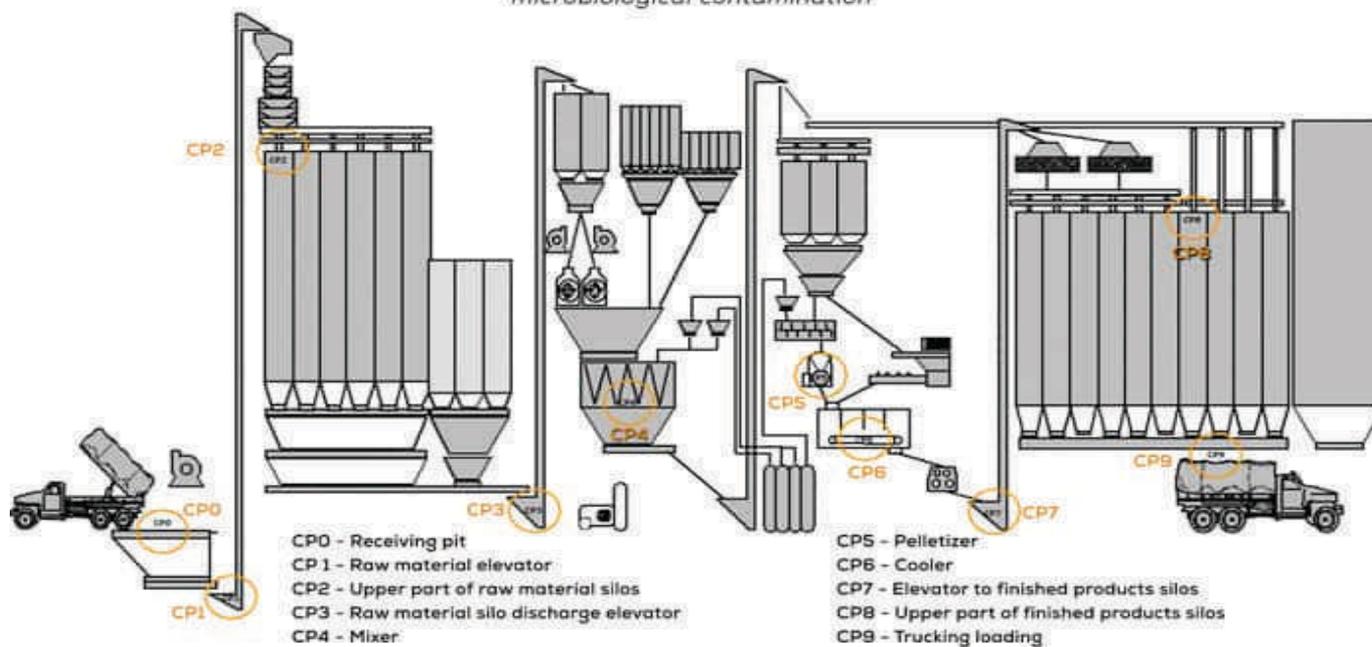
temperatures can compromise its effectiveness, increasing the risk of contamination. Proper upkeep of the pellet mill and maintaining optimal conditioning temperatures are essential for ensuring better feed hygiene in feed milling.

- 5. Cooling and Drying:** After pelleting, feed is cooled to stabilize it. Improper cooling can result in moisture retention, promoting mold and bacterial growth.
- 6. Storage of Finished Feed:** Once produced, feed must be stored under optimal conditions to prevent post-production contamination from pests, moisture, or other environmental factors. Implementing measures such as sealing containers and maintaining clean storage areas is crucial.

### Key Factors Affecting Feed Hygiene in Milling

- 1. Raw Material Quality:** The quality of raw materials significantly impacts overall feed hygiene. Poor-quality ingredients are more likely to contain contaminants such as pathogens, mycotoxins, or pesticides. Regular testing and quality control of raw materials are essential.

