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From the Editor's Desk

Brand, not commodities!

Opposition getting weaker in India- not healthy for a democracy. A weak leader of the opposition has led to poor opposition. The recent massive defeat in the Bihar elections is an indication. For a healthy democracy, a healthy opposition is a must, but the current opposition is acting like an internal enemy of the country. This needs to change.

Terrorism has no religion. It is inhuman. However, if a particular community maintains silence regarding a small segment with evil intent, it ends up as an accomplice. Globally, this becomes an issue for this community. This is something that the community should address and tackle for its own interest. The Delhi blast has highlighted a new danger to humanity. The reason for poverty, minority and illiteracy, pushing people to terror, is a hollow claim now. The reason is that educated doctors are resorting to destroying lives to save them. Such an attitude deserves condemnation of the highest order, as it makes people highly insecure and is also a block on the profession unless everyone strongly condemns in unequivocal words; these will be seeds of disaster for everyone.

The new high of egg prices has come as a boon to the farmers after a long time. These table raw material prices have helped to reach this. The farmer is now utilising money and investing in upgrading the quality, internal and external, and sustaining the profits. Proper packaging and branding should be seriously looked into to enhance quality to make it more export-worthy.

Digital sovereignty, AI, and non-dependence are essential for the future of India. Research, Development & Innovation is the Key! R&D investments are dismal, considering Bharat's Population, Skills, and knowledge present in India. India is way behind in funds allocation or investments in R&D compared to Korea, Israel, the USA, Japan & China. Recently, the government has announced a fund of ₹ 1.0 lakh crore, which is highly appreciated to start. The private sector hardly invests in R&D.

News about Indian Railways allowing catering of premium brands of KFC, McDonald's is welcome. But more important is that Indian brands should take this opportunity to market their own branded chicken and egg items - this indeed is a great opportunity for our chicken and egg producers. Let every integrator have a goal and objective to promote their own brand of produce as a mark of contribution to being in the industry. We must slowly stop producing commodities in the form of eggs and chicken.

Editor

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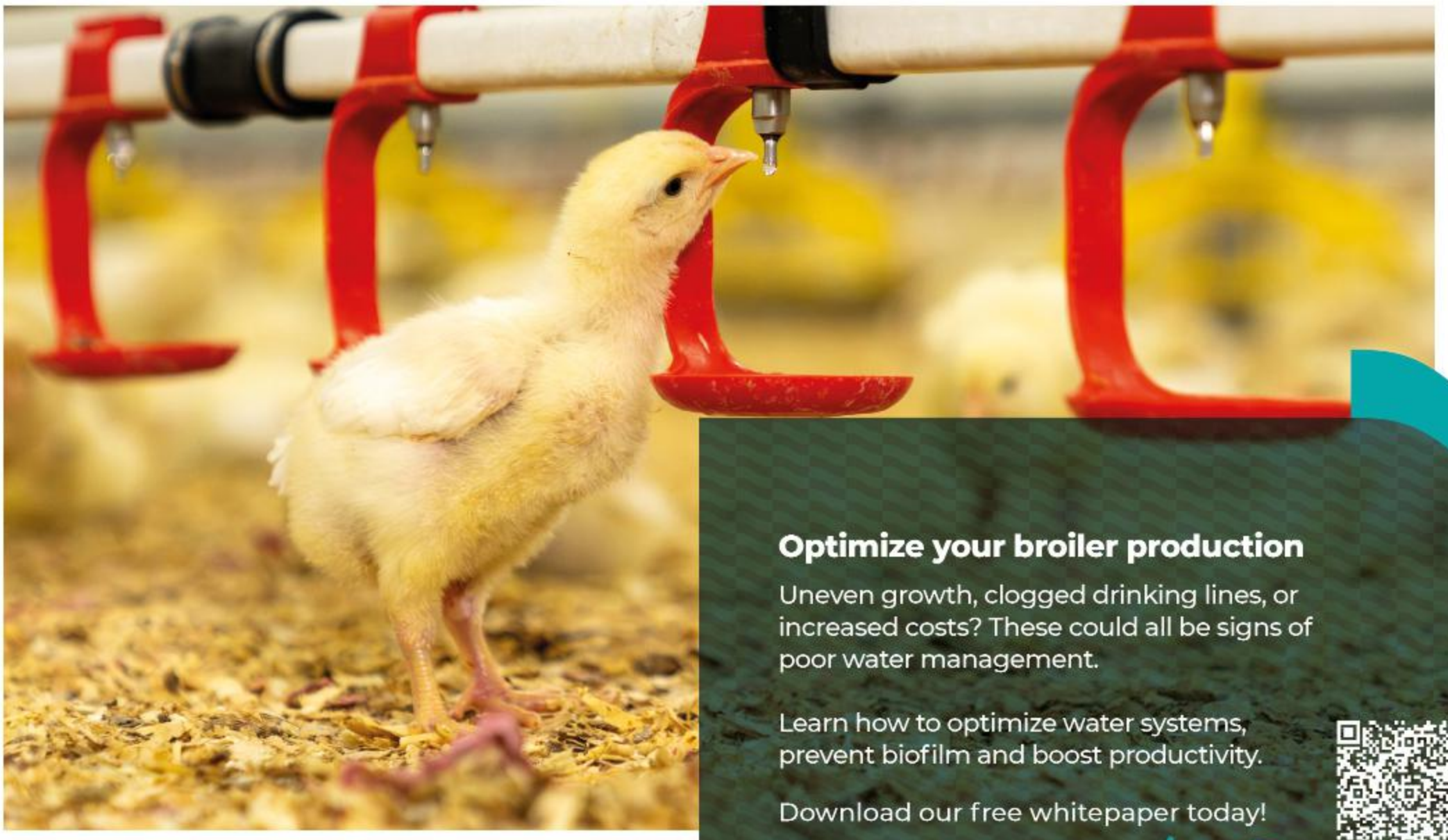

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Mr. Shabbir A Khan
Poultry Advisory and Technical Services (PATS)
Tropical Institute of Livestock Management and Health (TILMAH)

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एनकाउंटर न. 270- क्यों नहीं हम 'एग डे' को देश व्यापी समारोह के रूप में मनाते ?

हर साल जब पोल्ट्री मैगजीन में न्यूज एवं फोटो आती है डॉक्टर जीतेन्द्र वर्मा या ABTL IPEMA, Central Haryana Poultry Farmer Association ने 'एग डे' मनाया तब पता चलता है कि एग डे मनाया गया। हर बार तारीख निकल जाने के बाद पता चलता और सोचता कि अगले साल पहले से ही पोल्ट्री फार्मर्स को आगाह किया जाए कि अपने–अपने शहर–कस्बे में इस दिन को किस प्रकार मनाया जाए कि यह एक देश व्यापी समारोह बन जाए। इसके जरिये हम घर–घर में अंडे की उपयोगिता के विषय में सन्देश पहुंचा सकें। आज जो लोग एग डे मना रहे हैं वो निश्चित रूप से सराहनीये है, परन्तु हमें आस्मां के नीचे खुली हवा में घर–घर में एग डे पर्व का सन्देश पहुंचने के लिए कार्य करना होगा। सोचते–सोचते सालों गुजर गए परन्तु हम लोग इसे व्यापक रूप ना दे सके।

दुःख है कि अधिकाँश पोल्ट्री फार्मर्स विशेष रूप से लेयर फार्मर्स को इस 'डे' के बारे में कुछ मालूम ही नहीं। जिनको मालूम है वह सोते रहते हैं या उन्हें इसका फायदा उठाने की चिंता ही नहीं। 'एग डे' पूरे विश्व में एक साथ कब मनाया जाता है ? हर साल अक्टूबर के दूसरे शुक्रवार (FRIDAY) को मनाया जाता है। इसे सभी लेयर फार्मर्स नोट कर लें और अब अगले साल सन् 2026 में यह तारीख आएगी। अभी से हमारे लेयर फार्मर्स इस पर अपने कसबे अपने शहर के फार्मर से बातचीत करें और इसे अगले साल भव्य देश व्यापी मुहिम बनाये।

यह काम कठिन नहीं है ना ही महंगा, बस एक जुट होकर उस एक दिन अपना समय इस 'डे' को दे दें। अंडे के रेट को लेकर साल भर रोने से अच्छा है कि हम वह सब करें जिससे खपत बढे– रेट अपने आप बढ़ जायेगा। दुखद है इस पोल्ट्री को इंडस्ट्री की शकल में खड़े होते हुए 60 साल से ऊपर हो गया परन्तु हमने कभी भी अंडे की खपत को लेकर कोई प्रचार या पब्लिसिटी गंभीरता से नहीं की। यह काम बड़ी–बड़ी कंपनियों का था परन्तु वह भी सोते रहे – हाँ वेंकटेश्वरा ग्रुप की N.E.C.C. अक्सर विज्ञापन देती है। उसका 'संडे हो या मंडे गीत' इतना पॉपुलर हुआ कि बम्बइया फिल्म में इस मुखड़े को लेकर पूरा गीत आ गया। भारत जैसे बड़े देश में जहां की आबादी एक सौ पचास करोड़ हो वहां यह एक अकेला तारा पूरा प्रकाश नहीं दे पायेगा। इसके लिए सबको मिलजुल कर मुहिम चलाने की आवश्यकता है जो निरंतर चलती रहे।

अगर आपकी मेहनत से एक अंडा प्रति व्यक्ति साल का बढ़ा पाएं तो पांच लाख नई लेयर की आवश्यकता होगी जो कम से कम 500 लोगों को सीधा काम देगी और लगभग आश्रित 2500–3000 लोगो को अच्छी जीविका प्रदान करेगी और साथ में इन 3000 लोगों की दुआएं आपको मिलेगी और मिलेगा आपके अण्डों के भाव में कुछ उछाल। इस एक दिन की आपकी मेहनत से यदि हमने यह सब पा लिया तो हमें और क्या चाहिए ?

अब बात करते हैं इस 'एग डे' को किस प्रकार मनाया जाए जिसमे लागत भी कम हो और फल भी अच्छा हो ? प्रचार इतना शक्तिशाली हो, जो लोगों को आकर्षित करे, उन्हें अंडे के सेवन के लिए मजबूर करें और इसे आवश्यक खाद्य पदार्थ की श्रेणी में लाकर खड़ा कर दें। यही नहीं राज्य सरकार एवं सेंट्रल गवर्मेंट को यह सोचने पर मजबूर कर दें जो आज स्कूलों में मुफ्त दे रहे हैं उसका यह उच्च कोटि का विकल्प है। आज जो दे रहे हैं उसमे अक्सर मिलावट की और मात्रा में कमी की शिकायत आ रही है। उस अंडे को कुदरत (भगवान) ने स्वयं 'सील पैक' किया हुआ है जिसमे मिलावट नहीं हो सकती, अतः पौष्टिकता भी कम नहीं हो सकती। विश्व में हम नंबर एक पर हैं, बच्चों में 'कुपोषण' के मामले में। प्रति दिन एक उबला अंडा इसे दूर करने में सक्षम है। एक प्रश्न उठता है वेज और नॉन–वेज का। वैसे बापू के अनुसार यदि दूध और दही वेज है तो अंडा भी वेज (शाकाहारी) है। यदि गेहूं भी वेज है तो अंडा भी 'सुपर वेज' है। एक मुट्ठी गेहूं मिट्टी में छिड़क दें उससे हफ्ते भर में जन्म लेते हुए पौधे दिखेंगे। टेबुल एग को बच्चा निकलने की मशीन में रख दें, 21 दिन पर एक भी चू–चू (चूजा) नहीं निकलेगा। आप अब स्वयं तय करें शुद्ध शाकाहारी अंडा है या गेहूं।

स्कूलों में जो बच्चे शुद्ध शाकाहारी हैं उसका भी समाधान है। उन्हें आप केला, अमरुद, मूंगफली या शकरकंदी दे दें–इसमें भी मिलावट की सम्भावना बिलकुल नहीं है और दूसरे बच्चों को उबला हुआ ताजा अंडा दे दें। भारत सरकार एवं राज्य सरकारों को इसे गंभीरता से लेना चाहिए। विशेष रूप से बच्चों में कुपोषण को देखते हुए।

अब फिर वापिस आते हैं कामयाब 'एग डे' कैसे मनाएं ?

- 'एग डे' के अवसर पर उबले हुए अंडे बिना छिले देना है। यह अंडा आएगा कहाँ से? इसके लिए अपने पास के सभी अण्डों के उत्पादक से कहना होगा कि इसमें सहयोग दें, साथ ही अंडे के डीलरों से भी आग्रह करना होगा कि वह भी सहयोग करें।
- कम–से–कम 500 अंडा या अधिक से अधिक वह जितना चाहें अपनी इच्छा से दें। साथ में 'एग डे' के दिन अपना समय भी दें।
- ब्रिटिश राज में जिस तरह चाय की खेती जब भारत में शुरू हुई तो सुबह–सुबह शहर–कसबे और गाँव–गाँव में मिट्टी के कुल्हड़ में मुफ्त चाय बाजारों में जगह–जगह चाय बागान वाले पिलाते थे। 'लत' ऐसी लगी कि अब सुबह आँख खुलते ही मन करता है कि एक कप गरम चाय मिल जाए। इसी प्रकार केवेन्डर सिगरेट वालों ने भी सिगरेट की 'लत' लगा दी। हम पोल्ट्री वालों को भी 'एग डे' के दिन कुछ ऐसा ही करना होगा।
- हमारे पास कुल साल में एक दिन है। अतः सबसे अच्छी जगह चौराहे हैं, जहाँ रेड लाइट पर गाड़ियां रूकती हैं। हम नॉक करें। पहले छोटा बोर्ड दिखाएँ जिसपर लिखा हो "मुफ्त उबला अंडा" (FREE BOILED EGG) – इसके बिना आप नॉक करेंगे तो नाक भौं चढ़ाएगा कि आप भीख मांग रहे हैं, स्क्रीन नीचे नहीं करेंगे। कोई वेज वाला हुआ तो वह भी शीशा नीचे नहीं करेगा। कोई बात नहीं अंडा खाने वाले तुरंत खोलेंगे। उन्हें कम–से–कम जितने लोग बैठे हैं, उतनों को अंडा दे दें। इसी प्रकार स्कूटर, मोटर–साइकिल, और साइकिल वालों को दो अंडे दे दें। पैदल वालों को ना भूलें, एक–एक अंडा उन्हें भी देते जाएँ।
- यह मुहिम सुबह आठ बजे से शुरू करें और जब तक स्टॉक है तब तक चलने दें।

गंगा फीड का एक ही लक्ष्य – समृद्ध व सम्पन्न हो फार्मर हमारा ।

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- चौराहे के दो कोनों पर सुंदर छोटा सा इन्क्लोजर बनाएं। जहाँ आपके अण्डों के बारे में रंग–बिरंगे बैनर लगे हों। यहीं से ताजा उबले हुए अंडे चारों रोड पर वितरित होंगे।
- कुछ संगीत भी चलता रहे तो बेहतर होगा। इसमें 'संडे हो या मंडे, रोज खाओ अंडे' भी बजता रहे।
- यह गर्म अंडा उन्हें कैसे दें? हमें छोटे–छोटे आकर्षक हैंड बैग बनवाने होंगे, जिसपर एक तरफ अंडे के फायदे के बारे में लिखा हो एवं दूसरी और 'एग डे' सेलिब्रेशन आयोजित द्वारा –– भी लिखा हो जिसमे जिस जगह कस्बा या शहर में हो उसका नाम लिखा हो। लिखते–लिखते ध्यान आया कि अगर हमें हल्का छोटा चौकोर कागज का डिब्बा बनवा लें तो हमें 6 जगह लिखने की मिल जाएगी।
- इसके अतिरिक्त और भी तरीके हैं, परन्तु चौराहे वाला तरीका सबसे अधिक प्रचार का माध्यम है।
- हम स्कूलों में जा सकते हैं। एग डे से कुछ दिन पहले। किसी भी कक्षा के बच्चे हों उन्हें प्रश्न दें – "अंडा पौष्टिक आहार हैं या नहीं? यदि है तो क्यों और यदि नहीं है तो क्यों?" इस पर प्रथम तीन लेखों पर इनाम रखें – 3 ट्रे अंडा – 2 ट्रे अंडा एवं 1 ट्रे अंडा एग डे के दिन उन्हें इनाम दें और प्रशस्ति पत्र दें एवं कुछ और देना चाहें तो दें।
- इसी प्रकार सरकारी सिविल हॉस्पिटल में जितने मरीज एडमिट हों, उन्हें भी उबला अंडा बाँट सकते हैं। परन्तु C.M.O. की आज्ञा ले लें। सिविल हॉस्पिटल के TB वार्ड में अवश्य दें। यह वह मरीज हैं जिन्हे उनके इलाज में सहायक होगा। वैसे यदि आप कर सकते हैं तो रोज एक अंडा उन्हें दे दें। वहां 20–25 से ज्यादा मरीज नहीं होते। सप्ताह भर का इकठ्ठा ही दे दें। उन्हें खाने के साथ उबाल कर कुक दे देगा। हमें कुछ पुण्य भी कमाना चाहिए। हर शहर, हर कसबे या गाँव में अति ठंडी "चिल्ड बियर" का बोर्ड मिल जायेगा, क्या हम उनसे भी गैर गुजरे हैं कि अंडे की उपयोगिता पर कुछ बैनर मुख्या रास्तों पर सदैव के लिए अभी लगा कर छोड़ दें।

यह कुछ सुझाव हैं आप अपनी क्षमता के अनुसार इससे अच्छा भी कर सकते हैं।

- अब जो सबसे बड़ा प्रश्न है 'एग डे' किस प्रकार देश व्यापक बनाया जाए और किस तरह हर जगह मुख्य बातें एक–सी हों ? इतनी बड़ी देश व्यापी मुहिम को चलाने के लिए भारत की किसी एक आर्गेनाईजेशन को आगे आना पड़ेगा। मैं स्वयं P.F.I. – पोल्ट्री फेडरेशन ऑफ इंडिया का फाउंडर मेंबर हूँ तो मैं तो उसी का नाम लूंगा, मगर वह आगे आएं, मेरे नाम लेने से क्या होगा। वैसे यह फेडरेशन जिसे नौजवान लीड कर रहे हैं। ऑर्गेनाईजेशन के मामले में बहुत सक्षम हैं। कर सकते हैं यदि कोई समस्या है तो कुछ दूसरे अपने देश के नामवर आर्गेनाईजेशन की मदद ले सकते हैं या साथ लेकर चल सकते हैं। इसमें देश के प्रसिद्ध IPEMA, VIPS, CLFMA एवं INFAH आदि को शामिल किया जा सकता है। कुछ स्टेट ऑर्गेनाईजेशन हैं एवं काफी सक्षम भी हैं, उनको साथ लिया जा सकता है। इस तरह एक अच्छी बड़ी टीम बन जाएगी जो अपने सुझाव से और अपने सहयोग से इसे आंदोलन का रूप दे कर इस 'एग डे' को देश व्यापी बना देगी।
- अब एक और सबसे बड़ा प्रश्न है कि इसके लिए फण्ड कहाँ से आएगा ? मुख्य खर्च अण्डों का है जो लेयर फार्मर्स खुद कॉन्ट्रीब्यूट (योगदान) करेंगे। यह काम उन्ही के लिए हो रहा है। दूसरा खर्च पैकिंग का है, जिसके लिए हमे बाहर से योगदान लेना होगा। इसके लिए पहले तो लेयर चिक्स बेचने वाले ब्रीडरों का दरवाजा खटखटाना पड़ेगा। इसके बाद उन दवा की कंपनियों को जो आदमियों की दवा बेचते हैं, उनसे संपर्क करना होगा। उन्हें बताना होगा कितने लोगों के घर सन्देश भेजना है। हम उतने बैग पर छोटा परन्तु आकर्षक ऐड उनका डाल सकते हैं। प्रति बैग उनसे चार्ज कर लें। इस प्रकार मैक्डोनाल्ड, KFC से भी संपर्क किया जा सकता है। हम अंडे के आढ़तियों को भी पकड़ सकते हैं। फीड मिलर्स से भी सहयोग लिया जा सकता है। इस प्रकार और बहुत से रास्ते हैं जब मिल बैठ कर विचार करेंगे तो रास्ते निकलेंगे। हमे यह पैक हर शहर–हर कस्बे तक पहुंचाना है जिसमे वह अंडा रख कर वितरित कर सकें। लोकल लेवल में भी कुछ खर्च होगा, जैसे बैनर लगाने में, अंडा उबालने में, परन्तु यह इतना कम है कि इस खर्च को लोकल लेवल पर छोड़ दें।

यह पूरा विचार या लेख एक सपने जैसा है परन्तु सारे जहानों के मालिक पर यकीन है, यह सब ऑर्गेनाईजेशन जिनका नाम लिखा है और जिनका नाम नहीं लिखा है अगर संकल्प कर लें तो यह सपना साकार हो सकता है।

- अब जो एक मसला, जो महत्वपूर्ण है कि लेयर के किसानों को कैसे जगाया जाए? क्योंकि यह साल में आने वाला एक दिन– 'एग डे' लेयर इंडस्ट्री के लिए बहुत महत्वपूर्ण है। सालों से यह चल रहा है परन्तु हम सब सोये हुए हैं, बहुतों को इसके बारे में मालूम ही नहीं है। यह बात दुखद है।
- हमें अभी से इन्हे 'मोटीवेट' (प्रोत्साहित) करने की आवश्यकता है।
- मोटीवेट करने का माध्यम क्या हो? सभी पोल्ट्री मैगजीनों का उपयोग किया जा सकता है। पूरे व्हाट्सप्प ग्रुप में डाला जा सकता है। लेयर ब्रीडर्स अपने चालान बुक और बिल पर एक या दो लाइन इस विषय पर प्रिंट करें। यही नहीं सभी फीड मिलर्स से अनुरोध किया जाए वह भी प्रिंट करें। एग डीलर इसमें बहुत बड़ा योगदान दे सकते हैं। हम कंपनियों से जहाँ भी अपना सेमीनार करते हैं, अपने विषय पर प्रकाश डालने के बाद अंत में दो मिनट इस विषय पर बताएं। यह काम अपने हर सेमीनार में करें।
- यह हर साल एक दिन मनाना प्रारम्भ में कुछ कठिनाई हो सकती है– मेहनत ज्यादा करनी पड़ सकती है। बाद में यही आसान हो जायेगा।

तमन्ना तो यही है कि पहले साल ही इतना भव्य 'एग डे' मनाया जाए कि सभी दूसरे साल इस दिन का इन्तजार करें। शुरू करने के लिए मजबूत संकल्प चाहिए, रास्ता अपने–आप बनता जायेगा। "अकेले निकले थे कारवां बनता गया"। किसी को आगे आना होगा और पहल करनी होगी।

Mr. Shabbir Ahmad Khan

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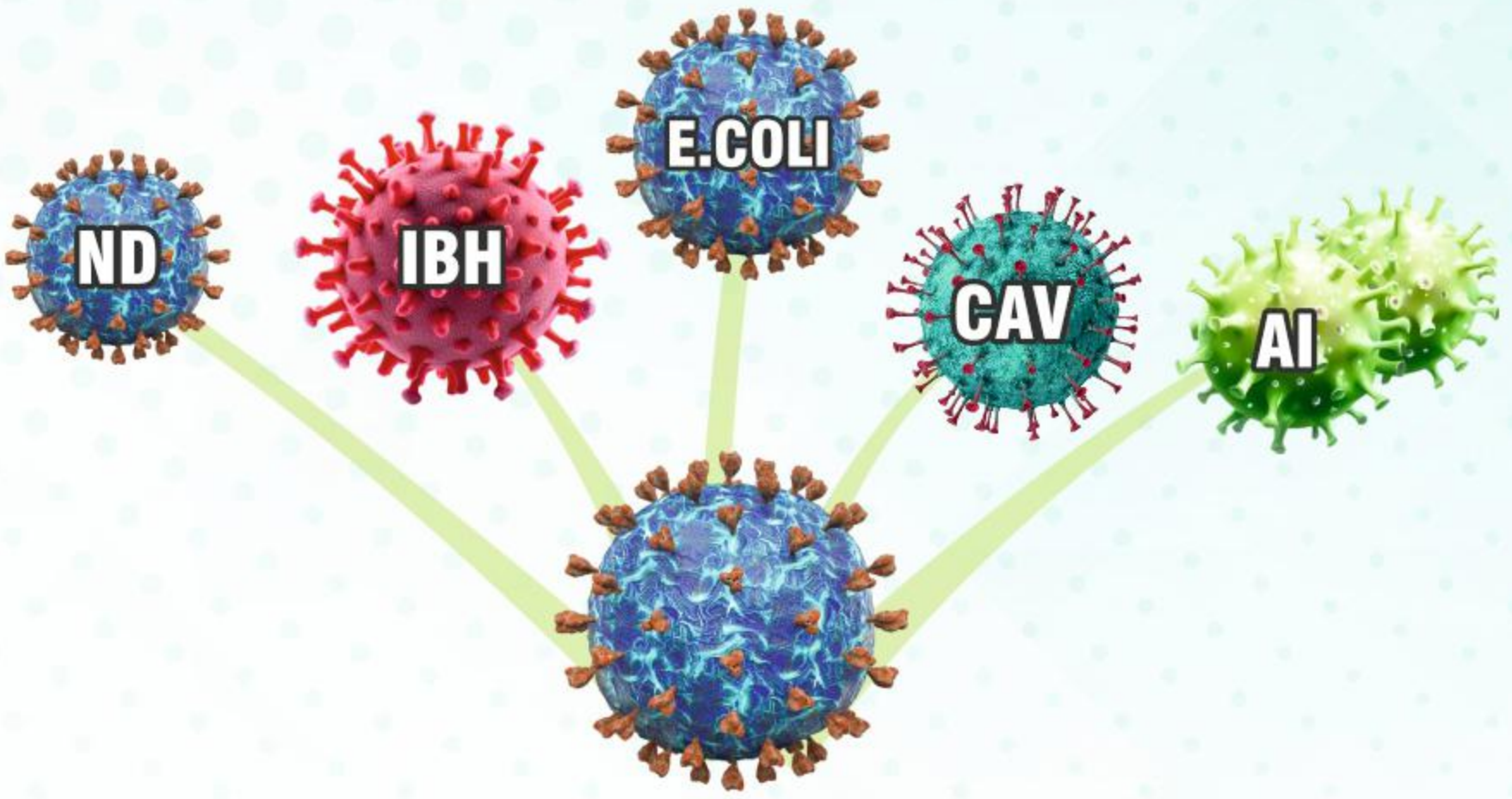

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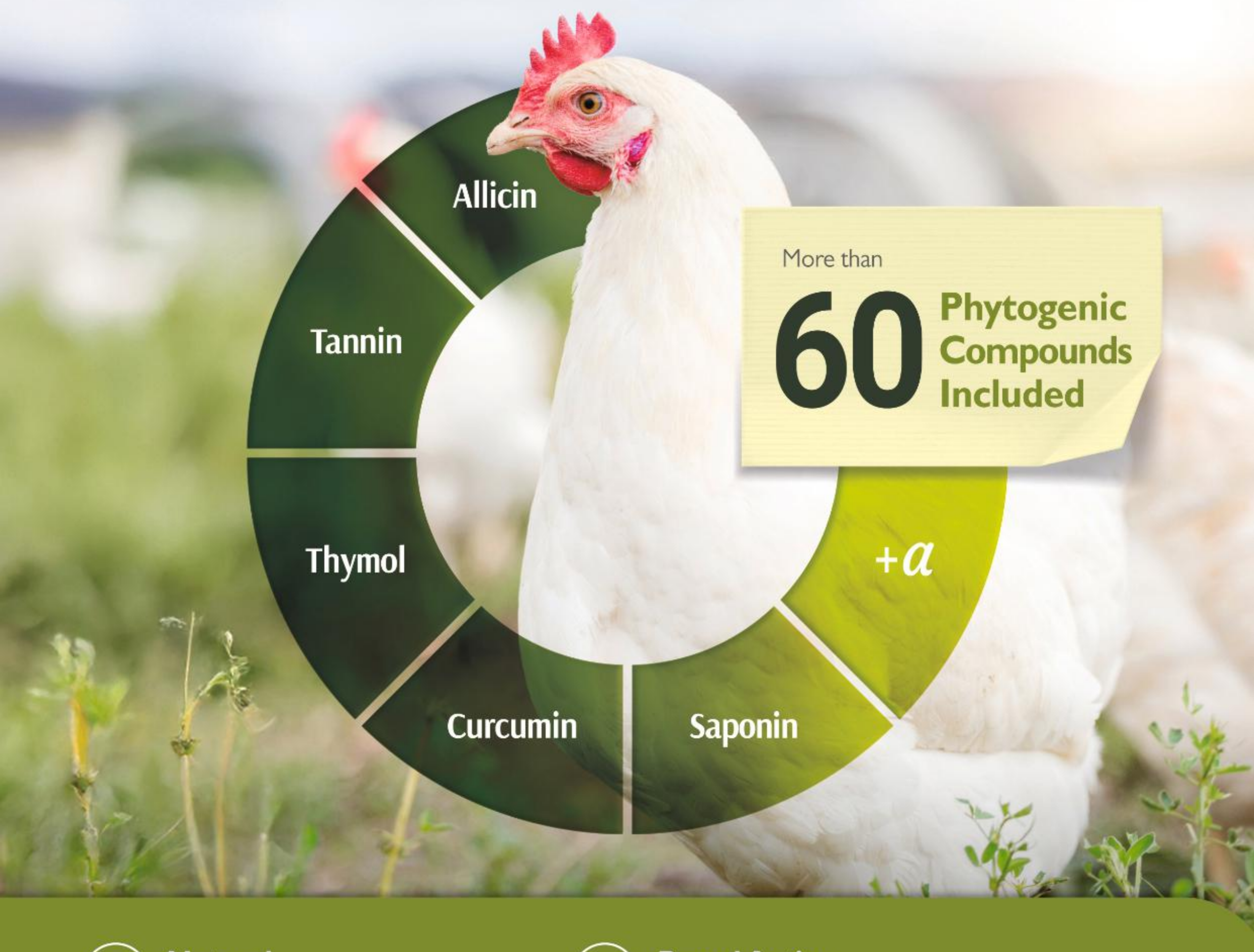

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INFAH Hosts Successful 14th AGM & Appoints New Managing Committee

The Indian Federation of Animal Health Companies (INFAH), the united progressive force of companies working towards animal healthcare, is delighted to announce the resounding success of its 14th Annual General Meeting (AGM). The event, held on Thursday, September 18, 2025, at the Vivanta By Taj, Navi Mumbai, was marked by insightful discussions, strategic deliberations, and invaluable networking opportunities, bringing together the stalwarts of the Indian animal health industry.

The day commenced with a warm and inspiring Welcome Address by the President, Dr. Shirish Nigam, who set the tone for the event by focusing on the timely and vital theme of 'Resilient Animal Agriculture for Viksit Bharat' (Developed India).

The AGM featured a packed schedule of thought-provoking keynote addresses from esteemed industry leaders who shared their expert perspectives on critical facets of the sector:

- Mr. Ajay Srivastava, Founder of Global Trade Research Initiative, on "Trade & Tariffs".
- Dr. R S Sodhi, President of the Indian Dairy Association, on "Dairy Industry - Opportunities & Challenges".
- Dr. P B N Prasad, former Drug Controller General of India, on "Regulatory Reforms for Viksit Bharat".
- Dr. Saundraya Rajesh, Founder & President of the AVTAR group, on "Enabling Inclusion: Powering a Future-Ready Organisation."

The annual report, along with reports on the Companion Animal Healthcare Market, 3rd edition of Nutritimes and Antimicrobial Usage (AMU) in Indian Animal Healthcare during 2023-2024 report, were published. The Companion Animal report was prepared by the Companion Animal Subcommittee, led by Dr. Vinayak Surve, its Chairman. The Nutritimes was prepared by the Feed Supplement Subcommittee, led by Mr. Satish Pasrija, its Chairman. The Therapeutic Subcommittee, under the leadership of its Chairman, Dr. Arun Atrey, prepared the AMU report. These publications were shared with member companies and guests in the presence of Managing Committee members.

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Key proceedings of the General Body Meeting included the presentation of the General Secretary's Report by Dr. Aman Sayed, a thorough review of the AGM proceedings and necessary approvals presented by Dr. Manoj Sood, and an engaging Open Forum that facilitated valuable feedback and interactive dialogue among members.

A major highlight of the day was the prestigious INFAH Awards 2024-25 ceremony, where the Federation had the honour of felicitating Dr. D K Dey and Dr. Sandeep Karkhanis for their outstanding and impactful contributions to the animal health industry. The session was concluded with a gracious Vote of Thanks from Ms. Ashwini Deshpande.

New Leadership Appointed

In a significant announcement during the AGM, the newly elected Managing Committee members for the forthcoming term from 2025 to 2027 were introduced. Following the AGM, the Office Bearers were officially appointed at the Managing Committee meeting held on October 19, 2025.

The newly appointed Office Bearers and Executive Members of the INFAH Managing Committee are:

Designation	Name
President	Mr. Vijay Teng
Vice President	Dr. Sayed Aman
General Secretary	Dr. Manoj Sood
Joint Secretary	Dr. Vinayak Surve
Treasurer	Dr. Mubeen Patel
Immediate Past President & Executive Member	Dr. Shirish Nigam
Past President & Executive Member	Dr. Arun Atrey
Past President & Executive Member	Mr. Satish Pasrija
Past President & Executive Member	Dr. Vijay Makhija
Executive Member	Dr. Anup Kalra
Executive Member	Ms. Ashwini Deshpande
Executive Member	Dr. Pratibha Mandloi
Executive Member	Mr. Vikram Baranwal

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"We are immensely proud of the successful conclusion of our 14th AGM under the leadership of Dr Shirish Nigam and Team INFAH," said Mr. Vijay Teng, the newly appointed President of INFAH. "The exchange of ideas on topics critical to national development, from trade policies and regulatory reforms to industry challenges and workplace inclusion, has positioned INFAH to drive the agenda for a Resilient Animal Agriculture sector in its journey towards a Viksit Bharat. We are excited to lead the Federation into a new year of collaborative efforts and growth."

INFAH extends a heartfelt thank you to all the distinguished speakers, dedicated members, and supportive partners for making this event a grand success. The Federation looks forward to another term of collaborative engagement to advance the welfare of animals and contribute to the nation's food security and economy.

About INFAH:

The Indian Federation of Animal Health Companies (INFAH) is the united progressive force of companies dedicated to animal healthcare in India. INFAH plays a critical role in promoting ethical practices, enhancing the animal health industry's value, and collaborating with policymakers to shape a robust and progressive regulatory framework for the sector.

Here are a few glimpses from the day!

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ARTICLE

Innovative Vaccine Strategies
and Rapid Response Model to Combat Bird Flu

Prof. (Dr.) P.K. Shukla and Dr. Amitav Bhattacharyya

Avian influenza (bird flu) continues to pose a major threat to global poultry production, trade, and public health, particularly in countries like India where poultry is vital for nutrition and livelihoods. Conventional vaccines, primarily inactivated whole-virus formulations, have shown limitations due to antigenic drift, inability to prevent viral shedding, and challenges in differentiating infected from vaccinated flocks. These shortcomings necessitate the adoption of innovative vaccine strategies and rapid response models to ensure sustainable disease control.

Next-generation vaccines such as recombinant vector vaccines, DNA and mRNA platforms, and the pursuit of universal influenza vaccines represent transformative tools. They offer flexibility, rapid adaptability to emerging strains, and improved biosafety. When complemented by advanced diagnostic technologies—including portable PCR, CRISPR-based systems, and biosensors—outbreaks can be detected and contained at their source. Additionally, digital surveillance and predictive analytics, powered by artificial intelligence and geospatial mapping, enable real-time monitoring and risk forecasting.

Rapid response vaccination platforms, including modular manufacturing units and vaccine banks, further enhance preparedness by ensuring timely availability and deployment. Integrating these innovations within a "One Health" framework aligns animal and human health efforts, reducing zoonotic spillover risks and strengthening global pandemic preparedness.

This article emphasizes that technological innovation must be supported by strong governance, public-private partnerships, farmer participation, and international collaboration. Together, innovative vaccine strategies and robust rapid response models offer a resilient pathway to mitigate the threat of bird flu, safeguard food security, protect farmer livelihoods, and promote public health.

The Growing Threat of Bird Flu

Avian influenza (bird flu) has emerged as one of the most persistent threats to global poultry production, food security, and public health. The virus, caused primarily by highly pathogenic strains of influenza A such as H5N1 and H7N9, has resulted in severe mortality in poultry and sporadic spillover infections in other species, raising concerns of a potential pandemic. For countries like India, where poultry is a key source of protein and livelihood, outbreaks of bird flu have caused massive economic losses, trade restrictions, and consumer mistrust. Traditional measures such as culling infected flocks and imposing movement restrictions, though effective in containment, are not sustainable in the long run. The virus's high mutation rate further complicates control, as it rapidly evolves to evade immunity induced by conventional vaccines. In this context, innovative vaccine strategies combined with robust rapid response models are critical to safeguarding poultry health and minimizing risks to humans. This article explores the latest advancements in avian influenza vaccine technologies, the integration of digital tools for surveillance, and the development of rapid response mechanisms that together form a comprehensive strategy to combat bird flu in an evolving epidemiological landscape.

Limitations of Conventional Vaccines

Traditional vaccines against avian influenza, mainly inactivated whole-virus vaccines, have been widely used in many poultry-producing countries. However, they present multiple limitations. Firstly, these vaccines often fail to provide protection against newly emerging strains due to antigenic drift and shift. Secondly, they may not prevent viral shedding, allowing vaccinated but infected birds to act as silent carriers, thereby facilitating the spread of the virus. Thirdly, production of inactivated vaccines requires high-level biosafety facilities to handle live viruses, resulting in high costs and delayed availability during sudden outbreaks. Another major challenge is the inability to distinguish between infected and vaccinated birds (DIVA issue), which complicates surveillance and trade. Moreover, reliance on conventional vaccination strategies often leads to complacency in biosecurity, further aggravating the risk of outbreaks. These drawbacks highlight the urgent need for next-generation vaccines that are more adaptable, cost-effective, and capable of inducing robust immunity. Innovative approaches such as recombinant vector vaccines, mRNA vaccines, and universal influenza vaccines hold promise to overcome these challenges. To complement these technologies, countries must also develop a rapid response system that ensures quick identification, approval, and deployment of vaccines during emergencies.

Recombinant Vector Vaccines: A Modern Alternative

Recombinant vector vaccines have emerged as a strong alternative to traditional inactivated vaccines for avian influenza. These vaccines use harmless viruses, such as fowlpox virus or Newcastle disease virus (NDV), as carriers to deliver specific influenza antigens. This strategy provides dual benefits: protection against both the vector virus and the avian influenza virus, as well as the ability to differentiate vaccinated from infected flocks through marker genes.

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Recombinant vector vaccines can be mass-administered via spray, drinking water, or *in-ovo* delivery, making them logistically attractive for large-scale poultry operations. Furthermore, because they do not require handling of live influenza virus during production, the biosafety risks and costs are significantly reduced. Several recombinant vaccines have shown strong efficacy in reducing viral shedding and protecting against multiple strains. Importantly, vector-based platforms allow for rapid redesign and production when new strains emerge, providing a flexible tool in outbreak situations. Despite these advantages, challenges remain in terms of regulatory approval, public acceptance, and integration into existing vaccination programs. Nevertheless, recombinant vector vaccines represent a cornerstone of innovative vaccine strategies that can significantly reduce the burden of bird flu.

DNA and mRNA Vaccines: The Frontier of Innovation

The success of mRNA vaccines against COVID-19 has opened new possibilities for their application in avian influenza. DNA and mRNA vaccines offer unmatched flexibility and speed in responding to emerging strains. Unlike conventional vaccines, they do not require growing the virus in eggs or cell cultures, which drastically reduces production time. Once the genetic sequence of a new influenza strain is known, vaccines can be designed and manufactured within weeks. This rapid turnaround is crucial in containing outbreaks before they spread widely. Moreover, nucleic acid vaccines stimulate both humoral and cellular immunity, providing robust protection. Research in poultry has demonstrated promising results, though large-scale application faces challenges such as stability, cost, and efficient delivery systems. Innovations such as nanoparticle-based carriers and thermostable formulations are addressing these barriers. If successfully scaled, DNA and mRNA vaccines could revolutionize bird flu prevention, enabling a proactive rather than reactive approach. Their adaptability also makes them suitable for inclusion in pandemic preparedness frameworks, where cross-sector collaboration between animal and human health is essential.

Universal Influenza Vaccines: A Long-Term Solution

One of the most ambitious goals in influenza vaccine development is the creation of a universal vaccine that provides broad and long-lasting protection against multiple subtypes. Traditional vaccines target highly variable surface proteins like hemagglutinin (HA), which frequently mutate. In contrast, universal vaccines focus on conserved regions of the virus, such as the HA stalk or internal proteins, which change less frequently. Such vaccines could reduce the need for frequent updates and provide cross-protection against both low- and high-pathogenic strains. For the poultry sector, this would mean stable, predictable protection that lowers the risk of mass culling and economic disruption. Although research on universal vaccines is still in early stages, promising candidates are being tested in both laboratory and field trials. If successful, they could transform avian influenza control into a more sustainable practice. However, their development requires substantial investment, international collaboration, and integration with surveillance systems to ensure global applicability. Universal vaccines are not an immediate solution but represent a critical component of long-term bird flu preparedness strategies.

Role of Rapid Diagnostic Tools in Response Models

Vaccines alone cannot control avian influenza without effective surveillance and rapid diagnostics. Early detection of outbreaks is essential for timely response. Advances in point-of-care diagnostic tools, such as portable PCR machines, CRISPR-based detection systems, and biosensors, allow for real-time identification of avian influenza strains in the field. These tools empower veterinarians and farmers to take immediate containment measures, reducing the window of virus spread. Integration of diagnostic platforms with digital reporting systems enhances transparency and allows authorities to monitor disease progression across regions. Coupled with geospatial mapping and predictive modelling, diagnostic tools form the backbone of a rapid response model. For instance, by linking field diagnostics with central databases, authorities can quickly identify hotspots, mobilize vaccines, and implement movement restrictions in a targeted manner. The synergy between innovative vaccines and rapid diagnostics ensures that outbreaks are managed proactively rather than reactively, minimizing economic and health impacts.

Digital Surveillance and Predictive Analytics

Modern bird flu control requires not just vaccines and diagnostics but also real-time surveillance. Digital platforms, artificial intelligence (AI), and big data analytics are increasingly being used to track disease dynamics. Predictive models can analyse weather patterns, migratory bird routes, and farm-level biosecurity data to forecast potential outbreaks. For example, AI-powered algorithms can detect anomalies in poultry mortality and feed consumption, serving as early warning indicators of disease. Blockchain-based systems can improve traceability in poultry trade, ensuring rapid containment in case of outbreaks. Mobile applications linked with farmer networks can provide instant reporting of symptoms and vaccination coverage. When integrated with vaccination strategies, digital surveillance allows authorities to deploy resources more efficiently, prioritize high-risk areas, and evaluate the effectiveness of interventions. In countries with large backyard poultry populations, such systems also enhance community engagement and trust in government programs. Predictive analytics thus complement vaccine innovation by ensuring timely, data-driven responses to bird flu threats.

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Rapid Response Vaccination Platforms

A critical component of combating bird flu is the ability to rapidly deploy vaccines during outbreaks. Innovative vaccination platforms, such as modular vaccine manufacturing units and regional vaccine banks, ensure timely availability. Modular facilities can be quickly repurposed to produce vaccines for emerging strains, reducing dependency on centralized production. Vaccine banks, stocked with pre-approved and pre-tested formulations, enable immediate rollout in hotspot regions. Additionally, novel delivery methods like aerosolized vaccines, drone-assisted distribution, and automated *in-ovo* vaccination enhance coverage and reduce labour costs. Public-private partnerships play a vital role in establishing these rapid response systems by aligning research institutions, vaccine manufacturers, and government agencies. Ensuring cold-chain infrastructure, training field veterinarians, and securing regulatory fast-tracking are also crucial to making rapid vaccination platforms successful. By linking these mechanisms with surveillance data, authorities can mount swift, targeted vaccination campaigns that halt outbreaks before they escalate.

One Health Approach: Linking Animal and Human Health

Bird flu is not just an animal health issue but also a significant zoonotic threat. The One Health approach, which integrates human, animal, and environmental health, is essential for sustainable control. Innovative vaccine strategies must therefore be aligned with public health priorities, ensuring reduced risk of viral spillover into human populations. Coordination between veterinary and medical authorities allows for joint surveillance, shared diagnostic platforms, and harmonized response measures. For example, human vaccine development can benefit from poultry vaccine research and vice versa. Migratory birds and live animal markets, which serve as critical transmission interfaces, must be monitored collaboratively. Public awareness campaigns play a key role in educating communities on safe handling of poultry and reporting of unusual mortalities. By embedding avian influenza control into a One Health framework, the world can build resilience against not only bird flu but also other emerging zoonoses.

Towards a Resilient Future

The fight against bird flu requires a shift from reactive crisis management to proactive, science-driven strategies. Innovative vaccines such as recombinant, DNA, mRNA, and universal formulations provide new hope for robust and flexible protection. Coupled with rapid diagnostics, digital surveillance, and rapid response vaccination platforms, these tools can revolutionize the way outbreaks are managed. However, technological innovation alone is not enough. Strong governance, international collaboration, farmer participation, and One Health integration are equally vital. Countries like India, with their vast poultry sector, must invest in research, regulatory agility, and infrastructure to implement these solutions effectively. The global community must also recognize bird flu as a shared threat requiring joint action. By embracing innovation and building resilient rapid response models, the poultry industry can secure its future against avian influenza, ensuring food security, farmer livelihoods, and public health for generations to come.

Policy Recommendation Framework: Combating Bird Flu

1. Vaccine Innovation and Deployment

- Support R&D in recombinant, DNA, mRNA, and universal avian influenza vaccines.
- Establish fast-track regulatory approval pathways for next-generation vaccines.
- Incentivize private sector and academic partnerships for vaccine innovation.
- Promote DIVA (Differentiating Infected from Vaccinated Animals) compliant vaccines for trade sustainability.

2. Rapid Response Infrastructure

- Develop regional vaccine banks with pre-approved formulations for emergency rollout.
- Invest in modular, mobile vaccine manufacturing units for rapid strain-specific vaccine production.
- Train veterinary services in mass vaccination logistics (spray, *in-ovo*, drone-assisted delivery).

3. Diagnostics and Surveillance

- Deploy portable PCR, CRISPR-based, and biosensor diagnostic tools for on-site detection.
- Integrate diagnostics with national digital reporting platforms for real-time alerts.
- Expand geospatial mapping and AI-driven predictive analytics for hotspot identification.

4. One Health Integration

- Strengthen collaboration between animal, human, and environmental health sectors.
- Monitor live bird markets, migratory bird routes, and wildlife reservoirs jointly.
- Align poultry vaccination strategies with public health pandemic preparedness plans.

5. Governance, Policy, and Capacity Building

- Establish national and regional rapid response task forces for avian influenza.
- Secure international cooperation for data sharing and vaccine equity.
- Provide financial and insurance mechanisms to protect farmers from outbreak losses.
- Conduct community awareness campaigns on safe poultry handling and early disease reporting.

Outcome: A resilient, science-driven system that reduces outbreak risks, protects farmer livelihoods, ensures food security, and safeguards public health.