Figure 5. Factory Control Points (CP) where surface samples are recommended for the control of microbiological contamination



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02

Improve feed efficiency and Performance of the bird

03

Induces resistance to environmental transition stress impact on gut health

04

Replacement of AGP free feed production along with disease prevention

05

Higher and faster return on investment

06

The best immuno modulator and enrich appetite of bird

07

Inhibits growth of pathogens like Clostridium perfringens, Salmonella species and E. Coli

08

Introduction of secondary metabolites strengthens Villi integrity for effective nutrients absorption

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2. **Moisture and Temperature:** Both high moisture levels and elevated temperatures during storage and processing can encourage microbial growth, particularly molds and bacteria. Maintaining optimal temperature and humidity levels during storage and feed processing is essential for preventing microbial proliferation.
3. **Cross-Contamination:** Cross-contamination occurs when feed comes into contact with contaminants during different stages of the milling process. Regular cleaning and maintenance of milling equipment, as well as proper sequencing of feed production, are crucial steps in avoiding cross-contamination.
4. **Processing Equipment:** The condition of feed milling equipment has a direct effect on feed hygiene. Worn-out equipment, especially in grinding and pelleting stages, can lead to physical contamination with metal shards or other debris and microbial contamination due to accumulated residues.
5. **Biosecurity Measures:** Implementing biosecurity measures in feed mills, such as controlling human and vehicular traffic, maintaining cleanliness, and restricting access to feed production areas, plays a crucial role in preventing contamination.

### Strategies for Ensuring Feed Hygiene

To maintain feed hygiene throughout the feed milling process, several strategies should be implemented:

#### 1. Receiving of Raw Materials

Preventing contamination starts with the careful inspection of incoming materials:

- **Vehicle Cleanliness:** All delivery vehicles must be inspected for cleanliness, with declarations confirming no contamination from previous loads like animal waste or municipal garbage. Vehicles should pass through sanitation protocols (fumigation, foot dips, and cleaning underbellies).
- **Ingredient Inspection:** Check for

signs of contamination (e.g., mold, discolored grains, unusual odors). High-risk ingredients like meat and soybean meals should undergo regular microbial testing (e.g., *Salmonella*).

- **Specific Ingredient Tests:** Corn should be tested for moisture and fungal contamination; soy for protein content and urease activity; and oils for rancidity and peroxide values.
- **Ingredient Traceability:** Maintain records of the date, time, and lot number of all ingredients received to quickly respond to any contamination or recall.

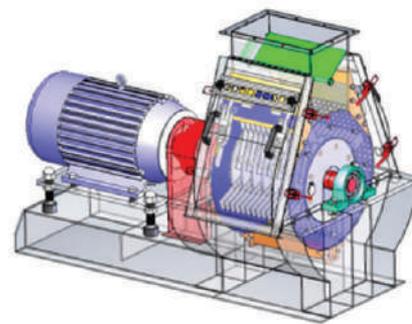
#### 2. Storage of Ingredients

Proper storage techniques are essential to prevent contamination and maintain ingredient quality:

- **Contamination Prevention:** Store ingredients in vermin- and insect-proof containers, away from domestic animals. Separate high-risk ingredients to avoid cross-contamination.
- **Stock Rotation:** Implement a “first-in, first-out” system to minimize the risk of older ingredients spoiling.
- **Spill Management:** Immediately clean up spills to avoid attracting pests.
- **Medication Storage:** Store medications securely, following strict protocols, and keep records of their use.

#### 3. Feed Manufacturing Process

- **Personnel Hygiene:** All personnel must wear clean, work-specific clothing, with changes as needed after handling equipment. Visitors must follow strict biosecurity measures to prevent external contamination.
- **Grinding:** Particle size consistency is vital for feed efficiency. Ensure grinder calibration and monitor temperature to avoid overheating, which can reduce nutrient availability.
- **Feed Mixing:** One-Directional Flow- Where possible, design



the plant to allow materials to flow in one direction to prevent cross-contamination. Regular equipment cleaning and flushing between batches can mitigate contamination risks.

- **Conditioning: Control Temperature & Time:** This helps reduce microbial loads, including *Salmonella*. Over-conditioning can reduce nutrient availability, so maintain an optimal balance.



- **Pelleting:** Aim for a Pellet Durability Index (PDI) of at least 95%. Control moisture and temperature to produce strong, uniform pellets and reduce fines.





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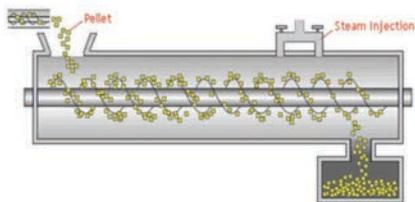


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- **Post-Pelleting Cooling:** After pelleting, cooling is a critical stage for contamination risk. Maintain cleanliness, airflow, and proper cooling time to avoid moisture



buildup and mold growth.