Prof. (Dr.) P.K. Shukla and Dr. Amitav Bhattacharyya
Department of Poultry Science,
College of Veterinary Science and Animal Husbandry,
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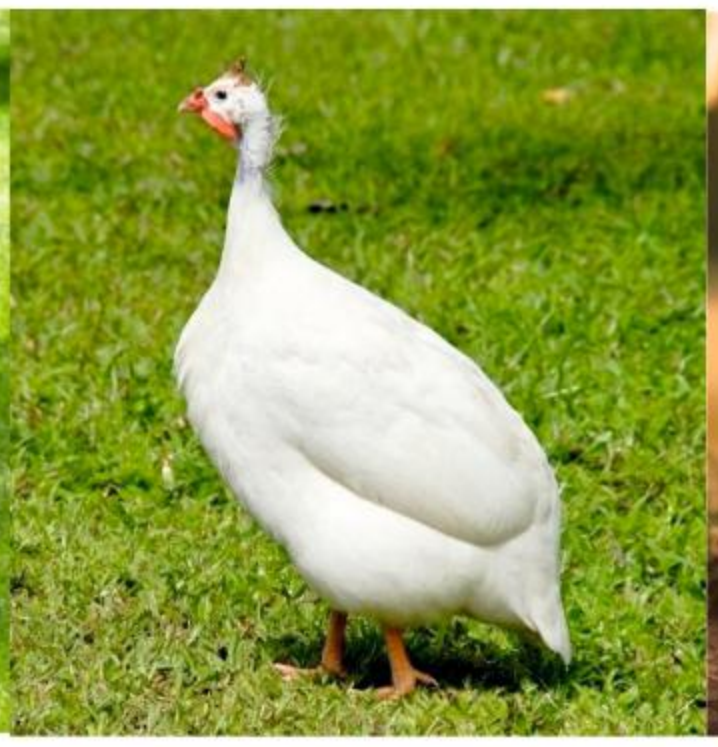

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ARTICLE

Wings of Change:
The Story of a Progressive Poultry Farmer

Kanwarpal Singh Dhillon[1]* and Bikramjit Singh[2]

The will to earn and succeed is the driving force behind every hardworking individual. S. Karamjit Singh, a well-educated and progressive farmer from village Ramana Chakk, district Amritsar, has set new benchmarks in the field of poultry farming. With only three acres of ancestral land, he faced challenges in sustaining his family through traditional agriculture. Motivated to improve his livelihood, he ventured into poultry farming by establishing Mand Poultry Farm (broiler unit) with a capacity of 5,000 birds in 2023. Initially, due to limited technical knowledge, he faced high mortality and disease outbreaks. His turning point came after enrolling in a seven-day vocational training on "Scientific Poultry Farming" at Punjab Agricultural University's Krishi Vigyan Kendra (KVK), Amritsar, in 2024. Guided by KVK experts, he applied scientific practices in breed selection, feed management, housing, vaccination, and biosecurity. Subsequently, he expanded his farm to a capacity of 20,000 birds. Improved feed conversion ratio (FCR), reduced mortality, and better management practices resulted in a monthly profit of about Rs. 3 lakh per batch. Today, he provides employment to village youth and serves as a role model for other farmers. His success demonstrates how scientific interventions and technical guidance can transform small-scale farmers into successful entrepreneurs.

Situation analysis

In Punjab, declining landholdings and increasing input costs have made farming less remunerative, particularly for small and marginal farmers. S. Karamjit Singh (aged 40) from village Ramana Chakk, district Amritsar, owned only three acres of land, which limited his income from traditional cropping. After observing successful poultry ventures in nearby villages, he decided to diversify his livelihood through broiler farming.In 2023, he established Mand Poultry Farm with 5,000 birds under a contract arrangement with the private company "Sampoorna," which supplied chicks, feed, and medicines. Initially, due to lack of technical knowledge in feed, breed, and disease management, he experienced high mortality rates and poor profitability despite approaching several agencies for support.

Plan, implementation and support

During this period, Karamjit Singh learned about a vocational training course on "Scientific Poultry Farming" at PAU's Krishi Vigyan Kendra, Amritsar. On the advice of KVK experts, he joined the seven-day programme in 2024. The training covered scientific management of poultry housing, breeds, feed formulation, vaccination and deworming schedules, and exposure visits to successful farms.He also participated in a method demonstration on egg candling and joined the "KVK Poultry Farming" WhatsApp group for continuous advisory support. Regular on-farm visits and mentoring by KVK scientists helped him implement recommended scientific practices and boosted his confidence.

Output

After receiving the training and according to the guidance provided by KVK expert, he modified and expanded his poultry farm capacity from 5,000 to 20,000 poultry birds. Now, his birds (broiler) reach to the marketable weight earlier due to improvement in FCR (Feed Conversion Ratio) and he sells more broiler birds to the company than before with higher benefit cost ratio (Table 1). After a gap of 15 days, now he brings a new batch of birds and again sells them after they reach the marketable weight and this cycle keeps on repeating. Now, he properly follows the deworming and vaccination schedule, and biosecurity measures without fail, due to which mortality rate decreases in his poultry farm.He also established an Azolla cultivation unit on his farm, providing fresh Azolla as a natural feed supplement for the birds. This practice not only significantly reduced the overall feed costs but also enhanced the birds' health and immunity, promoting better growth and productivity.

His family members also provide him helping hands in routine farm work, thus reducing labour cost at their farm. Due to carrying out the practices in a scientific manner, he is preparing and selling 6 batches in a year and earning good profit around Rs. 15 lakh/year in this enterprise.

Table 1. Performance before and after KVK intervention

Parameter	Before intervention (2023)	After KVK intervention (2024)
Number of birds	5,000	20,000
FCR	1.72	1.48
Mortality (%)	7.20	3.42
No. of batches/year*	5	6
Gross cost (Rs. /batch) **	61,400/-	2,04,000/-
Gross income (Rs. /batch)	1,36,100/-	5,12,050/-
Net return (Rs. /batch)	74,700/-	3,08,050/-
Benefit–Cost Ratio	2.22	2.51
Annual Net Income	Rs. 2.5 lakh	Rs. 15 lakh

**Each batch has a duration of approximately 35 days.*

***Includes cost of labour, electricity, bedding, and other miscellaneousinputs; excludes cost of birds, feed, medicine, and transportation as provided by the company under contract farming.*

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Outcome

Within months, S. Karamjit Singh was recognized as one of the best poultry farmers in Amritsar district by Sampoorna Company. He now earns around ₹3,00,000 per batch after deducting all expenses and has generated local employment opportunities. His farm is regularly visited by farmers, extension workers, and dignitaries for exposure visits and Farmer Field Schools. His remarkable progress earned him the "Award of Honour" from Punjab Agricultural University, Ludhiana, during the Kisan Mela at KVK Amritsar (March 2025). Today, he serves as a guest speaker in KVK's vocational trainings, sharing his experiences with aspiring poultry farmers. His future plans include expanding to 50,000 broilers, establishing a layer-cum-fish integrated unit, and exploring value addition in poultry meat.

Impact

S. Karamjit Singh's journey illustrates how hard work combined with scientific knowledge and institutional support can transform livelihoods. He remains actively engaged with KVK Amritsar through meetings, trainings, and Kisan Melas, inspiring over 50 fellow farmers and relatives to adopt poultry farming as a profitable enterprise. He exemplifies a new generation of educated farmers who bridge traditional wisdom with modern practices, contributing to food security, rural employment, and economic growth in Punjab.

S. Karamjit Singh in his poultry farm of broiler birds

Fig. 3 Awarded with "Award of Honour" in the field of Poultry farming by Punjab Agricultural University during Kisan Mela on 3rd March, 2025 at Krishi Vigyan Kendra, Amritsar

CONCLUSION: Poultry farming is one of the fastest-growing agro-industries and offers a viable avenue for small and marginal farmers to enhance their socio-economic conditions. The success of S. Karamjit Singh demonstrates that scientific management, technical guidance, and perseverance can turn challenges into opportunities. His transformation from a small farmer to a successful entrepreneur underscores the crucial role of Krishi Vigyan Kendras in empowering rural communities through knowledge-based interventions.

Kanwarpal Singh Dhillon[1*] and **Bikramjit Singh**[2]

[1]Assistant Professor (Animal Science), Krishi Vigyan Kendra, Amritsar

[2]Associate Director (Training), Krishi Vigyan Kendra, Amritsar Punjab Agricultural University, Ludhiana - 141004

Setup of 20,000 broiler birds in poultry farm after intervention by KVK Amritsar

Exposure visit- poultry farm-Mand farm-July 2025

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- SWISS VITAMIN - C
- SWISS VITAMIN - K
- SWISS VITAMIN - D2
- SWISS VITAMIN - B2
- SWISS VITAMIN - B9
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Efficacy Of Aleta™ Flex On Immunity In Broiler Breeder Chick & Grower Birds

Jagadeesh N and Chanthirasekaran R

Natural Immunomodulation for Sustainable Poultry Health

In recent years, genetic selection has significantly boosted poultry production efficiency, improving growth rates, feed conversion, and processing yields. However, this focus on performance traits has often compromised bird immunity. Combined with intensive farming and confined housing, poultry are increasingly exposed to pathogens and stress. Therefore, several tools like vaccination, biosecurity, and antibiotic growth promoters (AGPs) have helped tomaintain health and productivity. Yet, due to rising concerns over antimicrobial resistance and shifting consumer preferences, the industry is moving toward natural alternatives.

Immunomodulators have emerged as a promising solution, supporting the immune system and enhancing disease resistance, growth, and feed efficiency. Among these, ALETA™ Flex, a next-generation linear 1,3 beta-glucan derived from *Euglena gracilis*, helps the bird to improve immunity and performance.

Key Benefits of ALETA™ Flex:

a) Better disease resistance
b) Reduces stress
c) Improves gut health
d) Anti-inflammatory action.

This makes ALETA™ Flex an effective and sustainable alternative to AGPs, especially in antibiotic-free production environments.

Objective

The main objective of the trial was to check the efficacy of ALETA™ Flex on the immunity of breeder chicks & growers in terms of mortality, uniformity, and serology titer in actual farm conditions in Cobb-430y broiler breeders.

Trial Design

The experiment was conducted in a well-managed broiler breeder farm in Udumalpet, India, in 2023. The details of the experimental groups are given in **Table 1**. A total of 36510 Cobb-430ybroiler parent female (F) birds were selected for a 16-week study.Birds were placed in two different sheds with an open-sided Californian cage system of rearing under natural environmental conditions. The birds were fed with a breeder crumble feed diet and ad libitum water during the experimental period.

Parameters Measured

- Livability - assessed in terms of mortality %
- Uniformity - by average Body weight (BW) with CV%
- Vaccination Response / Uniformity - by blood serum analysis for ND, IB, IBD, REO, MG&MS ELISA titer estimation.

Results

Results indicated that the treatment group fed with ALETA™ Flex had low mortality & better uniformity, and good ELISA titer. The current trial data & tested reports indicate that the ALETA™ Flex treated group is better compared to the control. The detailed results are mentioned below.

Impact on Mortality:

For the total trial period of 16 weeks, the ALETA™ Flex group had a Female mortality of 0.4% less compared to the control group, and weekly mortality details for both the ALETA& Control groups areshown in **Figure 1.**

Figure 1: Mortality % of experimental groups (Female birds) during the trial period.

Table 1: Dosage and trial details of experimental groups

GROUP	DESCRIPTION	NUMBER OF BIRDS
Control	Breeder diet without any immune modulators	19,500 F
Treatment-ALETA™ Flex*	Breeder diet with ALETA™ Flex through feed for 16 weeks at the dose of 500 g per ton of feed	17,010 F

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Uniformity (Body weight & CV%):

For the total trial period of 16 weeks, average body weight is almost normal in both the trial and control groups compared to standard body weight, but CV% is better by 1.1% in the ALETA™ Flex trial group than in the control group. Week-wise Body weight and CV% details for both the trial and control groups are given in **Table 2,** and a graphical representation of body weight for both the trial and control groups, along with the standard, is given in **Figure 2.**

Table 2: Female body weight with CV% of experimental groups during the trial period.

	ALETA – Female		Control - Female		Females
Age in Wks	ALETAB .wt	CV%	Control B.wt	CV%	Standard B.wt
1	153	7.4	157	7.6	140
4	537	7.2	562	7.9	530
8	931	7.9	913	8.5	940
12	1322	8.3	1294	9.2	1310
16	1797	8.2	1788	9.3	1730

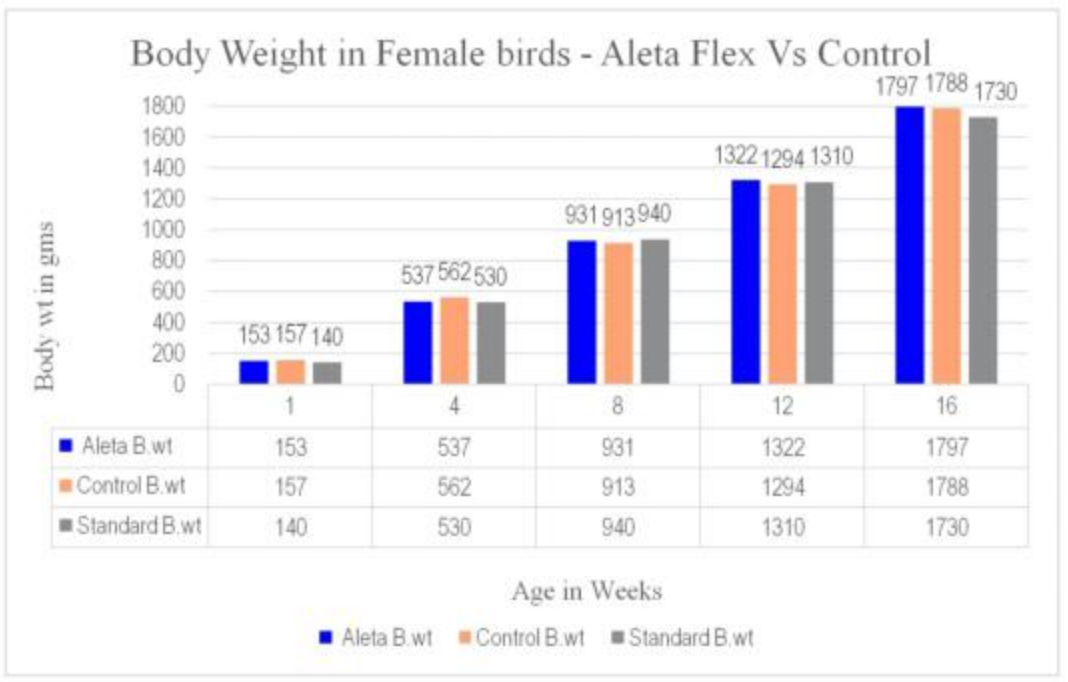

Figure 2: Female body weight of experimental groups during the trial period.

Vaccination Response (Serology titer):

Serology titers were analyzed for Newcastle Disease (ND), Infectious Bronchitis (IB), Infectious Bursal Disease (IBD), Reoviral disease, *Mycoplasma gallisepticum*(MG),and*Mycoplasma synoviae* (MS) at different periods during the trial study of 16 weeks. All four disease titers given in **Table 3** are numerically and marginally better in the ALETA™ Flex trial group than in the control group. MG & MS are negative in both the trial and control groups. Breeder vaccination schedules are common for both trial and control groups.

Table 3: ND, IB, IBD & REO ELISA titer with CV% of experimental groups during the trial period.

ND				
Age(wks)	Aleta	CV%	Control	CV%
4	85	88	48	145
11	6431	22	5015	27
16	6207	20	7095	11
IB				
Age(wks)	Aleta	CV%	Control	CV%
4	101	79	147	52
11	3594	57	3106	40
16	3926	64	3454	59
IBD				
Age(wks)	Aleta	CV%	Control	CV%
4	141	131	319	107
11	2677	68	1524	81
16	1850	62	1445	68
REO				
Age(wks)	Aleta	CV%	Control	CV%
4	85	88	48	145
11	2549	64	2191	78
16	2802	87	2832	79

Discussion

Usage of ALETA™ Flex in broiler breeders showed benefits in terms of productivity parameters, minimizing the cost of production of hatching eggs, and improving chick quality. Supplementation of ALETA™ Flex resulted in a reduction of mortality by 0.4% in females, and average body weight is even though normal in both trial and control groups compared to standard body weight, but CV% is better by 1.1% in the ALETA™ Flex trial group than the control group. There are no major natural or field challenges during the trial period. Also, it was indicated that ALETA™ Flex helped in maintaining the immunity of the birds by improving antibody titer for ND, IB, IBD & Reo vaccination.

Conclusion

The study concluded thatALETA™ Flex helped in improving the economic indices of broiler breeder birds with better performance in terms of better livability, body weight gain with better CV%, and improved immune parameters. Thus, ALETA™ Flex can be used as the best immune modulator to improve the health and immunity of chicks and growers, maintain optimum pullet uniformity, and improve livability.

References are available upon request

Jagadeesh N and Chanthirasekaran R
Kemin Industries South Asia Pvt. Ltd.

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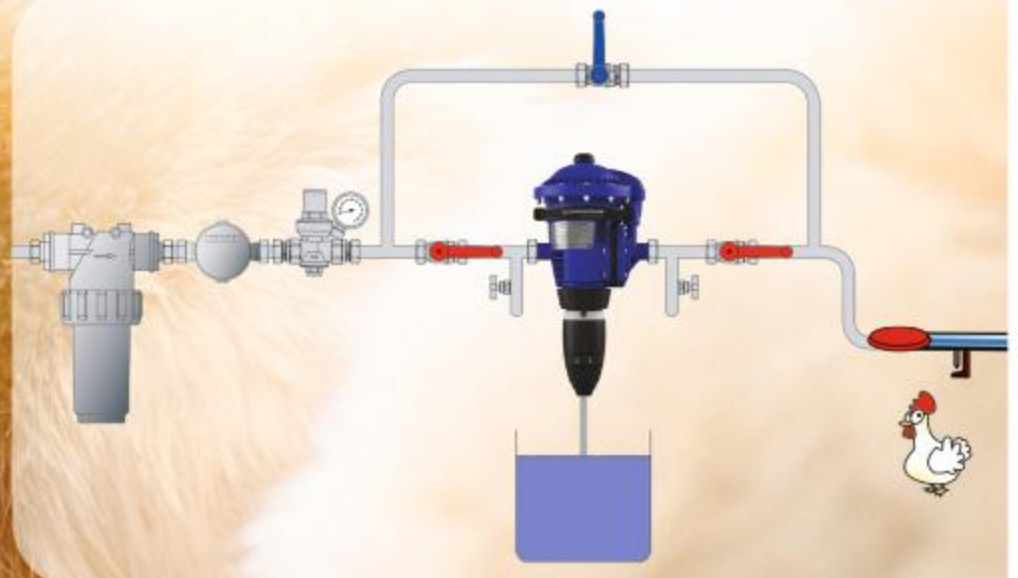

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ARTICLE

HatchScan™ by Petersime:

A break-through in incubation temperature control

Petersime is continually striving to improve its incubation technology. HatchScan™, an extension of the company's Embryo-Response Incubation™ series, ensures the continuity of temperature control throughout the entire setter-to-hatcher cycle and safeguards chick comfort once the hatch is complete. This enables the hatcher to enhance and optimize what has been achieved in the setter, bringing significant improvements in hatch results and chick welfare.

Embryo-Response Incubation™ is Petersime'sunique technology series that listens and responds to embryo signals, emulating the experience the embryo has in the nest. Over twenty years ago, the company introduced OvoScan™, one of the first technologies developed as part of this approach. Installed in over 10,000 Petersime setters worldwide, OvoScan™ automatically monitors and controls the eggshell temperature in the setter environment, mimicking how the mother hen controls the temperature of her eggs and delivering high hatch results. To live up to the standard of technology trendsetter, Petersime still had to cover the second part of the incubation cycle, the hatcher environment. With HatchScan™, the company presents the solution to ensure the continuity of temperature control throughout the entire setter-to-hatcher cycle. Additionally, itprioritizes the comfort of the chicks once they have hatched.

"In nature, there is no distinction between 'setter' and 'hatcher.' The mother hen seamlessly transitions through the stages of incubation, creating ideal conditions for her embryos and chicks," says Roger Banwell, Senior Hatchery Expert at Petersime. *"In commercial incubation, the best approach is to emulate nature. Thanks toHatchScan™, a non-disruptive thermal transition between setter and hatcher is guaranteed, and the hatcher air temperature is automatically and continuously adjusted to the needs of each specific batch of hatching eggs. Replicating the conditions experienced in the nest always delivers the best hatch results."*

From the onset of the hatching cycle until the moment of hatch, HatchScan™ captures the exacteggshell temperature using surface temperature measurement. This enables the hatcher to automatically start at the optimal air temperature and maintain the target eggshell temperature, guaranteeinga 100% smooth thermal transition between setter and hatcher. Additionally, the hatcher air temperature is continuously adapted in response to the actual eggshell temperature, ensuring that the core temperature of the developing embryos does not deviate from the optimum.Once emerged from the shell, the newly hatched chicks go through a period of recovery after their intense hatching process. During this period, HatchScan™ controls the ambient temperature directly in the basket, ensuring the environment is ideal for the chicks to feel comfortable until trolley pull-out.

Up to this point, configuring the optimum starting temperature and temperature profile for hatchers has relied on the expertise and experience of hatchery managers. With the launch of HatchScan™, Petersime delivers yet another new technology that automatically and continuously monitors bio-signals to consider 'egg variables' such as breed, egg age, size, and transfer time, thereby enhancing both hatch results and animal welfare.

HatchScan™ is a patent-pending technology, unique to Petersime and standard available on all X-Streamer™ hatcher models.

With HatchScan™, Petersime presents the solution to ensure the continuity of temperature control throughout the entire setter-to-hatcher cycle and safeguard chick comfort once the hatch is complete.

With HatchScan™, Petersime presents the solution to ensure the continuity of temperature control throughout the entire setter-to-hatcher cycle and safeguard chick comfort once the hatch is complete.

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Poultry Federation of India

Team interacts with 12 Members Nuffield Scholarship Delegation from 10 Countries

As part of a Nuffield Scholarship, 12 scholars participated in a five-week 'Global Focus Program' world tour to develop understanding of local and international agricultural and livestock best practice and meet with progressive businesses, organisations and government officials. This delegation of 12 scholars from 10 countries touried Canada, Scotland, Italy, Spain, Australia and visitrd India along with Ms. Parminder Kaur. During Nuffield Scholars visit to Delhi, the group had good interaction with Poultry Federation of India Team followed by visit to Khushboo Feed Mills Pvt. Ltd., and Khushboo Broiler EC Farms near Gurgaon. Nuffield scholars group interacted with **Mr. Sanjeev Gupta, Vice President (HQ), PFI and Managing Director, Khushboo Feed Mills Pvt. Ltd.** During the feed mill visit, the team members also had good interaction with Mr. Rajeev Gupta, Director and Mr. Harsh Gupta, Director and Mr. Ashish Gupta, VP, Khushboo Feed Mills Pvt. Ltd.

Mr. Ricky Thaper, Joint Secretary, Poultry Federation of India briefed the delegation about current scenario of Poultry Industry in India and shared the poultry figures. The group asked several questions related to Indian poultry and livestock sector, which were answered by **Mr. Sanjeev Gupta and Mr. Ricky Thaper**. The delegation appreciated the modernisation and the growth of the Indian poultry sector.

In this group of 12 scholars from 10 countries, **Mr. Jon Pemberton from New Zealand** *is a* dairy farmer and sector leader with a strong interest in governance, environmental stewardship, and the future of rural communities. **Dr. Jonathan Richetti, from Australia** is exploring how data driven modelling can improve agricultural decision-making under increasing climate variability. **Ms. Trudi Oxley from Australia** is researching ways to build soil organic matter in tropical environments. Ms. Trudi and her family operate Oxley Grazing, which runs 1,500 breeders across 17,000 hectares of owned and 26,000 hectares of leased land, supplying steers to the live export market. **Mr. Ruben Exterkate from The Netherlands,** is focused on how pig farmers can adapt to societal expectations while maintaining a viable, future-proof business model. Mr. Ruben and his family run an organic pig farm with 220 sows and 500 finishers, supplying premium meat to the De Groene Weg organic chain. **Mr. Lucas Ingold from Brazil**, is an agronomist and rancher. He manages his family's livestock operation, which is integrated into a crop-livestock production system, balancing productivity with environmental stewardship. **Ms. Beth Goodwin from Zimbabwe**, is an ecologist and seed specialist with a passion for reforestation and practical innovation. With a diverse background that includes work in plant nurseries, seed banks, reforestation projects and education.

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Ms. Jenny Matthiesen from Germany, is a plant breeding scientist specialising in organic agriculture. **Mr. Shoshiro Yamamoto from Japan** is the founder of a thriving plum farming and processing enterprise in Japan. For the past five years, he has managed a 100,000 square meter plum farm, producing premium-quality Umeboshi, a traditional Japanese pickled plum. **Mr. George Mailat, from Romania**, is a third generation farmer managing a 200-hectare farm in central Romania, where he grows wheat, barley, corn, rapeseed, alfalfa, oats & beans. **Ms. Emma Canepa from California, USA**, is exploring how artificial intelligence can enhance precision agriculture and improve on-farm decision-making. **Mr. Ignacio Jose Lopez Cruzat from Chile**, manages a company that sells agricultural materials and inputs while assisting his father with their family's hazelnut orchard. **Mr. Tyson Cattle from Australia**, has built a career as a journalist, editor, and industry advocate, and now works in a major agribusiness, focusing on agricultural representation and policy.

Discussions during the meeting were on strengthening collaboration to advance India's poultry sector. It was highlighted that in future Artificial Intelligence (AI) Tools would Drive and Sustain the Growth of the Indian Poultry Sector in the Next Decade.

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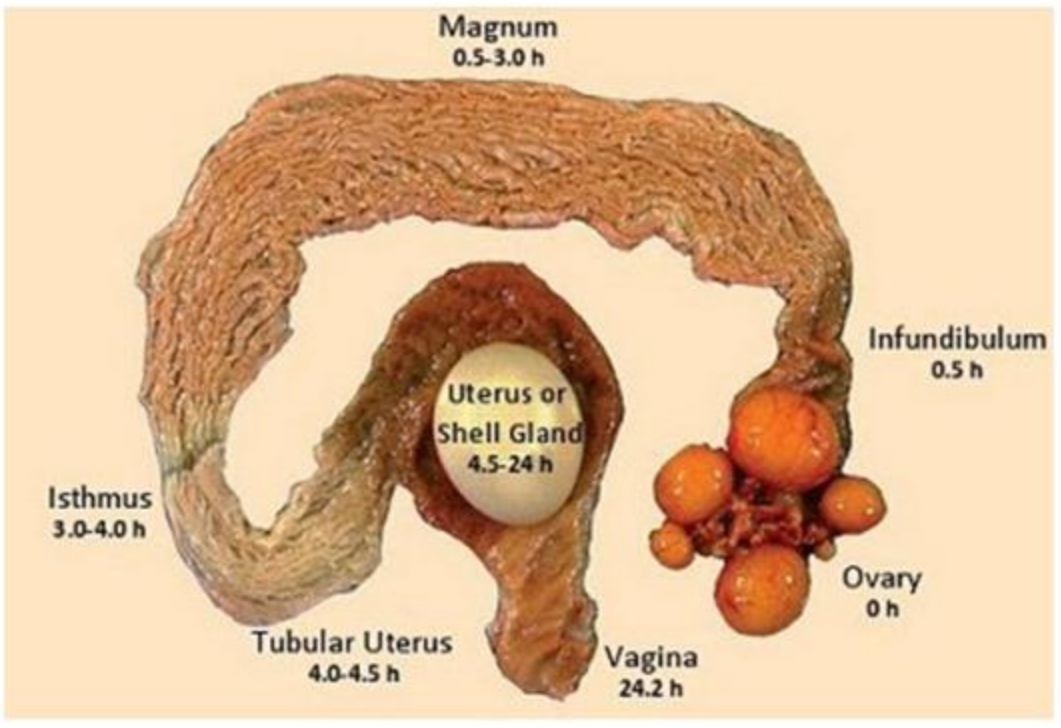
ARTICLE

Calcium Tetany in Breeder Poultry Birds

Dr Rajeeb Kumar Roy
Dr Debashis Dutta

Calcium tetany is a metabolic disorder that affects breeder poultry, particularly modern broiler breeder hens, characterized by acute hypocalcaemia, muscle weakness or paralysis, and sudden mortality. Although less commonly discussed than other metabolic and infectious diseases of breeder flocks, its economic and welfare significance is non-negligible due to mortality, impaired mobility, reduced fertility and hatchability risks. This review synthesises current knowledge on its etiology, pathophysiology, clinical signs, diagnosis, management, prevention, and implications for breeder operations.



Introduction

Breeder poultry operations, especially those managing high-yield broiler parent stocks, operate under intensive production systems with genetic lines bred for high egg mass, early lay and prolific output. Such birds face unique metabolic and reproductive demands, including large calcium mobilization for eggshell formation, medullary bone turnover, and maintenance of skeletal integrity. Under these conditions, the homeostasis of calcium (Ca), phosphorus (P), vitamin D and associated mineral and hormonal regulation is critically challenged.

In breeder hens, one syndrome of interest is Calcium Tetany (also called acute hypocalcaemic paralysis in breeders). Though described in the literature and in industry manuals, it remains poorly characterised in many contexts. This review aims to collate evidence, highlight practical implications for breeder flocks (hens & roosters), and offer guidance for nutritionists, flock managers and veterinarians.

Etiology and Predisposing Factors

Several interrelated factors contribute to calcium tetany in breeder birds:

- **Inadequate blood/ionised calcium levels (hypocalcaemia):** A primary hallmark. In a study of mobility-impaired broiler breeder hens, affected birds had significantly lower ionised calcium (iCa) (~1.14 mmol/L) compared with unaffected (~1.53 mmol/L) in one flock, though in other flocks mobility impairment occurred without documented hypocalcaemia.
- **High eggshell calcium demand:** The onset of lay causes massive calcium mobilization. If dietary supply or mobilization (from medullary bone) is inadequate relative to demand, hypocalcaemia may ensue.
- **Poor pullet uniformity and early photostimulation:** Industry notes that flocks brought into lay too early, with poor uniformity, may be more vulnerable. For example, one industry brief suggests calcium tetany occurs in young broiler breeder hens between ~25-34 weeks of age, especially in flocks with poor uniformity and premature high dietary Ca.
- **High dietary calcium too early:** Paradoxically, feeding high calcium diets *before* the birds' physiological systems are fully primed (e.g., before ~5% production) may predispose to imbalance.
- **Heat stress / panting / respiratory alkalosis:** When birds pant (e.g., under heat stress), blood CO_2 is lowered, leading to elevated blood pH, which reduces ionised calcium (the biologically active form) and precipitates hypocalcaemic signs.
- **Imbalanced dietary Ca:P ratio, particle size of calcium source:** Large particle calcium is more beneficial; poor particle size/distribution may reduce effective bioavailability. Also, P deficiency, or other mineral antagonisms, reduce calcium mobilisation or absorption.
- **Rapid change in production diet or feeding management:** Sudden switch to high-Ca 'production' diets, changes in feed allocation, early onset lay—all these management triggers may precipitate events.

In breeder roosters, while less specifically documented, improper calcium metabolism may indirectly impair fertility or mobility; however, the bulk of literature focuses on hens.

Pathophysiology

Calcium homeostasis in poultry involves: intestinal absorption (influenced by vitamin D_3), mobilisation from medullary bone in laying hens, renal excretion, and allocation to eggshell formation. In breeder hens, intense eggshell deposition and follicular development increase demands.

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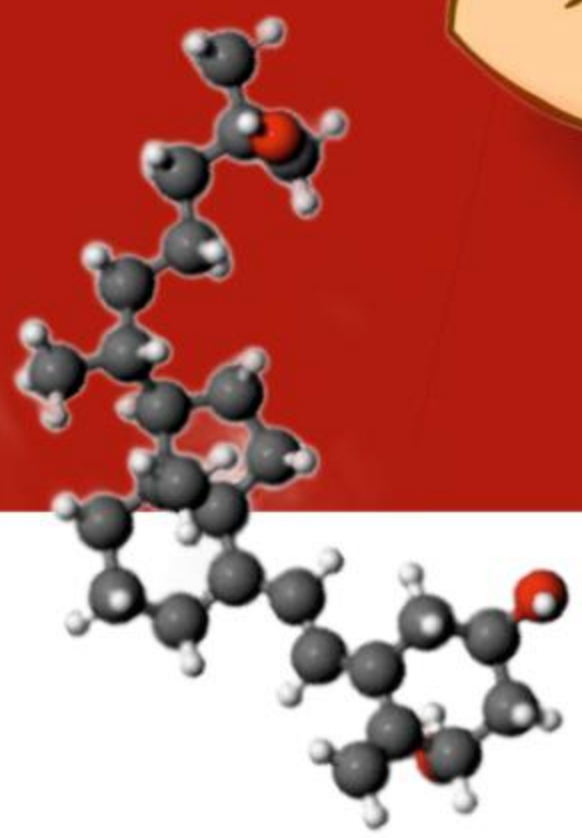

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When demand exceeds supply or mobilisation/absorption is impaired, ionised calcium concentration in plasma falls. Ionised Ca is critical for neuromuscular transmission, cardiac contraction, and membrane stability.

Additionally:

- Panting-induced respiratory alkalosis reduces free Ca^{2+} (ionised), aggravating hypocalcaemia. (See above.)
- In early lay/breeder hens, the hormonal regulation (including estradiol, parathyroid hormone, 1,25-dihydroxyvitamin D_3) may not be fully mature or optimally tuned, reducing capacity to respond to high Ca demands.
- The resulting hypocalcaemia causes neuromuscular weakness (tetany), paralysis of muscle groups (often pectoral/legs), cardiac disturbances and ultimately death (often in early morning or during feeding).
- Necropsy often reveals an egg in the shell gland (indicating egg being formed during the event), congested lungs, cyanotic comb, no other major lesions (so it may be confused with male kills).

Clinical Signs and Gross Pathology

Clinical signs

- Sudden collapse/paralysis of breeder hen (often early morning).
- Spreading wings, panting/gular flutter, inability to rise, often down in litter.
- Often misinterpreted as male aggression ("male kills") because male may attempt forced mating on downed hen.
- Mortality rate may be up to ~1-2% per week for 1-2 weeks during an acute event in a flock.

Gross pathology

- Active ovary with multiple large yellow follicles, egg or partially formed shell in oviduct/shell gland.
- Lungs congested, dark, sometimes edematous; comb may be cyanotic. Musculature may show signs of asphyxia.
- Medullary bone may be lacking (in cases of chronic bone depletion) but in acute episodes classic findings may otherwise be minimal.
- Absence of specific lesions like those seen in major infectious diseases helps differential diagnosis.

Diagnosis

Diagnosis requires integrating clinical, nutritional and laboratory data:

- **History & flock context:** Age (often ~25-34 weeks in broiler breeders), early lay, poor uniformity, sudden collapse, morning events.
- **Necropsy findings:** As above, plus exclusion of other causes (infectious, toxin, sudden death syndrome, male aggression).
- **Laboratory measurement:** Measuring ionised calcium in live or recent specimen is ideal. For example, one study used the i-STAT® analyser and found significantly lower iCa in affected hens (~1.14 mmol/L) vs unaffected (~1.53 mmol/L) in one flock.
- **Feed and diet review:** Check dietary calcium level, particle size, Ca:P ratio, feeding schedule, pullet uniformity, management of photostimulation and feeding allocation.
- **Environmental/management review:** Heat stress, ventilation, feed intake, timing of feeding, changes in diet around onset of lay.
- **Exclusion of other disorders:** For instance, sudden death syndrome, infectious causes, metabolic diseases. One review mentions that mobility impairment in breeder flocks is not always due to calcium tetany since some mobility impaired hens had normal iCa.

Management and Treatment

Acute treatment

- Administer supplemental calcium immediately: e.g., top dress with oyster shell (2-5 g/hen/day) for 3 consecutive days, combined with vitamin D_3 in drinking water, then rest period (3 days) and repeat if necessary.
- Ensure correct dosing: Over-supplementation can lead to toxicity (see calcium poisoning lesions) and renal/gout issues.
- Provide good ventilation, reduce heat stress, ensure feed intake continues.

Longer-term management

- Shift to diets with appropriate calcium levels at correct time points: Industry recommendation is to delay high-calcium diets until ~5% production in broiler breeder hens.
- Ensure calcium source has large particle size and good solubility (e.g., coarse limestone, oyster shell) to maintain adequate calcium during the night when eggshell calcium deposition peaks.
- Manage pullet body weight, uniformity and age at photostimulation—birds should be optimally developed before high calcium load begins.
- Improve management to avoid heat stress: good ventilation, cooling, avoid feed bunching that increases metabolic heat. Heat stress can precipitate panting and alkalosis reducing ionised Ca.
- Maintain correct Ca:P ratio and trace mineral status (Mg, Mn, Zn) because mineral interactions affect Ca absorption and mobilisation.

Prevention in Breeder Operations

Key preventive strategies for breeder flocks:

- **Pre-lay diet management:** Avoid high calcium diets too early; gradually ramp up calcium once hens are in production (or at ~5% production).

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- **Feed particle size and consistency:** Ensure feed is well mixed, calcium particle size large, avoid separation of heavy minerals in mash feed.
- **Uniformity of pullets:** Ensure birds enter lay with uniform body weight/composition; heterogenous flocks are more susceptible.
- **Control environmental stressors:** Heat, overcrowding, feed restriction or heavy competition are precipitating factors through panting/alkalosis.
- **Monitor flock closely early in lay (especially 25-34 weeks):** This is the high-risk window for calcium tetany in broiler breeders.
- **Nutrition audits:** Periodic sampling of feed for calcium, available phosphorus, vitamin D_3, trace minerals; monitor bone status, egg shell quality, mobility.
- **Management of feed timing & feeding schedule:** Evening feeding for calcium supply during shell formation is beneficial. For example, a study found hens fed in the afternoon (16 : 00) had better shells than morning fed.

Implications & Economic Significance for Breeder Flocks

- **Mortality & welfare:** Sudden losses, paralysed hens, reduced mobility, increased male aggression on downed hens = welfare concerns.
- **Reproduction losses:** Affected hens are usually in active egg production with follicles; paralysis/ euthanasia reduces egg set, fertility and hatchable egg numbers.
- **Eggshell quality/hatchability:** Even subclinical calcium imbalance may affect eggshell integrity, chick quality, bone development in progeny. While specific studies on tetany's downstream progeny effects are limited, general calcium/P studies (e.g., in turkey breeders) showed hatchability improved with correct Ca and P.
- **Management cost & labour:** Rapid supplementation, investigating cause, adjusting diets, perhaps culling affected birds—all add cost.
- **Reputation & production scheduling:** Breeder operations rely on predictable fertility/hatchability; metabolic disorders like calcium tetany introduce risk.

Research Gaps & Future Directions

- The exact endocrinology of calcium tetany in modern breeder hens (especially hormonal triggers, estradiol/medullary bone interaction) remains under-studied. For example, the relationship of estradiol (E_2) peaks and calcium mobilisation in broiler breeders is hypothesised but needs further research.
- Identification of early biomarkers (ionised calcium, bone turnover markers) to predict risk before onset.
- Quantification of sub-clinical calcium imbalance on reproductive indices (fertility, hatchability, progeny quality) in breeder flocks.
- Optimal calcium feeding strategies (timing, particle size, source) specific for breeder hens rather than layers.
- Interaction of heat stress, feeding time, calcium metabolism and breeder bird genetics in tropical climates (such as India) which may differ from temperate research settings.

Application in Indian / Haryana Breeder Poultry Context

Given breeder operations in regions like Haryana, the following context-specific considerations apply:

- High ambient temperatures and heat stress increase risk of panting/alkalosis and thus precipitate calcium tetany. Hence, environmental management (ventilation, cooling) is critical.
- Local feed ingredient variability may affect calcium source, particle size and bioavailability—audit feed ingredients for limestone/oyster shell quality.
- Breeder pullet uniformity and feeding program must be carefully managed, especially given potential resource constraints/variable feed intake.
- Given the risk window (~25-34 weeks) and early onset of production in some lines, adjust diet timing and ensure calcium levels are ramped up only once birds are ready for high production.
- Immediate supplementation protocols (oyster shell top-dressing, vitamin D_3 in water) should be established and workers trained in recognising early signs (panting, wing spreading) for prompt response.

Conclusion

Calcium tetany in breeder poultry represents a critical metabolic syndrome that bridges nutrition, management and physiology. For breeder operations, especially those managing modern broiler parent flocks under high production pressures, awareness and proactive management of calcium homeostasis is essential. By implementing best practices in diet formulation (correct calcium levels, particle size, appropriate timing), pullet uniformity, environmental control (especially heat stress mitigation), and early detection/response protocols, the risk of calcium tetany can be significantly reduced.

Tailoring these insights to local contexts—such as India's ambient conditions, feed ingredient variability, and breeder genetics—will enhance robustness of breeder flock performance, reduce mortality, safeguard welfare, and maintain reproductive efficiency. Further research into mechanistic pathways and early biomarker identification will help refine prevention strategies and support optimal breeder nutrition and management.

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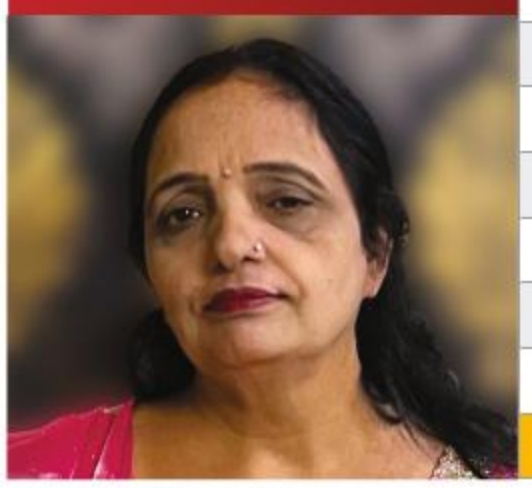
Northern Region

COMPANY: Sampoorna Feeds
FARMER NAME: Ms.Tripta Rani



OCTOBER-2025	Top #1
Farm Type	Open House
State	PUNJAB
Chicks Placed	7958
Mean Age	32.6
Avg Body Wt	2335
FCR	1.300
cFCR	1.226
Livability%	96.3
Daily Gain	71.6
EPEF	530.5

Eastern Region

COMPANY: IB Group
FARMER NAME: Mr. Brajesh Patel

OCTOBER-2025	Top #1
Farm Type	EC House
State	BIHAR
Chicks Placed	11979
Mean Age	35.0
Avg Body Wt	2500
FCR	1.424
cFCR	1.313
Livability%	98.1
Daily Gain	71.4
EPEF	491.8

Central Region

COMPANY: Japfa
FARMER NAME: Mr. Avinash Choudhary

OCTOBER-2025	Top #1
Farm Type	EC House
State	MAHARASHTRA
Chicks Placed	15617
Mean Age	32.9
Avg Body Wt	2451
FCR	1.355
cFCR	1.255
Livability%	96.1
Daily Gain	74.6
EPEF	529.0

South Region

COMPANY: SKM
FARMER NAME: Mr. Subash Chandra Bose

OCTOBER-2025	Top #1
Farm Type	Open House
State	TAMILNADU
Chicks Placed	5272
Mean Age	33.2
Avg Body Wt	2310.0
FCR	1.420
cFCR	1.351
Livability%	96.9
Daily Gain	69.7
EPEF	475.5

OCTOBER-Top **PERFORMANCE BY AREA**

Area	Chicks Placed	Mean Age	BW	FCR	cFCR(2Kg)	Livability%	Daygain	EPEF
North EC House	6460	35.2	2554	1.390	1.267	96.0	72.5	500.6
North Open House	7958	32.6	2335	1.300	1.226	96.3	71.6	530.5
East EC House	11979	35.0	2500	1.424	1.313	98.1	71.4	491.8
East Open House	2720	41.0	2909	1.434	1.232	95.7	71.0	473.5
Central EC House	15617	32.9	2451	1.355	1.255	96.1	74.6	529.0
Central Open House	8329	32.6	2349	1.398	1.321	97.6	72.2	503.7
South EC House	7798	31.2	2050	1.350	1.339	97.5	65.8	475.1
South Open House	5272	33.2	2310	1.420	1.351	96.9	69.7	475.5

OCTOBER-Top 10 **FIELD PERFORMANCE**

Flock	Farm Type	State	Chicks Placed	Mean Age	BW	FCR	cFCR	Livability%	Day Gain	EPEF
Flock 1	OPEN HOUSE	PUNJAB	7958	32.6	2335	1.300	1.226	96.3	71.6	530.5
Flock 2	EC HOUSE	MAHARASHTRA	15617	32.9	2451	1.355	1.255	96.1	74.6	529.0
Flock 3	EC HOUSE	MAHARASHTRA	10580	33.0	2454	1.373	1.272	96.7	74.4	524.4
Flock 4	OPEN HOUSE	PUNJAB	18967	33.0	2453	1.330	1.229	93.6	74.3	522.9
Flock 5	EC HOUSE	MAHARASHTRA	9480	31.7	2310	1.351	1.283	96.8	72.8	521.3
Flock 6	EC HOUSE	MAHARASHTRA	7272	31.4	2302	1.352	1.285	95.8	73.3	519.6
Flock 7	OPEN HOUSE	HARYANA	15689	34.0	2618	1.420	1.283	94.9	76.9	514.0
Flock 8	OPEN HOUSE	PUNJAB	11860	30.8	2120	1.300	1.273	97.2	68.7	513.9
Flock 9	OPEN HOUSE	PUNJAB	10544	34.5	2484	1.360	1.252	97.0	71.9	513.2
Flock 10	OPEN HOUSE	PUNJAB	11494	34.9	2514	1.370	1.256	97.2	72.1	511.6

ARTICLE

Reimagining Poultry Supply Chains Through Cloud Principles

Dr. Akash Wadal | M.V.Sc (Animal Nutrition)

Cloud kitchens have redefined the economics of food production by restructuring costs, eliminating unnecessary overheads, and maximizing industrial efficiency. These operational strategies provide a useful blueprint for poultry production models aiming to cut costs while scaling profitably. Cloud kitchens operate by removing the cost-heavy structures of traditional restaurants. Premium real estate, elaborate interiors, and front-of-house staff are eliminated. Instead, expenses are concentrated on affordable production facilities, core kitchen equipment, utility usage tied solely to cooking, raw material procurement, and delivery logistics. Operational efficiency is achieved through optimized inventory, lean multi-tasking labor, digital kitchen management tools, and centralized production models that push down per-unit costs. With this streamlined approach, cloud kitchens typically achieve gross margins of 60-70% and net margins of 15-25%, significantly outperforming conventional restaurant setups.

Application to Poultry Production

Poultry businesses can replicate cloud kitchen efficiencies by centralizing production in affordable industrial zones to reduce facility costs, focusing investment on automation and essential processing equipment, and adopting lean labor models with multi-skilled staff. Digital platforms for inventory, logistics, and order tracking provide real-time visibility and streamlined operations. Producers can introduce new product variants or establish small satellite hubs to test demand with minimal risk, ensuring scalability and flexibility. By combining centralized operations, digitalization, and optimized labor and equipment use, poultry companies achieve lower fixed costs, faster adaptability, and improved margins. This model supports efficient workflows, reduces waste, and enhances responsiveness to shifting market demands

- **Efficiency & Workflow:** Automation, IoT sensors, and AI-driven monitoring optimize feeding, ventilation, and welfare in real time, cutting manual input, reducing waste, and speeding production.
- **Predictive Optimization:** Data analytics and machine learning adjust feed and resources to bird growth stages, maintaining smooth, low-cost operations.
- **Operational Flexibility:** Producers can vary flock sizes, diversify outputs (meat, eggs, processed products), and adapt distribution based on market signals.
- **Scalable Systems:** Modular production units and automation enable rapid capacity expansion, new product testing, or operational reconfiguration without heavy capital lock-in.
- **Agility & Responsiveness:** Real-time visibility allows quick adjustments to demand shifts or supply chain issues, aligning production with consumption patterns.
- **Industrial Outcome:** Combining automation, monitoring, and scalability yields higher productivity, resource efficiency, and lower costs.
- Strategic Advantage: Direct-to-consumer channels, multi-brand approaches, and centralized processing strengthen market reach, scalability, and profitability.