- **Crumbles and Screening:** Adjust the roller gaps for consistent crumble size, especially for chicks. Recycle fines back into the process to minimize waste.
- 4. Storage and Bagging**
- **Moisture Control:** Store feed in cool, dry environments with relative humidity below 70% to prevent mold and pest infestation.
  - **Labeling:** Ensure every batch is properly labeled with production dates and ingredient composition for traceability.

- **Regular Quality Testing:** Test stored feed for peroxide values to monitor rancidity, especially in fats and oils.

**5. Final Product Testing:** Consistent testing is key to ensuring safe and high-quality feed:

- **Proximate Analysis:** Regularly check for moisture, protein, fat, fiber, and ash content.
- **Microbial Contamination:** Test for pathogens like *E. coli* and *Salmonella*.
- **Toxins & Heavy Metals:** Regularly test for mycotoxins and heavy metals such as lead and mercury to ensure compliance with safety limits.

#### 6. Distribution and Delivery

**Prevent Contamination:** Ensure vehicles which are going to use for distribution of feed should be clean, sealed, and pest-free during transport. Timely delivery is crucial to avoid exposure to adverse environmental conditions like heat and humidity.

#### 7. Cleaning & Sanitation

Maintaining a clean feed mill is essential for hygiene and product safety:

- **Equipment Cleaning:** Establish a regular cleaning schedule for machinery. Pay special attention to high-risk areas like grain cleaners, dust collection systems, and floor sweepings.
- **Floor Sanitization:** Smooth surfaces (e.g., stainless steel) are easier to clean but may harbor biofilms. Regular cleaning and sanitization reduce pathogen risks.
- **Dust Control:** Implement effective dust control systems to minimize contamination risks and maintain safety.

#### 8. Sampling and Testing

**Microbiological Testing:** Take samples from key stages of the production line (mixer, cooler, etc.) to test for microbial contamination. Routine sampling ensures hygiene and product safety.

#### Conclusion:

Feed hygiene is critical in poultry industry and the feed milling process is a key control point in maintaining this hygiene. Implementing stringent quality control measures, maintaining equipment and optimizing processing techniques such as heat treatment and storage conditions are essential for minimizing contamination risks. These measures ensure the production of safe, high-quality feed that promotes poultry health and productivity while minimizing the risk of disease transmission. A focus on feed hygiene also contributes to food safety for consumers and supports the economic sustainability of the poultry industry.

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# Feed Safety: Leading the way to food safety

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Feed safety is a prerequisite to food safety and human health as well as a necessity for animal health and welfare. Since feed accounts for majority of livestock production cost it is important that the feed produced is safe for the animals that consume it as well as the animal produce, like eggs, meat and milk is safe for human consumption. Animal feed plays a leading role in the global food industry, and it is the largest most important component for sustainable production of safe and affordable animal produce. In order to maintain

this good quality raw materials monitored through strict quality control measures should be used for feed production. Together with this, there are various other sources of feed contamination like microbial hazards, mycotoxins, pesticides, environmental pollutants, etc.

From raw materials to final feed the four important aspects should be taken care to ensure complete feed safety.

1. Mycotoxin risk management
2. Feed Mill hygiene

3. Moisture Management
4. Microbial risk management

## 1. Mycotoxin risk management:

Mycotoxins are the secondary metabolites produced from toxigenic fungi recognized as major food and feed contaminants. They are a source of grave concern in food contamination, resulting in mycotoxicosis in humans and animals. Toxin production is influenced by moisture, time, temperature, and food or feed substrates. Contamination can occur throughout

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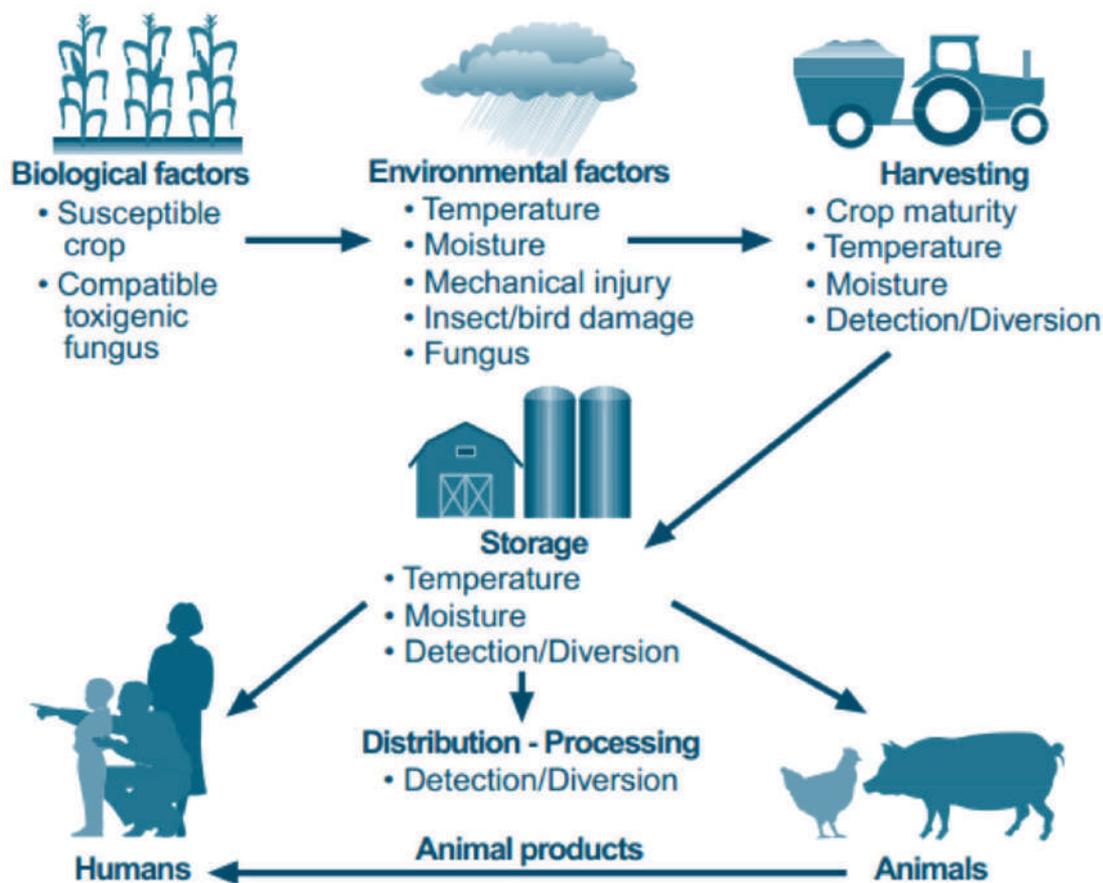
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the food chain—from the field, during harvesting, processing, materials, preharvest contamination of mycotoxins is the most difficult part in risk management. Regarding food safety issues, food and feeds absolutely free from fungi and mycotoxins are needed everywhere to prevent health hazards and to secure the international food trade. Foods associated with fungal alterations are characterized by a low value of water activity (aW) or a low pH value, where fungi may be imposed on the colonization of bacteria and yeasts. Therefore, the main food groups contaminated by fungus are cereals and their derivatives, nuts and fruits. On the other hand, the major mycotoxin-producing fungal genera are *Aspergillus*, *Penicillium*, *Fusarium* and *Alternaria*. Nonetheless, although thousands of mycotoxins exist, the most important for public health are aflatoxins, ochratoxin, fumonisins, zearalenone, and trichothecenes.

The key to mycotoxin control is risk management taking an integrated approach rather than isolated

measures. It is important that the mycotoxins present in feed are identified quickly and accurately followed by using superior quality toxin binders. A rapid mycotoxin monitoring tool will allow producers to take quick decisions with respect to the handling of mycotoxin contaminated raw materials and/or finished feed. To help identify the risk of mycotoxins in feed on the farm, Trouw Nutrition offers Mycomaster, a lateral-flow smart device that provides a reliable quantitative reading of the contamination levels in feed materials and compound feed. It enables rapid on-site, cost-effective and user-friendly analysis of six different mycotoxins: Zearalenone, Deoxynivalenol, Aflatoxins, Fumonisin, Ochratoxin and T2-HT2. This easy-to-use tool gives results within 15-30 minutes, which means that feed producers can analyze mycotoxins themselves. It can also be connected to Trouw Nutrition's global data exchange system, allowing the review of data collected from all over the globe. Good quality Mycotoxin Binders needed to be added to feed

according to the risk which are specific to mycotoxin binding with little or no nutrient binding enhanced with gut health management and immunity building capacity as both gut health and immunity is compromised with multi mycotoxin challenge.