Direct-to-Consumer Sales and Digital Integration

- **D2C Advantage:** Poultry producers bypass intermediaries using apps, e-commerce, and delivery platforms.
- **Product Range:** Fresh, processed, marinated, ready-to-cook, and ready-to-eat items delivered directly to consumers.
- **Data Insights:** Digital platforms track purchasing behavior, seasonal demand, and preferences in real time.
- **Production Alignment:** Demand signals guide production, packaging, and pricing, reducing waste and inefficiency.
- **Brand Building:** Direct interaction boosts loyalty, subscriptions, personalized offers, and promotional campaigns.
- **Market Resilience:** Stronger customer retention and adaptability to changing market conditions.

Multi-Brand and Shared-Resource Strategy

- **Multi-Brand Strategy:** Launch diverse poultry product lines (organic, flavored, convenient packs) under one framework.
- **Consumer Segmentation:** Target health-conscious, taste-driven, and time-sensitive customers with differentiated offerings.
- **Centralized Infrastructure:** Use single hubs for processing, packaging, cold storage, and logistics to cut costs.
- **Shared Resources:** Increase asset utilization and reduce per-unit production expenses.
- **Operational Elasticity:** Scale product lines up or down based on real-time demand signals.
- **Agility & Growth:** Rapidly introduce new brands or shift to high-margin products without major capital investment.

Industrial Outcome and Strategic Benefits

- **Lean Model:** Cloud kitchen tactics create a cost-efficient, consumer-focused poultry system.
- **Digital + Centralization:** Combining D2C sales with shared-resource hubs lowers fixed overheads.
- **Multi-Brand Capability:** Enables multiple product identities under one platform.
- **Market Impact:** Stronger penetration and better infrastructure utilization.
- **Future-Ready:** Flexible to demand shifts and supply chain changes.
- **Strategic Shift:** Moves away from capital-heavy distribution to scalable, adaptive operations.

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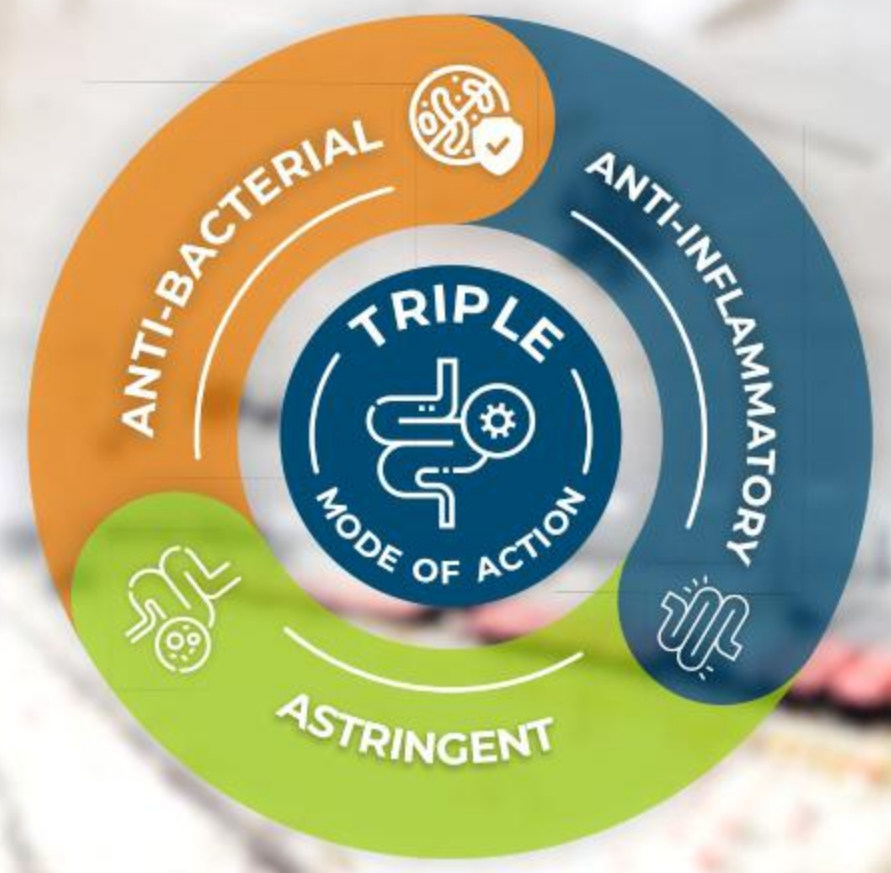

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- **Business Benefits:** Delivers higher margins, reduced waste, lower risks, and stronger competitiveness in local and export markets.

The **Hub-and-Spoke Model**

- **Model Structure:** Centralized hub for heavy processing, decentralized spokes for finishing and distribution.
- **Hub Operations:** Slaughtering, chilling, and freezing concentrated in one facility for economies of scale and efficiency control.
- **Resource Optimization:** Maximizes use of labor, energy, and high-cost equipment while avoiding duplication.
- **Spoke Activities:** Portioning, packaging, labeling, and local distribution near consumer markets to cut lead times and improve freshness.
- **Logistics Efficiency:** Live birds transported overnight to reduce stress; carcasses mature during transit, extending shelf life.
- **Tech Integration:** Central platforms align production with demand forecasts and optimize routes.
- **Automation & AI:** Inventory automation, waste reduction, and regional demand prediction improve distribution accuracy.
- **Outcome:** Transparent supply chain, faster deliveries, and consistent product quality.

Core Framework of the Hub-and-Spoke Model

Hub (Central Facility)

- **Functions:** Slaughtering, chilling, freezing, carcass grading, bulk storage
- **Infrastructure:** High-capacity chilling and freezing equipment, waste management systems, automation for slaughtering and primary processing

Spokes (Regional Units)

- **Functions:** Portioning, deboning, marinating, packaging, labeling, order customization, distribution
- **Infrastructure:** Modular processing lines, packaging equipment, cold rooms, last-mile logistics support

Process Flow

- Inbound Logistics:
- Live birds transported overnight to reduce stress and ensure animal welfare compliance.
- Transport conditions optimized to allow carcass maturation during movement.

Hub Processing:

- Slaughter → Chilling → Freezing → Bulk storage.
- Automation and industrial controls reduce human error, optimize throughput, and maintain consistent product quality.

Outbound Logistics to Spokes:

- Frozen or chilled carcasses delivered to spokes strategically located near high-demand zones.

Spoke Processing:

- Portioning into retail-friendly packs (wings, drumsticks, boneless cuts).
- Further processing into marinated, spiced, organic-certified, or ready-to-eat SKUs.
- Final packaging tailored for local consumer or B2B orders.

Distribution & Sales:

- Orders fulfilled via retailers, wholesalers, or direct-to-consumer e-commerce channels.
- Subscription models and digital platforms connect customers directly with producers.

Technology Integration

- **Automation at Hub:** Robotic slaughter lines, automated chillers and freezers, blockchain for traceability.
- **Digital Platforms:** Centralized software synchronizes production and inventory across hubs and spokes.
- **AI Analytics:** Demand forecasting by geography, seasonal consumption prediction.
- **Logistics Tech:** Route optimization, real-time cold-chain monitoring, automated inventory replenishment triggers.
- **IoT Sensors:** Monitor storage conditions, animal welfare, and processing equipment for predictive maintenance.

Profit margins in the cloud kitchen model rely on strict cost control, overhead reduction, and efficiency through technology. Profitability is driven by raising Average Order Value (AOV) to spread fixed costs, while managing delivery commissions that often reach 15-25%. Operators increasingly push direct digital sales channels to cut aggregator fees. This disciplined approach offers a scalable framework for poultry production, where margins can be optimized by maximizing revenue per transaction and tightly managing costs

Stable Revenue Streams: B2B and Subscriptions

B2B contracts with retailers, QSRs, and hospitality	Predictable high-volume revenue, stable cash flow
Subscription-based household/business deliveries	Recurring demand, customer loyalty, reduced volatility
Increase basket size with bundled/value-added products	Higher transaction margins, improved profitability
Emphasize direct-to-consumer channels	Lower commission costs, stronger brand-consumer link
Deploy digital platforms and analytics	Smarter demand forecasting, optimized logistics, higher retention
Locate facilities in low-rent industrial zones	Lower overheads, cost-efficient distribution
Digital marketing, SEO, influencers, promotions, loyalty programs	Increased visibility, repeat purchases, long-term engagement

Industrial Application for Poultry Sector

By combining cost minimization through low-rent production facilities with aggressive digital marketing and customer-centric retention strategies, poultry enterprises can improve operational margins, expand consumer reach, and build sustained brand loyalty. This integrated approach mirrors the efficiency of cloud kitchens while adapting it to the industrial poultry supply chain.

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IBH 15-20 ML / 100 BIRDS IN BROILER

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20-25 ML/100 BIRDS

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Layer Chicks : 15 to 20 ml/100 Birds
Grower : 15 to 20 ml/100 Birds
Layer : 15 to 20/100 Birds
Toxicity Control Treatment :
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Toxicity Control Treatment :
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I B H

Presentation : **1 Ltr.**

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FAMSUN Seminar 2025
Integrated Solutions Transforming Aqua Feed and Pet Food Production

FAMSUN successfully hosted its **second technical seminar** on *"Integrated Solutions Transforming Aqua Feed & Pet Food Production"* at **The Park Hotel, Hyderabad**, bringing together over **80 industry professionals** from across India's aqua feed and pet food sectors.

Opening the seminar, **Ms. Rong**, *Vice Country In-Charge, FAMSUN South Asia*, emphasized FAMSUN's continued commitment to driving innovation through collaboration:

"FAMSUN has always believed in connecting technology with people. Our aim is not just to supply equipment but to create a culture of learning, innovation, and partnership that uplifts the entire feed industry. This seminar reflects that vision—where knowledge, experience, and technology meet to empower our customers."

Technical Highlights & Expert Insights

The seminar featured in-depth presentations by **Mr. Robert Strathman, President - FAMSUN USA**, and **Mr. Michel Pereira, Process Expert - FAMSUN Global**, who explored *extrusion essentials, feed hygiene by design,* and *KPIs for successful feed production.*

Their sessions covered the fundamentals of **grinding, mixing, conditioning, extrusion, and coating**, linking engineering precision to product performance. Participants gained actionable insights into **particle size optimization**, **steam quality management**, and **process efficiency**, helping them better align plant operations with quality outcomes.

Strong Industry Participation & Response

With attendees representing India's leading feed producers, the event became a hub for technical exchange and collaboration.

- **Growel Feeds:** Mr. Narendra, MD, and Mr. G.V.V. Sathyanarayana, VP, appreciated FAMSUN's design insights and expressed keen interest in process optimization opportunities.
- **Devi Feeds**: Engaged in detailed discussions on flow chart refinements and density control systems; the project is expected to conclude by November.
- **Avanti Feeds**: Their leadership team, led by Mr. Venkata Sanjeed, explored pet food solutions and acknowledged FAMSUN's superior process design and product quality.

A few of other key participants, including **NG Feed, Uno Feeds, Godrej Agrovet, Heritage Feed, Sandhya Feed, and Deepak Nexgen**, commended the seminar's structure, depth, and clarity.

"The seminar was exceptionally well-organized, offering practical insights into extrusion, hygiene, and performance optimization,"said **Mr. Madan Mohan Meegada, CEO - Feed Division, Sandhya Feeds.**

"The technical flow and coordination were mind-blowing. It's encouraging to see how FAMSUN is raising the benchmark for knowledge-sharing events in India." added **Mr. Rahul Tyagi from Heritage Feed.**

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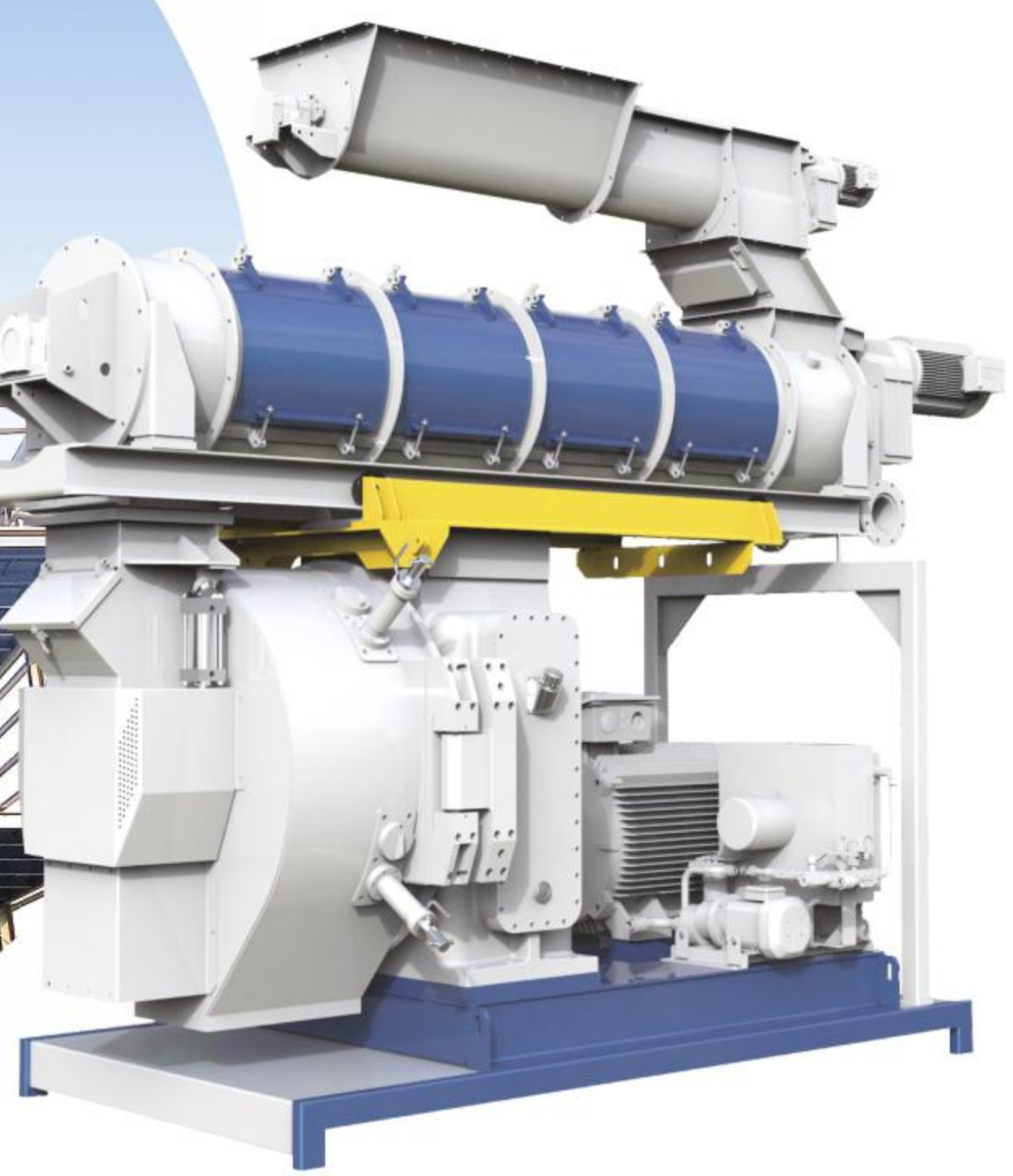

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Platform for Collaboration and Growth

The seminar also created meaningful opportunities for **face-to-face discussions** between FAMSUN's global experts and leading feed producers such as **Taiyo**, **Hugertail**, and **Sandhya Feeds**, focusing on equipment performance improvements—from **die open area** design to **steam system optimization** and **coating technology**.

Commitment to India's Feed Industry

Reflecting on the success of the seminar, **Mr. Arun Kumar**, *Country Head - FAMSUN India*, expressed his gratitude to the participants and reaffirmed FAMSUN's long-term commitment to advancing the feed industry in India:

"This seminar underlines FAMSUN's mission—to partner with our customers in achieving excellence through technology, efficiency, and innovation. India's aqua and pet food sectors are evolving rapidly, and our integrated solutions are designed to support this transformation. We are proud to be part of our customers' growth journey."

About FAMSUN

FAMSUN is a **global leader in integrated solutions** for feed milling, grain storage, oilseed processing, ethanol, and farming Solutions. With a strong presence across India and South Asia, FAMSUN continues to drive innovation through advanced engineering, automation, and customer-focused service.

BULLETIN

सैंट्रल हरियाणा पोल्ट्री फारमर्स ऐसोसिएशन द्वारा मासिक मीटिंग का आयोजन

सैंट्रल हरियाणा पोल्ट्री फारमर्स ऐसोसिएशन, करनाल द्वारा दिनांक 27 अक्तूबर 2025 को होटल येलो सफायर, करनाल में मासिक मीटिंग का आयोजन किया गया। श्री सुभाष नरवाल, प्रेजीडेंट, सैंट्रल हरियाणा पोल्ट्री फारमर्स ऐसोसिएशन ने आए हुए सभी फारमर्स का स्वागत किया।

श्री सुरिन्द्र भुटानी, सेक्रेटरी, सैंट्रल हरियाणा पोल्ट्री फारमर्स ऐसोसिएशन ने सभी फार्मर को अपने अपने फार्म की पशु पालन मंत्रालय द्वारा जारी दिशा निर्देशों के अनुसार अपने फार्म को पंजीकृत करने के बारे में विस्तार से बताया।

श्री सुरिन्द्र भुटानी ने फार्म पर समय समय पर किए जाने वाले जरूरी कार्यों के बारे में भी बताया और कहा कि फार्म पर बायोस्क्योरिटी का पूरा ध्यान रखें और किसी बाहरी व्यक्ति को फार्म के अन्दर जाने से सख्ती से रोका जाना चाहिए। उन्होंने कहा कि कमजोर बायोस्क्योरिटी के कारण फार्म पर तरह तरह की बीमारियां आती है और इस कारण फारमर का बहुत नुकसान होता है। अंत में श्री नरवाल ने आए हुए सभी फारमर्स भाइयों का तहेदिल से धन्यवाद किया और एसोसिशन के मेंबर्स को अक्तूबर महीने में श्री अजय दहिया, श्री केवल कृष्ण सुखपाल, श्री भारत मुंजाल और श्री सिमरन मारवाह को सम्मानित किया।

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ARTICLE

Enhancing Pellet Quality & Poultry Performance through Pellet Binders

Mrs. Yamini Sripal
Assistant Manager, Technical Services

Dr. Sushant Mhatre
AGM, Techno Commercial

Dr. J Bhattacharyya
Director, Techno Commercial

1. Introduction

Pelleted feed has become the dominant choice in the poultry industry due to its proven advantages in improving feed efficiency, minimizing feed wastage, and improving bird performance. Compared to mash diets, pelleting reduces ingredient segregation and selective feeding, ensuring birds to consume a consistent and balanced nutrient mix (Cutlip et al., 2008). This uniform nutrient intake leads to improved flock performance and more consistent growth. Additionally, pelleting process enhances nutrient utilization by promoting starch gelatinization, protein denaturation, and overall digestibility (Amerah et al., 2007). Conversely, poor pellet quality can have significant economic and nutritional drawbacks. Excess fines in the feed increases feed wastage, lower feed intake, and cause nutrient imbalance, ultimately impairing growth and feed conversion ratio (FCR). Studies have consistently demonstrated that improved pellet durability is associated with better body weight gain, FCR, and overall flock uniformity (Abadi et al., 2019; Abdollahi et al., 2013).

To address these challenges, feed manufacturers often add pellet binders to their feed formulations. Pellet binders help the feed particles stick together, enhancing inter-particle adhesion, reduce breakage during handling, and minimize fines, leading to improved pellet durability index (PDI) and hardness. Their role is particularly crucial in diets low in natural binders (e.g., corn-soy diets) or high in fat, where pellet integrity is otherwise compromised (Thomas & van der Poel, 1996). Thus, the inclusion of pellet binders has become a valuable technological strategy for sustaining pellet quality and improving poultry production outcomes.

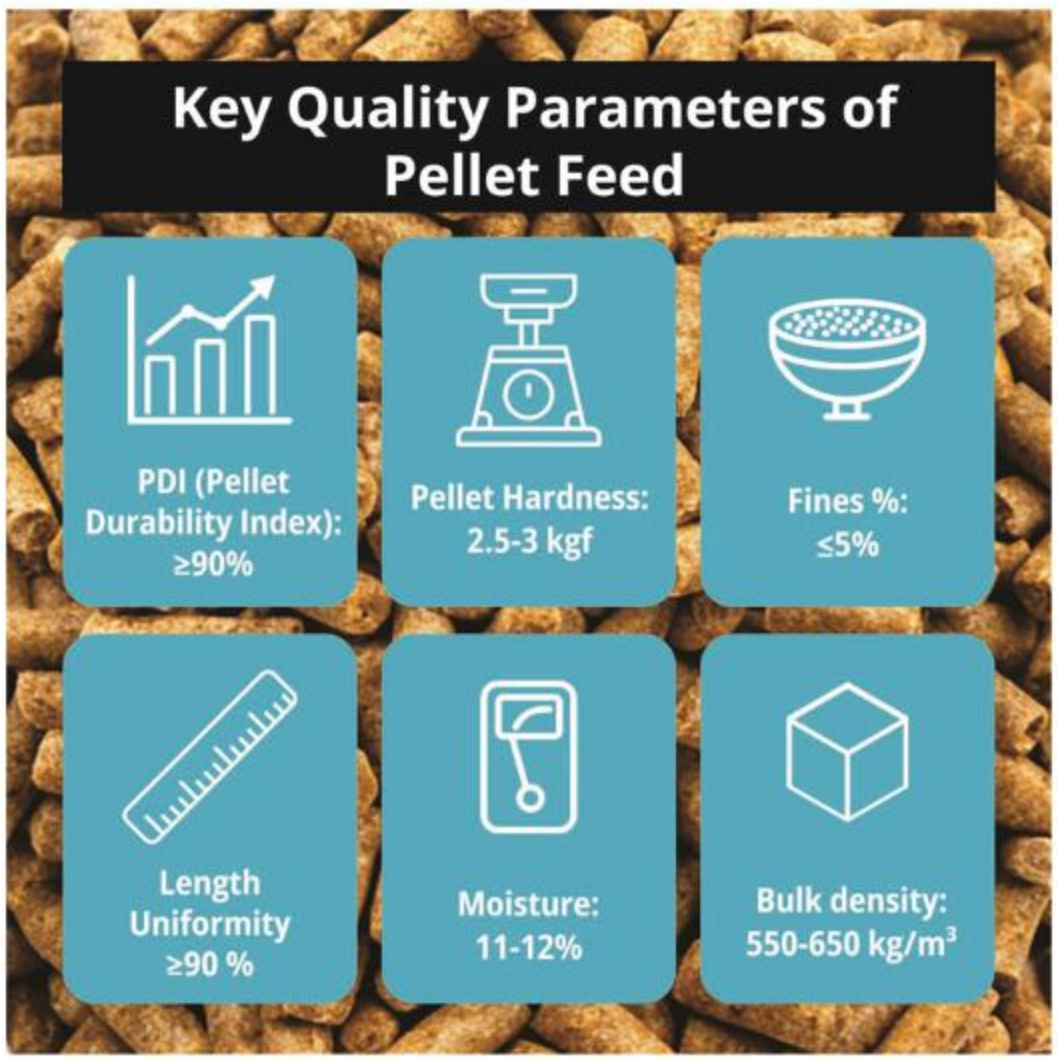
2. Pellet Quality and Its Measurement

Pellet quality is vital in poultry feed production as it affects feed intake, nutrient utilization, and bird performance. High-quality pellets resist breakage, reducing fines and wastage (Thomas et al., 1998), while poor-quality ones cause selective feeding and lower growth efficiency (Abadi et al., 2019).

a) **Pellet Durability Index (PDI):** PDI measures a pellet's resistance to mechanical breakdown during handling. It is expressed as the percentage of intact pellets after tumbling; values above 90% indicate good quality, while below 85% suggest poor durability (Pfost, 1995; Behnke, 1994; Ridla et al., 2024).

b) **Pellet Hardness:** Indicates resistance to crushing and it depends on conditioning temperature, die design, moisture, and binder use (Thomas & van der Poel, 1996; Amerah et al., 2007).

c) **Fines Percentage:** Refers to broken pellet fragments or dust that reduce feed efficiency. Binders like lignosulfonates, clays, and hydrocolloids minimize fines by enhancing particle adhesion (Briggs et al., 1999; Saleh et al., 2020).