**2. Feed Mill Hygiene:**

As food safety and consumer awareness increases, feed hygiene has become an integral part of poultry and livestock operations – ensuring that the feed given to the animals is clean and safe. Raw materials and feed can be contaminated by pathogens that can

lead to risks on health of animals and economic losses. Aside from that, the contamination in feed and ingredients is a potential risk of food safety for consumers. Since mycotoxins are produced by mould it is important that the raw materials and feed are stored properly at feed mill and farm properly. Feed mill machinery can act as strong carriers of microbial organisms and need to be effectively handled to avoid the same. Flushing of feed mill as part of maintenance program, needs to be carried out, with organic acid-based concepts, so that the production machinery is devoid of pathogenic microbes. Samples need to be collected from critical control points before and after flushing, for factual judgement of the decreased risk of (re)contamination.



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### 3. Moisture Management:

Variations in raw materials coupled with climatic conditions can be very challenging for feed manufacturers to maintain the moisture content of animal feed. Moisture management is very important for feed producers because along with high temperature, high amount of moisture in the feed may result in growth of mould and subsequent production of mycotoxins. That is why maintaining correct and constant moisture levels in animal feed is critical in obtaining high quality feed. Also, when moisture content in animal is too less it can result in reduction in yield, increased fines, reduction in pellet durability. High temperatures along with high humidity pose optimum conditions for microbes to proliferate and reduce the quality of nutrients in animal feed. To maintain the shelf life of feed despite moisture addition, addition of mould inhibitors is of vital importance. Propionic acid has been used as a mould inhibitor and shelf-life extensor since the last 40 years. However, since it is very corrosive a blend of organic acids works better and has a broader spectrum. Trouw Nutrition's Fylax Forte HC liquid is a liquid mould inhibitor with a synergistic blend of organic acids and surfactants.

### 3. Microbial risk management:

There has been several studies for microbial contamination of feed and food. Animal feed production is a complex process involving several steps during feed milling. In feed manufacturing, there are numerous opportunities to introduce microorganisms from various environmental and other sources. While most of these microorganisms are likely non-pathogenic, pathogens can also be members of feed microbial populations. In addition to fungi, several bacterial pathogens have been identified. They are believed to be associated with animal feed and include *Listeria*, *Clostridia*, pathogenic *Escherichia coli*, and *Salmonella*, as well as others that are less well characterized. These bacteria can contaminate animal carcasses at slaughter or



cross-contaminate other food items, leading to human illness. Although tracing contamination to its ultimate source is difficult, several large outbreaks have been traced back to contaminated animal feed. Improvements in the safety of animal feed should include strengthening the surveillance of animal feed for bacterial contamination and integration of such surveillance with human foodborne disease surveillance systems. In managing contamination, raw materials should be strictly monitored in terms of microbial contamination like *Salmonella*, *Enterobacteria*, *E. coli* and moulds. Water activity (aW) is an essential parameter to be measured that influences microbial development, along with other parameters like temperature, humidity, exposure to light, air. aW is a measure of the amount of free water available in raw material or feed, that predisposes the material to microbial growth. The mould and bacterial growth can be addressed through strict quality control measures for procurement of quality raw materials, apt storage of raw materials and finished feed, and judicious inclusion of mould inhibitors and feed acidifiers. The feed acidifiers intended to be used should possess specific activity against moulds or bacteria, depending upon the pathogen to be taken care of.

### Conclusion:

Foods of animal origin have an important role in a balanced diet and must be safe for human consumption. Equally important is the need for the food to be perceived as safe by the consumer. Safe food of animal origin must be free from animal pathogens that infect man and from contamination by residues. Animal feed has been identified as a critical component of food chain considering the carryover of undesirable substances such as dioxins, mycotoxins, heavy metals, pesticides, pathogens, veterinary drugs, growth promoters, specified risk material (prions), microplastics etc. from feed to food of animal origin. If carryover is not properly managed, contaminated feed can directly harm species that are sensitive to the unintended components they consume and can result in residues in foods of animal origin such as meat, milk and eggs that render them unsafe for human consumption. Hence, animal feed should be strictly monitored to rule out the presence of undesirable components. Failure to monitor the risks can lead to monetary losses to raw material producers, quality raw material supply chain, consequently deteriorating the animal health and performance; and the end product (meat, milk & eggs). Trouw Nutrition's complete risk management programme enables to make decisions based on knowledge and data, and to use our products in the most effective way.



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