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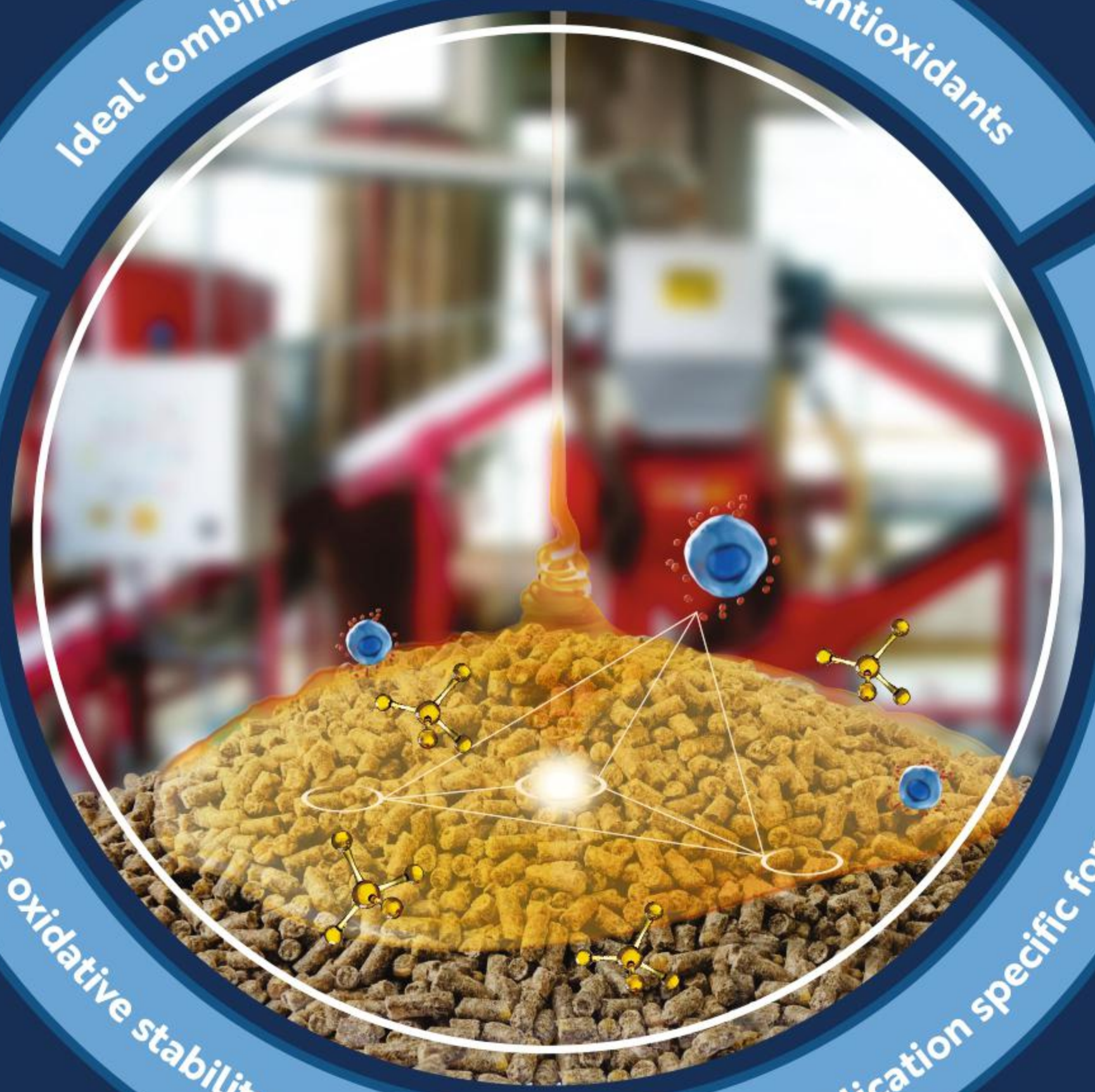

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d) **Other Parameters:** Uniform pellet length, proper moisture, and bulk density ensure consistent intake and prevent pellet softening or brittleness (Thomas et al., 2001).

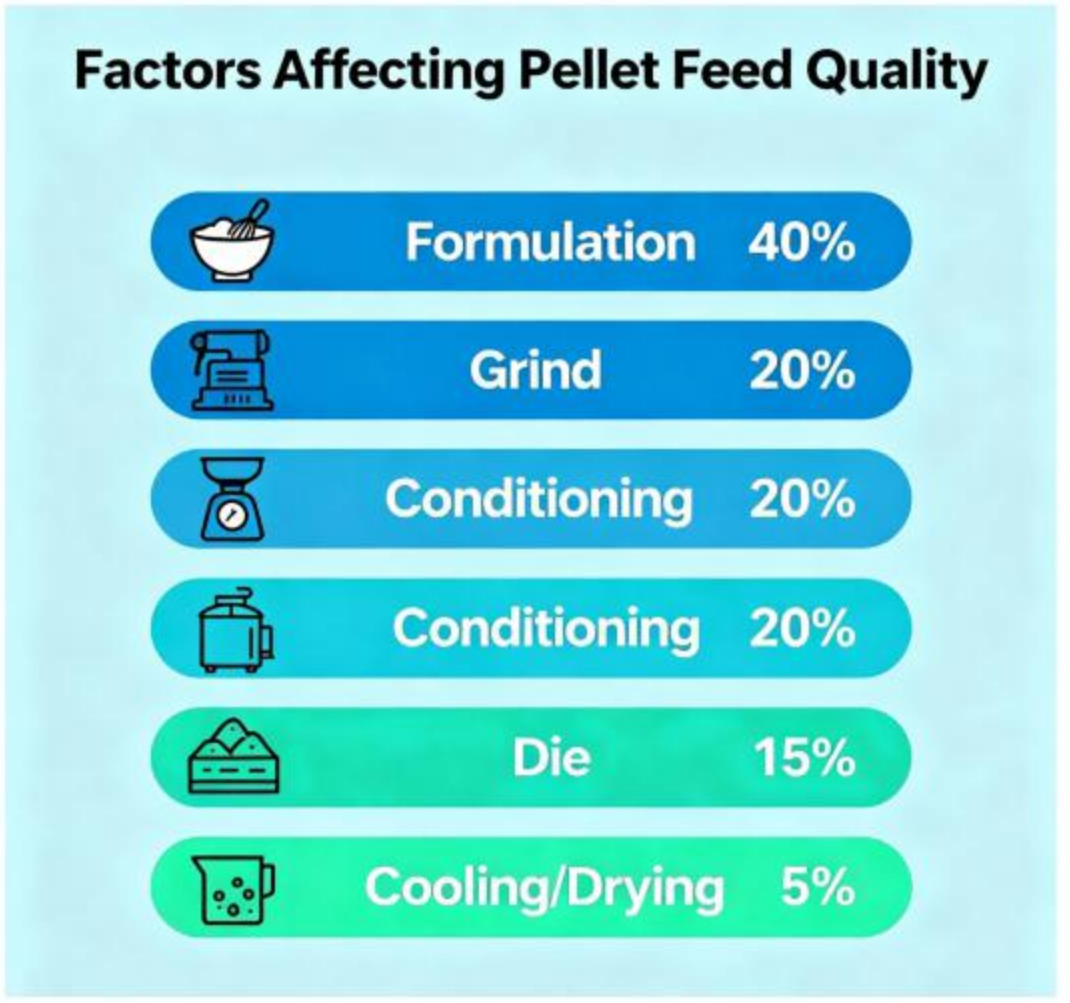
3. Factors Affecting Pellet Quality Measurement

- **Feed formulation:** High fat reduces bonding and weakens pellets, while wheat or gluten enhances durability through starch-protein interactions.
- **Particle size:** Fine, uniform grind improves PDI by increasing bonding surface, though over-grinding raises energy use and blockage risk.
- **Moisture and steam:** Adequate moisture and quality steam promote starch gelatinization and protein denaturation, strengthening pellets.
- **Conditioning:** Optimal temperature (70-80°C) and retention time improve hardness and durability, but heat-sensitive nutrients must be protected.
- **Binder use:** Additives like lignosulfonates, clays, or hydrocolloids enhance PDI, especially in low-starch or high-fat feeds; dosage should be optimized.
- **Die design:** Proper die thickness, L:D ratio, and finish improve compression and durability while maintaining throughput.
- **Mill setup:** Correct roll-die gap and maintenance ensure effective consolidation and fewer fines.
- **Cooling and drying:** Controlled cooling stabilizes pellet structure; over-cooling or high moisture increases breakage and microbial risk.
- **Post-pellet liquids:** Applying fats or enzymes after cooling maintains strength; excess coating can cause slippage and fines.
- **Raw materials:** Starch type and gelatinization properties affect achievable pellet strength.
- **Energy and throughput:** High throughput shortens compression time, reducing PDI; balance is key for consistent quality.

Accurate measurement of these parameters allows feed manufacturers to monitor and optimize the pelleting process, ensuring consistent feed quality and better performance outcomes in poultry production.

4. Types of Pellet Binders and Their Mechanisms

4.1 Cereal-Based Binders Wheat, wheat middlings, and gluten serve as natural binders through starch gelatinization and protein matrix formation. Wheat gluten provides viscoelastic strength, while corn- or sorghum-based diets often require added binders (Thomas & van der Poel, 1996; Saleh et al., 2020).



4.2 Lignosulfonates Calcium lignosulfonate (Ca-LS), a byproduct of the pulp industry, forms a sticky matrix that solidifies on drying, reducing fines. Inclusion at 0.5–1.0% enhances PDI and hardness, particularly in high-fat feeds, and is considered safe for all species (Skoch et al., 1981; Abadi et al., 2019; EFSA, 2020).

4.3 Clays and Mineral Binders Bentonite, zeolite, and sepiolite improve pellet density and hardness while offering toxin-binding benefits. Their main function is physical compaction, though excessive use may dilute nutrients (Yalçin et al., 2017).

4.4 Hydrocolloids and Polymers Binders like CMC, guar gum, and starch derivatives enhance pellet cohesiveness by forming viscous solutions during conditioning. Even at <0.5%, they improve durability in low-starch feeds (Thomas et al., 2001; Ridla et al., 2024).

4.5 Liquid Binders Molasses, glycerine, and liquid lignin derivatives increase pellet integrity and reduce dust. Molasses also supplies energy but excessive use may cause microbial growth and handling issues (Almeida & Pfost, 1989).

5. Benefits of Pellet Binders in Poultry Feed

a) **Feed Quality and Handling:** Pellet binders improve pellet durability, reduce fines and dust, and minimize wastage, ensuring birds consume a uniform, balanced ration (Thomas & van der Poel, 1996; Serrano, 2013).

b) **Nutritional and Health Advantages:** Stable pellets enhance palatability, ensure consistent nutrient intake, and support better digestive health and flock uniformity (Abdollahi et al., 2013; Choct, 2009).

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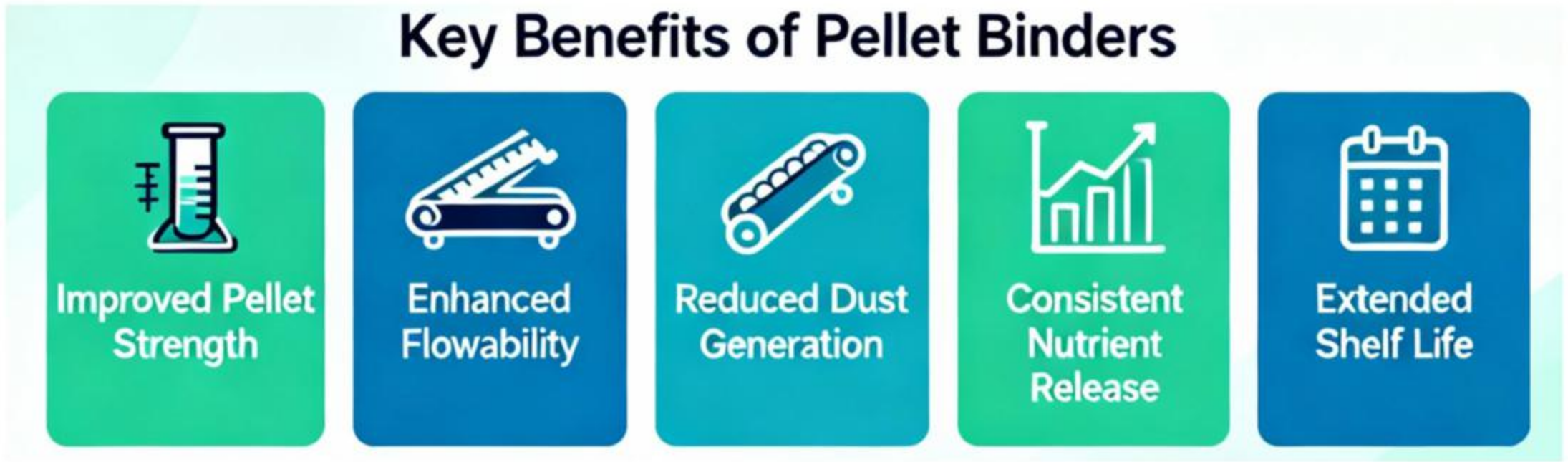

c) **Processing Efficiency:** Binders aid compaction and starch gelatinization, lowering energy use and equipment wear while improving throughput and pellet consistency (Briggs et al., 1999; Abdollahi et al., 2011).

d) **Farm Performance:** These benefits result in better FCR, uniform growth, and cleaner environments, reinforcing the role of pellet binders in both feed quality and economic efficiency (Amerah et al., 2007; Svihus, 2011).

6. Advances and Future Perspectives

Recent advances in pellet binder technology focus on multifunctional additives that go beyond improving pellet durability. Modern binders are designed to enhance mycotoxin adsorption, gut health, and nutrient release (Choct, 2009; Abdollahi et al., 2013). Clay- and yeast-based binders improve pellet quality while binding mycotoxins (Jouany, 2007).

Natural polymers like gums, starch derivatives, and cellulose are valued for their biodegradability and safety (Thomas & van der Poel, 1996). Plant extracts and phytogenic additives add antimicrobial and antioxidant benefits, supporting gut health and feed preservation (Windisch et al., 2008).

Enzymatic approaches further improve pellet quality and nutrient digestibility by enhancing starch and protein interactions during pelleting (Svihus, 2011). The industry is increasingly adopting residue-free, eco-friendly binders that align with sustainability goals. Future developments may integrate precision nutrition, where binders also serve as carriers for bioactives, probiotics, or heat-sensitive nutrients (Amerah et al., 2007).

Overall, pellet binders are evolving from simple mechanical agents into multifunctional feed additives that enhance poultry health, performance, and feed sustainability.

7. Practical Considerations

Pellet binders play a key role in improving poultry feed quality, but their use depends on type, diet, and processing conditions. Typical inclusion rates are: wheat gluten ≥10%, Ca-LS 0.25–1%, CMC <0.5%, clays 1–3%, and molasses 2–4%, with overuse potentially reducing nutrient density (Abadi et al., 2019). Corn-soy diets often need binders, while wheat-based feeds usually do not (Feed Strategy, 2019). Higher conditioning temperatures (70–80°C) and steam

8. Conclusion

Pellet binders play a vital role in modern poultry nutrition by significantly improving the physical quality of feed, including pellet durability, hardness, and reduction of fines. These improvements not only facilitate easier handling, storage, and transportation of feed but also enhance feed intake consistency, reduce wastage, and promote uniform nutrient consumption among birds. While pellet binders do not contribute directly to the nutritional content of the diet, their indirect effects can positively influence growth performance, feed conversion efficiency, and carcass yield. The selection and inclusion of appropriate binders should be carefully based on diet composition, feed processing conditions, compatibility with medicated feeds, cost-effectiveness, and regulatory compliance. Properly applied, pellet binders support sustainable poultry production by optimizing feed utilization, improving flock uniformity, and contributing to the economic efficiency of poultry operations, thereby making them an indispensable component of contemporary feed manufacturing strategies.

References:

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India Participated in XXIII World Veterinary Poultry Association Congress 2025 at Kuching, Malaysia

The XXIII World Veterinary Poultry Association Congress 2025 (WVPAC 2025) was organized at Boneo Convention Centre, Kuching, Malaysia from 6-10 October 2025. A global Forum where nearly 1800 Scientist/ Researchers/ Academician/Veteran Industry Professionals and Subject Matter Specialist attended this World Veterinary Poultry Congress 2025.

The 5 days long Congress started with WVPA Bureau Meeting and Pre-Congress Workshop on Immuno-suppression was organized on 6 October. More than 60 countries WVPA office bearers attended the Bureau Meeting and presented their reports.WVPA XXV Global Congress was voted and announced to be held at Sydney Australia. Dr Jeetendra Varma, President and Dr B. Barman attended BureauMeeting on behalf of WVPA India and presented the branch report and detailed planning of upcoming 7th ASIA WVPA Meeting to be held at New Delhi from 9-10th October 2026. A special gift in the form of a fridge magnet made as souvenir for the upcoming meeting was distributed among all the WVPA regional and global branches office bearers for their support and participation in Oct 2026.

In the inaugural opening ceremony, Prof. Dr. Abdul Rahman Omar, Organizer-cum-Congress Chair of WVPAC 2025 and Prof. Dr. Sjaak de Wit, the president of World Veterinary Poultry Association (WVPA) officially announced opening of the congress on 7 October 2025.Total 1800+ participants from 70+ different countries attended the congress. There were 19 Key note Speakers from throughout the globe, more than 700 research abstracts were submitted, more than 1200 delegates attended Pre conference workshop, there were 168 oral presentations and 412 E Poster presentations. More than 80 Scientist and Industry Professionals attended the event from India and many scientists and researchers and presented their research works. WVPA India Branch arranged travel grants for the scientist whose abstracts were accepted for the Congress.

Prof. Dr. Sjaak de Wit, the president of World Veterinary Poultry Association (WVPA) presented severalawards to many scientists and researchers and presented WVPA Hall of Honour Award to 5 eminent researchers for their incredible contribution for Poultry health, disease diagnosis and vaccinology. Indian Scientist and Professionals should be aware and apply for all these awards/travel grants and opportunities in the upcoming congresses/meetings of Regional and Global WVPA events. To apply and know more about these awards, please log on to www.wvpa.in or email to dr.barman@gmail.com

All the sessions, which included keynote and oral presentations covering various aspects of poultry production, strategies for disease prevention and control, and genomic approaches for developing disease-resistant poultry. The e-Posters were accessible across 20 e-poster kiosks grouped into four color-coded zones (blue, orange, red and green). The congress was for five days and on 9 October 2025, there was award distribution for the winners in various categories given by the World Veterinary Poultry Association.

In the business meeting with all the participants of WVPA Congress videos of upcoming events were displayed. Special attraction of the congress was small exhibition. Exhibitorsof more than 30 international companies displayed their new technology, interventions, products on various aspects of poultry diagnostics, adjuvants, equipments, nutritional supplements, farm equipments etc.

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The closing ceremony was on 10 October 2025 and it was the moment reflected the achievement of congress, celebrated the scientific and professional exchanges. The next WVPA Congress in 2027 was announced to be held in Brussels, Belgium from 30 August to 3 September 2027. Also, announcement was made for the 7th WVPA Asia Meeting to be held at New Delhi, India from 9-10 October 2026.

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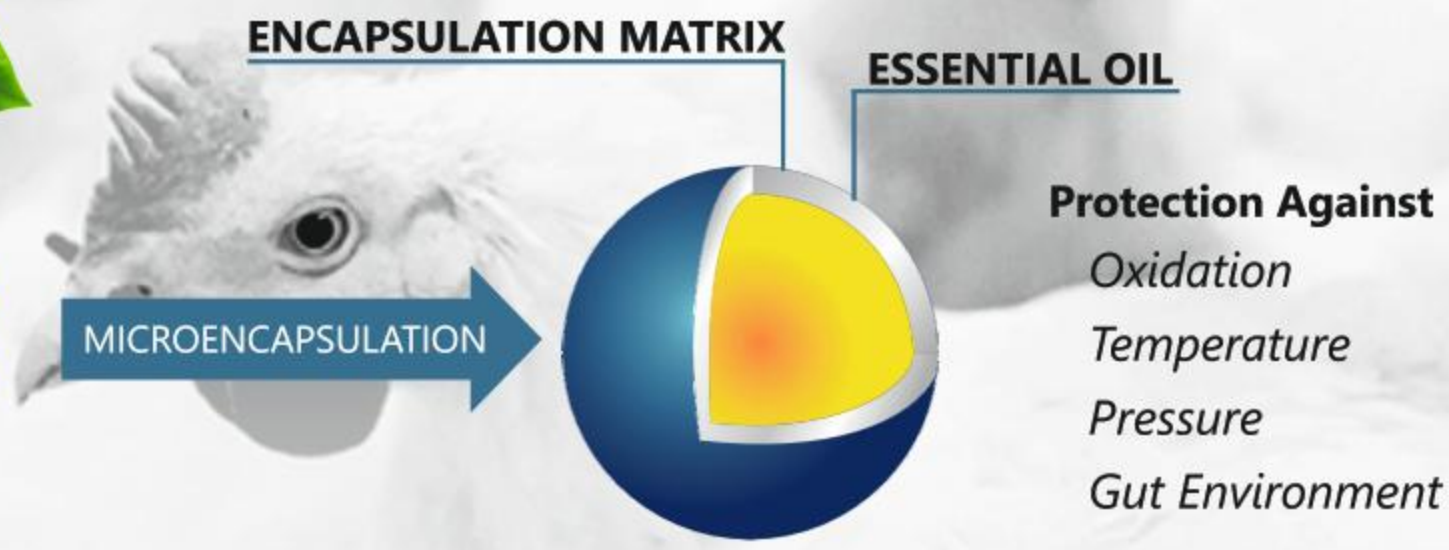

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Dr. S.F. Bilgili, Dr. Joseph Hess

Executive Summary

Green Muscle Disease (or Deep Pectoral Myopathy, DPM) is a degenerative disease of the minor pectoral muscles (i.e. the tenders), which is characterized by atrophy and necrosis. The condition arises when the muscle fibers become deficient in oxygen and is associated with sudden and excessive wing flap. The development of the disease can be split into three categories. Category 1 is the acute inflammatory lesion in which the deep pectoral muscle is very red and hemorrhagic. Category 2 describes the stage at which the lesion in the inner fillet becomes well defined and is sometimes circumscribed by a hemorrhagic ring. Category 3 describes the progressive degeneration and greening of damaged tissue. Although the incidence of DPM is increased in heavy broilers, it can occur at any age or weight and is dependent upon the management and husbandry systems employed. Identifying and eliminating the management issues which contribute to wing flapping and the development of the condition is key to reducing the incidence of DPM.

Introduction

Green Muscle Disease is a hidden problem in modern-day broiler chickens. Green Muscle Disease (or Oregon Disease) is a common name given to a degenerative muscle disease known as Deep Pectoral Myopathy (DPM). The condition is characterized by necrosis and atrophy of the tenders (i.e. supracoracoideus or minor pectoral muscles). The lesions often affect both tenders and vary in color, progressing from a pinkish hemorrhagic appearance to a gray-greenish discoloration as illustrated in Figure 1.

Figure 1: Deep Pectoral Myopathy

DPM was first described in mature breeder turkeys and broiler breeders but is being seen more in meat-type chickens, especially those selected for breast muscle development. The affected muscles are discarded during de-boning, result ing in saleable yield losses. However, the major issue with DPM is that if the birds are marketed as whole carcasses or parts, the problem is rarely detected during processing, resulting in consumer complaints and making the cause of the problem difficult to identify.

The condition is not associated with any infectious agent and therefore has no public health significance other than by affecting the aesthetic appearance of the meat.

DPM is rarely detectable during processing if the birds are marketed as whole carcasses or parts.

Why Does DPM Target Broiler Breast Muscles?

- The pectoral muscles in avian species are associated with flight and the deep and superficial pectorals work in synergy, one to raise the wing and the other to lower it.
- The anatomy of these muscles is, however, intrinsically different in that the inner fillet has a tough outer sheath which is made up of dense fibrous tissue and is inelastic.
- The outer or major muscle is simply surrounded by loose connective tissue that moves easily over the muscle surface as the muscle profile changes.

Contraction of the major pectoral muscles (the breast fillet) and the minor pectoral muscles (the tender) are responsible for the up- and down-strokes of the wings.

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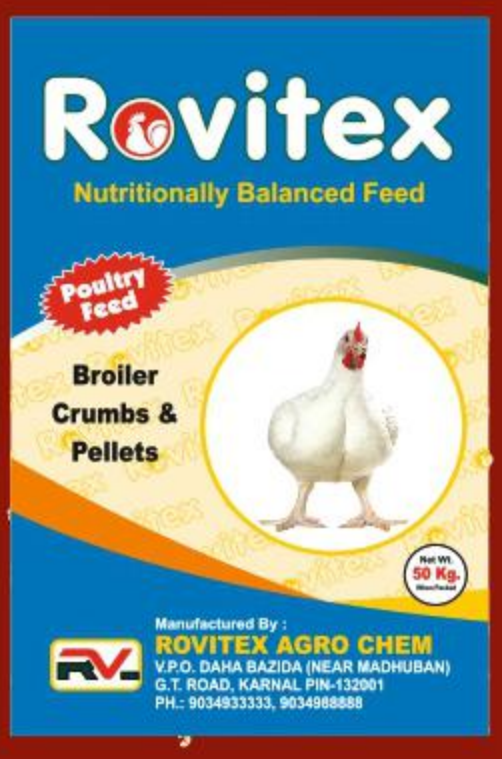

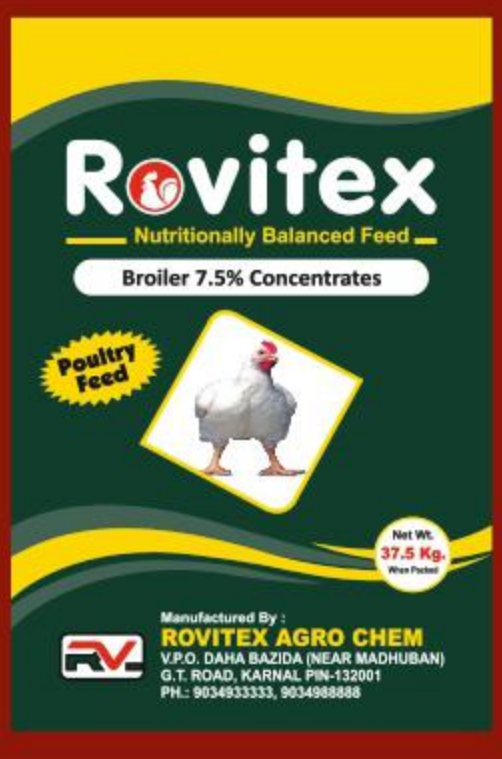

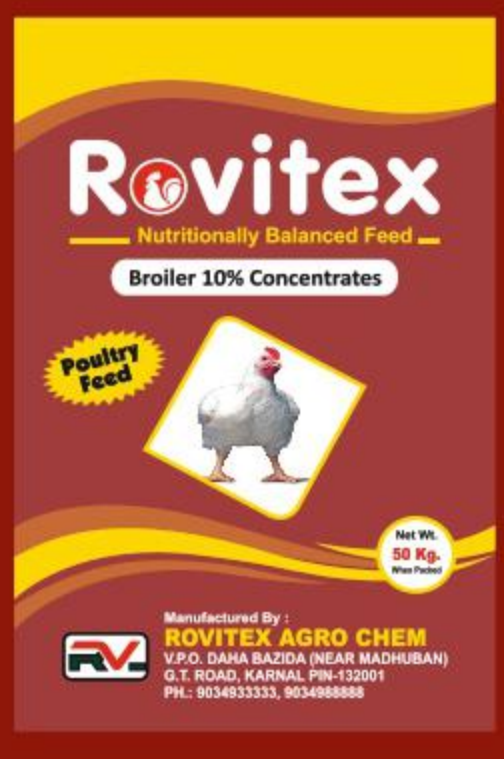

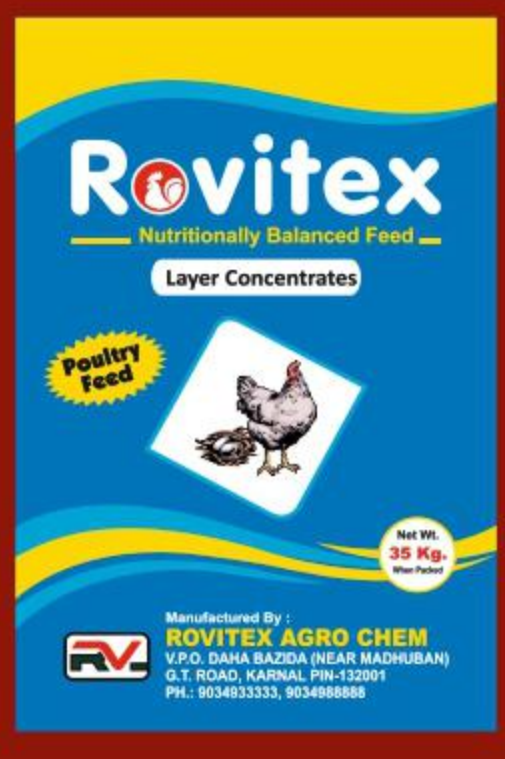

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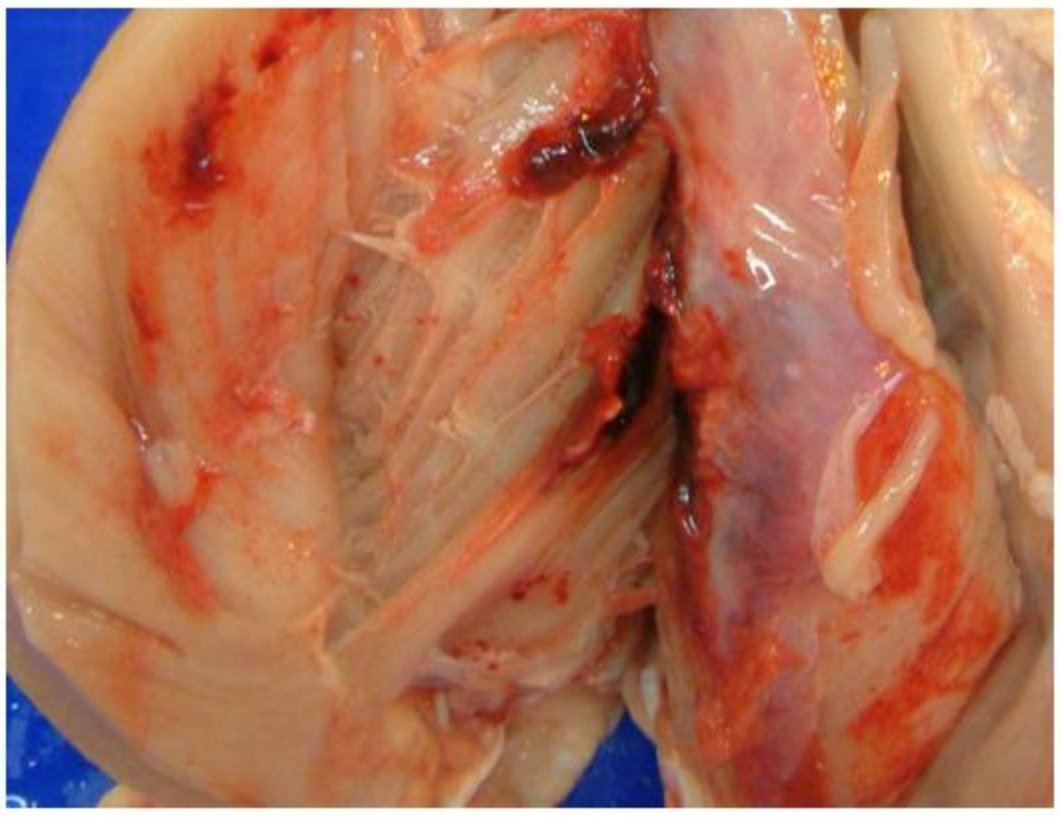
During contraction, these muscles expand with increased blood supply (i.e. muscle pumping). The expansion of the minor pectoral muscle, by as much as 25% in volume, is problematic because this muscle is confined in a 'tight compartment', sandwiched between bone (the sternum) and the large breast fillet. The minor pectoral muscle is also encased in a rigid fibrous sheath which restricts increases in muscle volume. Therefore, when intramuscular pressure increases to levels above circulating blood pressure, the blood supply flowing into the muscle stops and, with continued muscle activity, oxygen deficiency rapidly develops and lack of oxygen (ischaemic necrosis) of the muscle fibers occurs. There is also an additive effect as the muscle pH falls. Typically the middle third of the muscle is involved. In experimental studies, relatively short periods of wing flap are enough to induce these degenerative changes.

Recognition and Identification of the Development Stages in DPM

In response to complaints of DPM from the processing plant and/or customers, an investigation should be organized. This should include the identification of the category of DPM (fresh or old) at the processing plant. This information can then be correlated to husbandry management practices.

Category 1: The acute inflammatory lesion in which the deep pectoral muscle is very red and hemorrhagic. Hemorrhages also appear on the fibrous sheath (see Figure 2). There is an obvious suffusion of serous fluid in the area of the damage making it appear wet. This stage is likely to be associated with a handling event (e.g. catching) and will be present for about 48 hours.

Figure 2: Early Acute Pectoral Myopathy



Category 2: At this stage the lesion in the inner fillet has become well defined and is sometimes circumscribed by a hemorrhagic ring (see Figure 3). The affected areas are pale pink to plumb colored and there are clear changes consistent with early coagulative necrosis of the muscle, when the tissue texture becomes fibrous. This is sometimes described as 'fish flesh'. This stage will continue for a few days after the initial event or incident.

Figure 3: Pectoral Myopathy - developing lesions

Category 3: This stage reveals the progressive degeneration and greening of the damaged tissue (see Figure 4). Often, only the middle part of the fillet is involved and the progressive greening is in parallel with the loss of cellular structure, so that a 'putty like' consistency develops within the lesion. This green, necrotic area will persist and through time will gradually reduce in size as it is reabsorbed so that the sym metry of the breast is lost in some older birds. The green color is produced by the breakdown of hemoglobin and my oglobin to bile salts.

Figure 4: Aged Pectoral Myopathy

Factors affecting the occurrence of DPM

The pectoral muscles make up nearly a quarter of the total liveweight in current-day meat chickens. Rearing broiler chickens to heavy market weights can increase the probability for occurrence of DPM. Incidence is dependant on management and husbandry systems and not simply bodyweight as birds at any age or weight can be affected.

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DPM is associated with the following factors:

- Excessive wing flapping
- Heavy market bodyweight
- Sex: incidence can be higher in males compared to females
- High white meat yield
- Rapid growth rate

The desirable efficiency in growth and anatomy of today's broiler brings with it the possibility of DPM development.

Commercially raised broiler chickens are kept relatively comfortable and inactive during the growing period. Consequently, the pectoral muscles are not exercised enough to increase efficiency of the circulatory supply to the muscles and to allow the expansion of the surrounding fibrous sheath. It is doubtful that even a subtle amount of wing activity would help improve circulation or develop the sheath adequately.

Few, if any, processing plants actually track or document the incidence of DPM on a regular basis. Detection of DPM on whole carcasses and parts is extremely difficult as lesions are not visible during carcass inspection or sorting. As birds also exhibit no symptoms, finding affected live birds in a flock and treating them is not possible.

The key to avoiding the DPM lies with preventative management. Controlling the incidence of DPM hinges upon identifying and eliminating certain flock management issues that contribute to the development of the condition.

The key to reducing the incidence of DPM lies in management of the broiler flock and minimizing wing flapping.

To avoid the occurrence of DPM, the following flock management guidelines (Table 1) are suggested as starting points to investigate and minimize any unnecessary wing activity.

Table 1: Flock Management Guidelines to Minimize Unnecessary Wing Activity

Do Not Stress or Frighten Birds	Limit Sudden and Excessive Wing Exercise	Control Overall Flock Flightiness
Do not allow other animals in or around the house.	Avoid excessive human activity in the house, especially if the birds are flighty.	Bird activity and flightiness increases with increasing natural day length.
Eliminate novel sounds (buzzing security lights, sudden use of noisy ventilation fans, tractor/ generator operation in/ near houses).	Avoid walking birds too fast, especially when migration barriers (nets, pipes or fences) are used; this may cause the birds to pile up.	Birds respond to increased light intensity with increased activity. Blue curtains may help calm the flocks in curtain-sided facilities.
Limit weighing or penning birds. Weigh birds in a bucket (or similar) instead of by legs.	Train personnel for gentle bird handling techniques during catching. Do not catch birds by their wings.	In environmentally controlled houses, avoid sudden and excessive increases in light intensity with dimmers - especially under low light intensity (<3 lux) conditions.
Avoid excitement induced by frequent thinning of flocks.	Keep birds comfortable during transport to the processing plant. Low crate stocking densities can cause problems. Prevent any unnecessary bird movements when crated. Automatic catching systems can exacerbate wing flapping depending on the system used.	Avoid extended periods (>3-4 hours) of feed and/or water withdrawal.
In tunnel ventilated houses use migration fences approximately 100 ft (30 m) apart.		Intermittent lighting programs can be a potential problem due to frequent bird stimulation.
		Ensure that stocking density, feeder and drinker space are adequate.
	Minimize birds perching on swinging equipment such as feed tracks which allow birds to flap.	A dawn to dusk type dimmer offers a gradual increase in lux.

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Dr Joseph Hess is an Extension Specialist and Associate Professor in the Poultry Science Department at Auburn University, Alabama, USA. His research focuses on practical aspects of management and nutrition in broilers and broiler breeders and he engages in practical research projects that can provide immediate feedback to the industry in terms of poultry performance, product quality or feed technology. He is a member of the Poultry Science Association, the Southern Poultry Science Society, the Alabama Poultry & Egg Association and works closely with the Alabama Feed & Grain Association.

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ARTICLE

Duck Meat:

A boon to nonvegetarian diet

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The domestic rearing of ducks for food purposes can be traced back to historic times. In recent years duck farming has gradually grown and become a serious segment in the poultry meat industry, especially in Asia. The changing lifestyle, food consumption pattern, and taste preference of the consumer are bringing the duck food to the front line in their menu. With the increasing demand for poultry meat in this part of the world, the duck industry has commenced to follow the same pattern as the broiler industry. More specialized business ventures are being established along with the marketing use of modern production facilities as well as up-to-date processing plants and product marketing strategies. Duck has been appreciated for its taste and nutritional qualities by most of the meat-loving population. Today duckling is in high demand in the whole world, especially in Asian countries. The preference of duck meat depends upon the breed of duck and the method of preparation, which varies widely depending upon the region and the demand of the consumers. In Northern America, parts of Europe, Australia, and many other areas as well, roasted duckling is a very popular item. Roast, braised, or barbecued duck are a few of the popular duck cuisines around the world. More recently duck parts, such as breast and legs, have become more available, which offer more options for diet-conscious consumers. Precooked duck parts, which can be quickly heated in a microwave, are also becoming more available and popular. China is by far the leading country for duck production, with an annual production of about 75% of all ducks slaughtered and about 66% of all duck meat produced in the world (FAO stat), followed by France.

Meat-type breeds of duck

- **Pekin:** The Pekin breed is native to China. Pekin ducklings are ready for market at age two to three months. The white Peking duck, often sold under the name Long Island duckling, are the ones most often available in supermarkets today. This breed is the most demanded for its quality meat, tremendous taste and flavor. This breeds weights about 2.5 - 3.5 kg.
- **Muscovy:** The Muscovy breed is easily identified by its red knobby nodules along the eyes and above the base of the bill, it is the leaner variety and the meat is darker. Muscovy is a heavy breed of 2.6 - 6 kg. This meat is less fatty as compared to Pekin.
- **Mulard:** This breed is the cross of Muscovy (male) and Pekin (female). This breed is popular for the *foie gras* in European countries.
- **Rouen:** A large breed of France, weighing 3.5 - 4.5 kg. The flavorful meat is very popular.
- **Aylesbury:** A breed available in England. body weight varied between 4 - 5 kg.
- **Broiler or fryer:** These ducks are young (under 8 weeks) and tender, roaster duckling (under 16 weeks) is starting to harden, and mature duck has tougher flesh.

Composition of duck meat:

Duck muscles are predominantly dark muscle throughout the carcass and because of the high myoglobin content it appears red. The moisture content of duck meat is around 73-76% (Omojola, 2007). The protein content of duck breasts and legs are 20.8 and 19.6%, respectively (Cobos *et al.*, 2000). The ranges of essential amino acid percentages present in duck meats: 6.01-8.08% of phenylalanine and tyrosine, 3.21-6.14% of isoleucine, 7.67-8.45% of leucine, 8.60-9.57% of lysine, 3.11-3.26% of methionine and cysteine, 4.11-5.22% of threonine, 0.70-1.25% of tryptophan and 3.67-7.01% of valine(Woloszyn et al., 2006).

The percentage of fat in duck meat is relatively higher than other common poultry meats. Fat alteration over storage time will affect the physicochemical and sensory properties (Russell et al., 2004) in the form of raw meat or processed products. It contains 5.95% lipid without the skin and 39.34% with skin. Muscle alone contains 50.3% saturated, 33.4% monounsaturated and 16.3% polyunsaturated fatty acids, whereas duck with skin contains 35.7% saturates; 50.5% monounsaturates and 13.7% polyunsaturates, as with chicken and turkey the addition of the skin increases the proportion of monounsaturated fatty acids in the lipid from duck. The major fatty acids in duck fat are similar to those in chicken and turkey except for the absence of long chain PUFA's and a higher proportion of linoleic acid. Duck fat contains 35.7% saturates, 50.5% monounsaturates (high in linoleic acid) and 13.7% polyunsaturated fats (Which contains Omega-6 and Omega-3 essential oils).

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The main difference between chicken, turkey and duck is that duck contains more linoleic acid, which chicken and turkey contain a higher amount of polyunsaturated fats. It appears that duck fat is more like olive oil than it is like butter or beef.

Type of duck meat

Duck meat can be categorized into two types. Whole duck and the cutting part including breast meat, fillet, bone-in-leg, thigh meat, drum stick, three joint wing, wing stick, middle wing, two joint wing, wing tip and others e.g. tongue, beak and feet.

Purchasing and Storage Tips of duck meat

- Fresh duck should be odor-free and have clean skin with no pinfeathers.
- Frozen duck should have a plump breast and wrapped in an airtight package.
- The meat should be stored in the coldest part of the refrigerator and frozen duck can be stored in the freezer for three months.
- Duck liver/foiegras, is highly perishable and will only keep for 3 to 4 days in the refrigerator once the package has been opened.

Characteristics feature of duck meat:

The dressing percentage of duck is around 65-71% (Omojola, 2007) and it varies with the age and sex of the bird. Dusk is more flavorful than the chicken, as per the consumers. Its rich and strong flavor giving it a “game” tastes. Because of the characteristic features, duck meat is having a versatile culinary uses. Some important characters of duck meat are,

1. Color of Duck Meat

Duck meat is considered as "white" meat, even though its meat is considerably darker than other poultry meats such as chicken or turkey. The reason for this is ducks are more active in comparison to chicken therefore they need and use up more oxygen. The extra oxygen in the body of the duck or other types of game bird, gives their meat the darker red color due the higher content of muscle myoglobin.

2. Aroma of duck meat

The aroma of duck meat is relatively stronger than other poultry meats. It has been found that the flavor of meat is positively correlated with lipid content (Chartrin et al., 2006b) and the higher fat content of duck meat may cause the stronger flavor.

3. pH of duck meat

The pH range of duck meat is 5.4 to 6.3 (Erisir et al., 2009) in most of the cases. The pH of duck meat, however, is related to its glycogen content. A higher glycogen contents result in lower pH levels.

Processed duck products

Among the popular duck meat cuisine, Roasted duck , Roasted magret (breast filets of duck), Pan-fried Duck, Braised Duck, Pan-fried duck liver (Foie gras), Barbecued Grilled Duck, Grilled Duck Kebabs etc. are well known. Other than those some regional variation are, Peking roasted duck, Nanjing cooked duck, Zhangcha duck (China), Canard α l'Orange (France), Oritang (Korea) and gulai itiak lado mudo (Indonesia). The only traditional applications of duck meat cannot stimulate the rapid growth and popularity development of duck meat applications in this decade. Therefore the export graded duck meat products yet to be developed and fabricated.

Future prospects

Low demand for duck meat positively correlates with the low consumption of duck meat. The low level of consumption of duck meat is governed by many factors in comparison to chicken meat, reflected in low levels of duck meat acceptance and preference by society, the reason behind this constraints are, the unavailability of the meat quality ducks breeds, lower production level, difficulties in the slaughtering, lack of demand for ducks and weakness of market system for selling duck meat products (Oteku et al., 2006). The holistic approach towards the development of healthy, safe and nutritionally enriched duck meat can remove stigma adhere with the duck meat. The efforts to solve these problems focus should be on the researchers and government to popularize the duck meat as a food choice and to undertake necessary policy. A persuasive approach and good policies from the government will hopefully attract the society to use duck meat in greater quantities.

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ARTICLE

Raising the Bar:
Traceability as the Future of Poultry Safety

[1]Dr. Bhushan Sadar and [2]Dr. Akash Wadal

Traceability in poultry production is the ability to track and follow poultry or poultry products through all stages of production, processing, and distribution, from origin at the farm to the final consumer. This traceability is typically achieved by assigning identification to batches or flocks— rather than individual birds allowing the production history and movements of any given lot to be traced both backwards and forwards in the supply chain. Key elements include premises identification, batch or flock ID, and rigorous documentation of each stage from hatching, feeding, and processing to packaging and distribution.

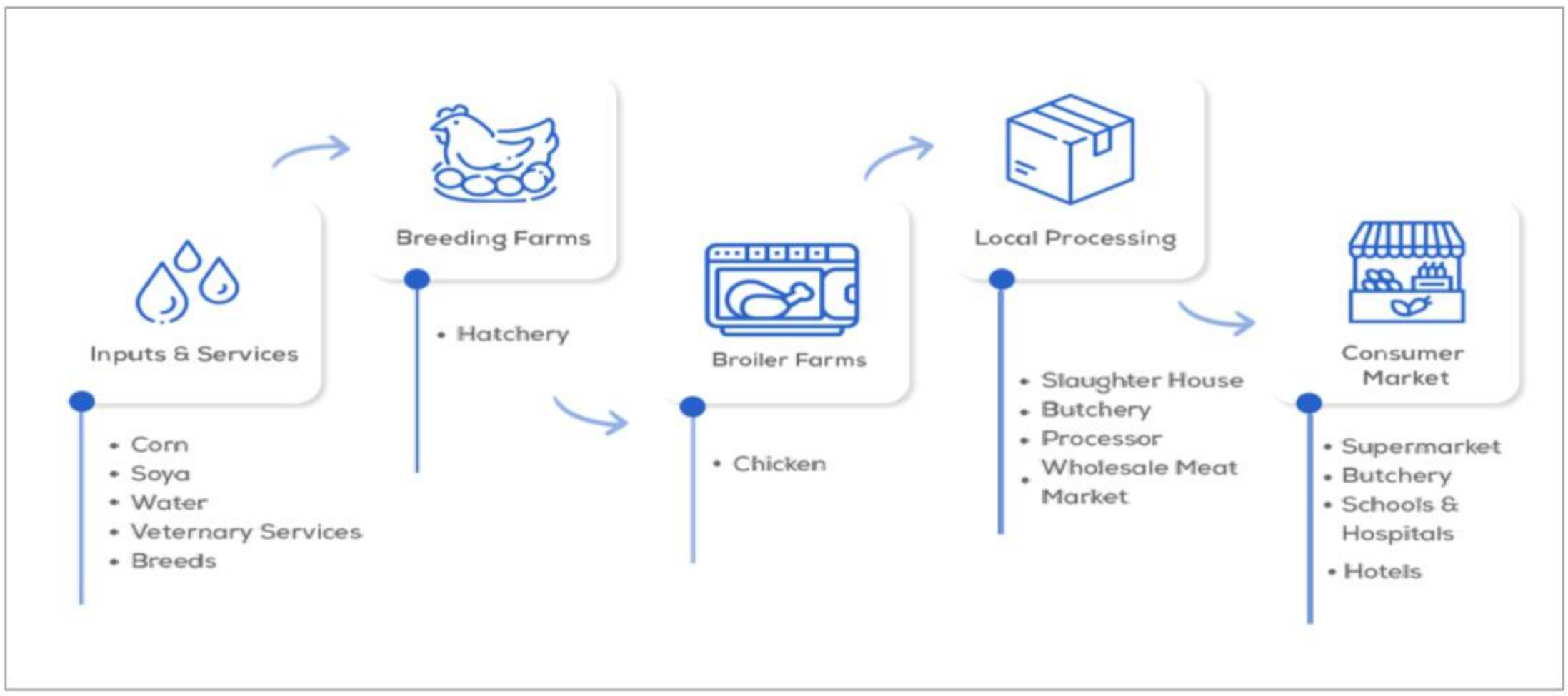
The importance of traceability in the poultry industry is profound and multifaceted:

- **Food Safety and Rapid Recalls:** Traceability systems allow for swift identification and isolation of contaminated or unsafe poultry products, helping limit the scope of foodborne illness outbreaks and reduce recall costs by narrowing the affected batches
- **Quality Assurance and Consumer Trust:** By documenting the origin, processing, and journey of poultry products, producers and retailers can assure consumers of the safety, authenticity, and quality of what they purchase—boosting brand reputation and customer confidence.
- **Disease Prevention and Biosecurity:** Traceability is essential for monitoring bird movement, identifying potential sources of disease, and implementing effective responses to outbreaks, thereby protecting both animal and public health.
- **Meeting Regulatory and Market Requirements:** Many export destinations and regulatory authorities demand traceability as a prerequisite; a robust system helps producers comply with international and domestic food laws, unlocking global market access and protecting against trade restrictions.
- **Efficient Supply Chain and Ethical Claims:** Detailed traceability supports auditing, verification of ethical claims (such as organic or free-range), and supply chain optimization, reducing fraud and ensuring transparency from farm to fork.
- **Continuous Improvement:** Having detailed data across the production process fosters continuous monitoring, benchmarking, and improvement to meet industry standards and changing regulations.

Robust traceability frameworks in poultry production offer significant advantages, enhancing food safety, public health, legal compliance, consumer assurance, and operational efficiency across the supply chain

- Food Safety

Traceability allows producers to rapidly identify and isolate affected products when contamination occurs, enabling highly targeted recalls that can shrink the scale of product removals by up to 95%. Batch codes and trace links help precisely determine which meat or eggs are compromised, minimizing both financial losses and public health risks



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- **Disease Prevention**

Advanced tracking throughout the entire production and retail process restricts the spread of zoonotic diseases by swiftly identifying exposure pathways and quickly removing impacted flocks or items. Tools such as RFID tags, block chain, and IoT sensors streamline outbreak management and enable immediate intervention when issues are detected

- **Regulatory Compliance**

Comprehensive traceability systems help poultry producers adhere to global food safety regulations (including USDA, EU, and Codex standards), making it possible to secure

certifications and access new export opportunities. Meticulous record-keeping and data integrity are fundamental for passing audits and verifying claims about food safety and ethics

- **Consumer Trust**

Complete supply chain transparency gives consumers confidence in the origin, quality, and integrity of poultry products, validating claims like "organic" or "antibiotic-free." Features such as QR codes and traceable labels empower buyers to verify product information, which bolsters brand credibility and reduces the chances of food fraud

- **Operational Efficiency**

Up-to-date traceability systems streamline paperwork, automate record-keeping, and simplify compliance audits. Access to real-time information supports smarter decision-making in inventory management, logistics, and process control, ultimately lowering waste and enhancing the efficiency of supply chain operations

Modern traceability solutions in poultry production integrate cutting-edge technologies to provide thorough monitoring and transparency across the entire supply chain.

- RFID (Radio Frequency Identification) employs electronic tags attached to birds, eggs, or equipment, allowing for real-time tracking and detailed monitoring. These tags carry unique identifiers for individual birds or batches, helping farm managers trace movement, health records, vaccinations, and feeding schedules. RFID footbands or wing tags enable automated data collection, support quick disease outbreak responses, and enhance resource management by digitizing records. Additionally, RFID tools monitor inventory, environmental factors, and personnel access, thereby reinforcing operational biosecurity.
- Block chain technology offers a secure, transparent, and tamper-resistant method of recording traceability data through decentralized digital ledgers. Each transaction—such as feed delivery, medication, processing, or shipping—is recorded as an immutable block, creating a continuous, trustworthy chain of custody for poultry products. This strengthens food safety and combats fraud, as the data cannot be altered retroactively, allowing stakeholders including farmers, regulators, and consumers to verify product origins and certifications in real time.
- Centralized digital databases act as management platforms where all traceability data related to poultry operations—including flock health, movements, feeding, inventories, and distribution—are stored and organized. When integrated with technologies like RFID, blockchain, and IoT sensors, these databases facilitate seamless information exchange, enable faster audits, and streamline reporting. These systems simplify workflows, ensure regulatory compliance, and empower data-driven decision making throughout the supply chain.

Best Practices for Implementation:

- Use globally recognized standards such as GS1 to uniquely identify traceable items (e.g., live animals, carcasses, cartons) with serial numbers or batch/lot numbers for consistent tracking across the supply chain.
- Establish clear internal traceability by maintaining linkage between inputs and outputs locally in production and processing.
- Capture and electronically store critical traceability data including product IDs, supplier info, batch numbers, transport details, and production dates.
- Implement robust data retention policies to keep traceability records accessible for regulatory compliance and rapid recall if necessary.
- Facilitate electronic data capture and seamless exchange of traceability data among stakeholders from farm to consumer.
- Provide training and support to supply chain participants to ensure proper understanding and execution of traceability practices.
- Engage guidance from industry associations and local GS1 organizations for application of standards and traceability system design.

Challenges in Implementation:

- High costs related to technology adoption, infrastructure setup, and ongoing system maintenance.

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- Lack of sufficient infrastructure and digital resources in some poultry production regions.
- Need for training and skill development among workers and stakeholders to effectively use traceability technology.
- Resistance or slow adoption by some supply chain participants due to complexity and perceived burden.
- Coordination difficulties when aligning multiple actors across the supply chain with varying capabilities and technologies.
- Regulatory and compliance pressures requiring continual updates to traceability systems and processes.

The regulatory framework for food safety and animal health combines international standards and national regulations.

International Standards:

- The Codex Alimentarius Commission (CAC), established by FAO and WHO, develops internationally recognized food safety standards to protect consumer health and promote fair food trade practices. These standards serve as global references and are scientifically based, addressing food additives, contaminants, hygiene, labelling, and more. The Codex is voluntary but serves as a benchmark under the WTO SPS Agreement for member countries to align their national regulations.
- The World Organisation for Animal Health (OIE) sets international standards for animal health, welfare, and veterinary public health. These standards provide a harmonized framework for national legislation concerning animal disease control and safe international trade of animal products. The OIE Terrestrial and Aquatic Animal Health Codes guide competent authorities worldwide in regulation and control systems.

National Regulations:

- Countries develop specific regulations and guidelines based on the international standards of Codex and OIE, tailoring them to their national context while ensuring compliance with global obligations under WTO agreements. National authorities use these frameworks to establish food safety controls, animal health surveillance, import risk analysis, and enforcement measures.
- Thus, the regulatory framework is anchored on these key international bodies Codex Alimentarius for food safety and OIE for animal health—and implemented through national laws and policies aligned with these global standards to ensure public health and fair trade.

Lessons Learned:

- Implementing traceability requires thorough review and documentation of production processes to build a comprehensive database suitable for automated control. Challenges include adapting systems to varying enterprise structures, maintaining data accuracy, and staff training.
- Successful systems often involve a combination of advanced technologies to cover different aspects of traceability and ensure data integrity and accessibility to stakeholders. Blockchain enhances security and trust, but integration with other technologies like IoT sensors is key to full traceability.

Recap of Traceability Importance in Poultry Production

Traceability in poultry ensures food safety, consumer trust, and regulatory compliance by tracking products from farm to table. Technologies like blockchain, IoT, RFID, and AI enable secure, real-time monitoring, risk management, and supply chain transparency. With a stronger focus on sustainability, collaboration across the value chain enhances biosecurity, feed quality, and ethical production—making poultry safer, more reliable, and future-ready.

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[1]Manager-Broiler Production (MH),
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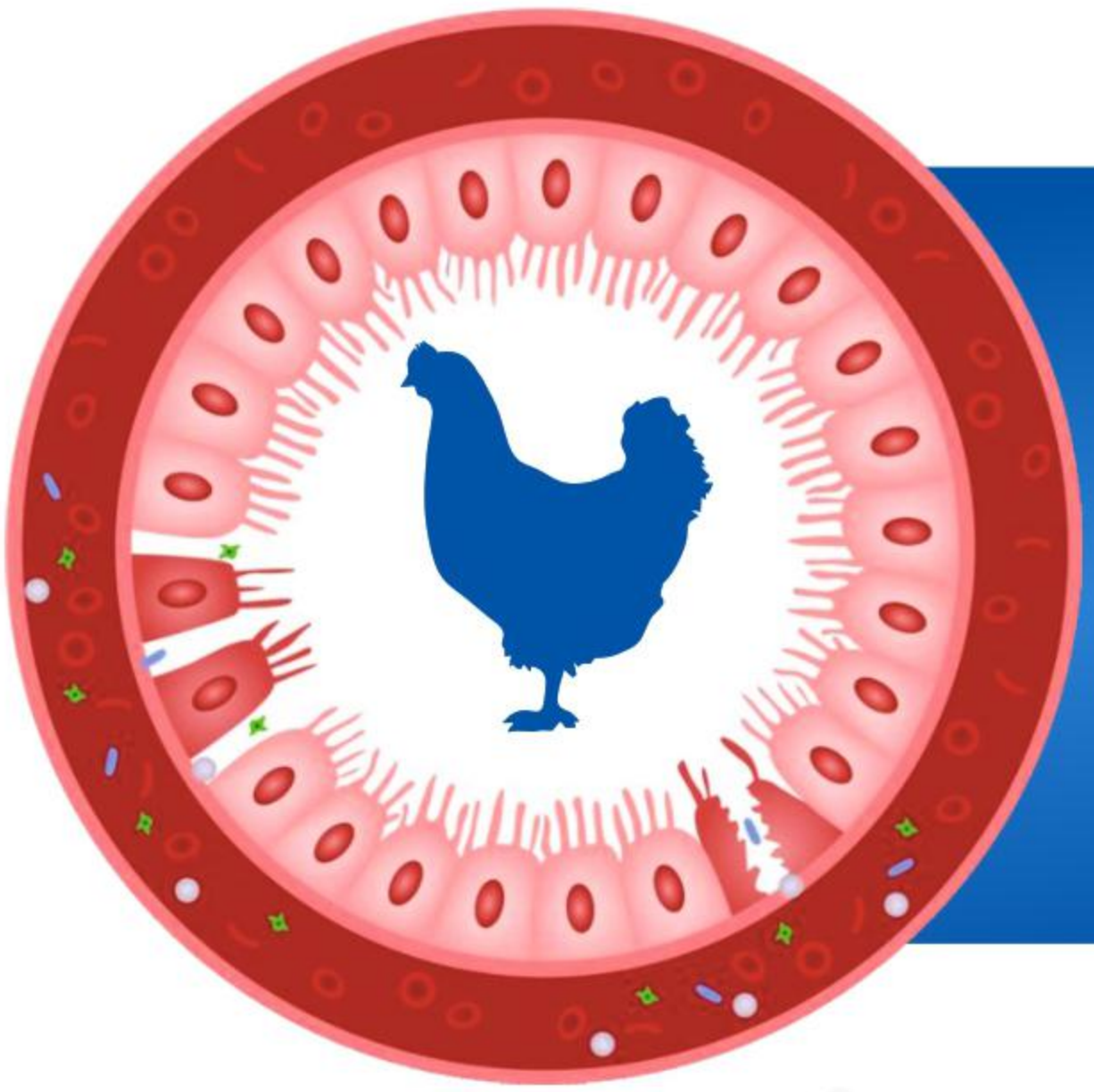

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DR. CARLOS CAMPABADAL

Faculty Member, Department of Grain Science and Industry, Kansas State University

Dr. Carlos Campabadal is a faculty member at the Department of Grain Science and Industry at Kansas State University focusing his work on the International Grains Program Institute (IGP) as an extension specialist and leader focused on outreach in the areas of grain storage, quality and processing, U.S. grain grading, export systems, and feed manufacturing. He conducts applied research in stored product protection focusing on grains, oilseeds and its co-products. He is active in international development with several projects with USAID and USDA in Central America and in Africa. He was born and raised in Costa Rica, Central America.

He obtained his doctoral degree in Agricultural and Biological Engineering from Purdue University focusing on Stored Product Protection and was a part of the Post-Harvest Education and Research Center (PHERC). He obtained his master's degree in Agricultural Engineering at the University of Illinois focused on grain processing. Before, his graduate studies and after obtaining a B.S. degree in Mechanical Engineering from the University of Costa Rica, he worked in his family feed mill company for three and a half years as a process and maintenance engineer. His previous experience includes animal farm management in beef cattle and swine farms. Dr.Carlos has travelled throughout Latin America, Africa, Asia, and Europe as a technical consultant, and speaker in more than 35 countries and 50 short courses and seminars in the areas of grain storage and feed manufacturing for U.S. Grains Council, U.S. Soybean Export Council, U.S. Wheat Associates, USDA, WISHH, World Bank, and private companies. He has also presented his research at several scientific and professional conferences, and has several publications in scientific journals. He is still involved in his family feed manufacturing and farm business operations.

DR. WILMER JAVIER PACHECO

Extension Specialist and Associate Professor, Department of Poultry Science, Auburn University

Dr. Wilmer Pacheco was born in Honduras where he obtained a BS in Food Science in 2005. Shortly after graduation, Dr. Pacheco began a feed mill manager training program with Murphy Brown, LLC in Laurinburg, North Carolina where he was responsible for overseeing the production of approximately 10,000 tons of pellet feed per week. In June 2009, Dr. Pacheco was awarded a fellowship in the Department of Poultry at North Carolina State University, where he earned his Master's in Poultry Science and his Ph.D. in Physiology and Nutrition. Currently, Dr. Pacheco is an Associate Professor and Extension Specialist at Auburn University in the State of Alabama. His research activities are focused on understanding the interrelationships between feed processing and nutrition on broiler performance. Additionally, Dr. Pacheco conducts research on nutrition strategies to reduce production costs, improve broiler performance, and nutrient digestibility. Dr. Pacheco is lead or supporting author of 32 research articles and 88 news articles primarily in Feedstuffs magazine, which is the leading source of news for animal agriculture in the United States with 12,500 accredited subscribers. Dr. Pacheco has been invited to give more than 165 presentations in 16 countries, has served as chair or member of 25 graduate student committees, and has mentored 21 visiting scholars from 12 countries.

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MR. MEENAKSHISUNDARAM KANAGARAJ

Consultant

Mr. Meenakshisundaram Kanagaraj is a freelancing consultant, technical trainer, and speaker on feed milling. He holds a Post Graduate Diploma in Digital Instrumentation and a Bachelor's degree in Physics. He has worked for an instrumentation company, an auto ancillary components manufacturer, and a multinational animal feed additive manufacturer. He has successfully completed a course on Lean Six Sigma Black Belt by the American Society for Quality (ASQ) and a course on Fundamentals of Feed Milling Technology conducted by the American Feed Industry Association (AFIA). As a consultant, he is involved in new feed mill projects from design to commissioning. He has helped feed milling organizations improve quality and productivity.

What SEC Community Members Have to Say

Dr. Wadajkar Prasad Shivaji
MVSc, PhD scholar, Division of Poultry Science
ICAR- Indian Veterinary Research Institute(IVRI)
ICAR- Central Avian Research Institute (CARI)

My main objective before starting the course was to gain a deeper understanding of feed mill operations, feed formulation techniques, and quality control measures that ensure precision nutrition and efficiency in poultry production. The course significantly helped me achieve these by providing comprehensive insights into modern feed manufacturing systems, equipment management, and process optimization. I was particularly impressed by the practical modules on feed processing efficiency and ingredient quality evaluation, which bridged the gap between theoretical knowledge and industry-level application. This aspect truly enhanced my learning journey and helped me appreciate the nuances of feed technology beyond laboratory research. Overall, the India SEC Feed Mill course has had a profound and positive impact on my academic growth and professional outlook, equipping me with valuable knowledge that complements my ongoing research in poultry nutrition and feed science.

BULLETIN

China Agricultural University's Professor Honored with NOVUS International Teaching Award

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

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

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

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

Professor Zheng's dedication is informed by her roots: family ties in rural China that drive her mission to improve farmers' lives through agricultural science. Her influential teaching style was shaped by her mentor, Professor Ning Yang, who instilled a passion for linking inquiry with practice and cultivating a global perspective.

Along with publishing over 40 peer-reviewed journal papers, Professor Zheng's other accomplishments include playing a key role as China Branch Secretary of the World's Poultry Science Association (WPSA) and contributing significantly to the successful organization of the XXV World's Poultry Congress in 2016, a milestone in international poultry collaboration.

Professor Jiangxia Zheng

Anna Fe Perino, NOVUS Poultry Solutions Manager for Asia, said the award was created to recognize educators advancing scientific rigor and delivering solutions that benefit producers, animals, and society.

"Dr. Zheng's commitment to advancing education in poultry science truly exemplifies the values of this award," says Perino. "In addition to a robust record of publication, Dr. Zheng is known for her commitment to undergraduate and graduate education, teaching several undergraduate courses in poultry science and mentoring dozens of master's and doctoral students in her lab group over the past nearly 15 years. Congratulations to Dr. Zheng."

NOVUS also presents its Outstanding Teaching Award to a poultry educator scientist at the Poultry Science Association Annual Meeting in the United States.

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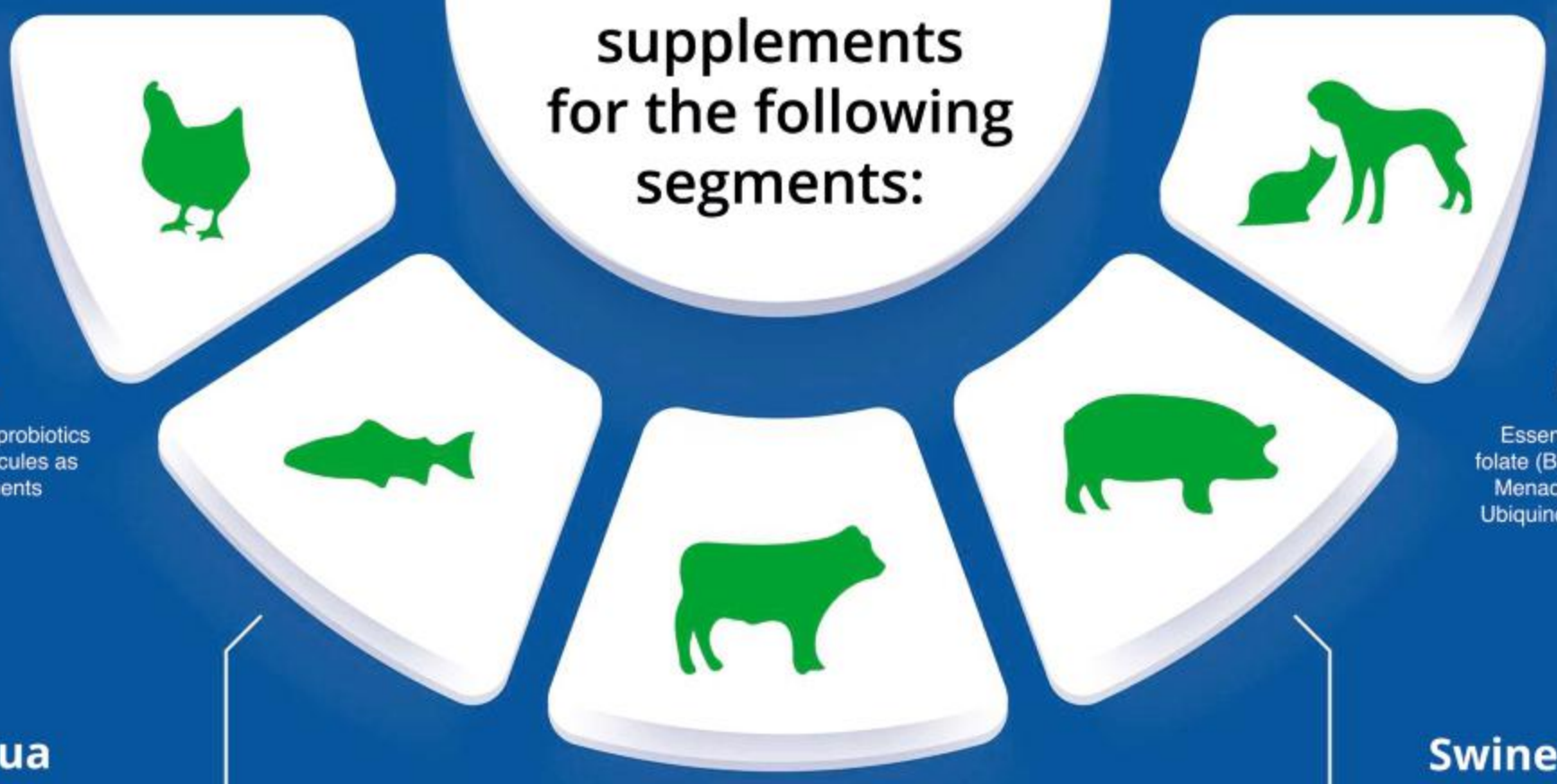

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Poultry probiotics, allied factors influencing probiotic performance, and the role of B-Act® as a key solution for optimal gut health.

Technical Team, Huvepharma SEA (Pune) Pvt. Ltd.

1. INTRODUCTION

Modern poultry production depends heavily on intestinal health to achieve high productivity and economic efficiency. The gastrointestinal tract is not merely a digestive organ but a complex ecosystem where microbial, nutritional, and immunological interactions take place. Disturbances in this ecosystem lead to poor feed conversion, growth retardation, and higher disease susceptibility. In this context, probiotics have emerged as vital alternatives to antibiotic growth promoters (AGPs), providing sustainable support to gut health, immunity and performance.

2. POULTRY PROBIOTICS: CONCEPTED AND CLASSIFICATION

Probiotics are defined as live microorganisms which, when administered in adequate quantities, confer a health benefit on the host. In poultry, commonly used probiotic strains include ***Lactobacillus, Enterococcus, Bifidobacterium, Saccharomyces*** and ***Bacillus*** species. Among these, *Bacillus*-based probiotics are particularly attractive due to their ability to form spores, survive pelleting temperatures and maintain stability during feed storage and gastrointestinal transit.

Probiotics are incorporated into feed or water and can be used in broilers, layers, breeders, and even in hatchery or in ovo applications. Their efficacy depends on strain selection, viability, administration route and compatibility with other feed additives.

3. MECHANISMS OF PROBIOTIC ACTION IN POULTRY

Probiotics contribute to gut health and performance via several biological mechanisms:

- **Competitive exclusion**: Occupying epithelial binding sites and competing with pathogens for nutrients, thereby reducing colonization by *Salmonella*, *E. coli*, and *Clostridium perfringens*.
- **Antimicrobial production**: Many probiotic bacteria secrete organic acids, hydrogen peroxide and bacteriocins that inhibit harmful bacteria.
- **Enzyme secretion**: Especially in *Bacillus* spp., the production of amylases, proteases, and lipases improves nutrient digestion and absorption.
- **Immune modulation**: Probiotics enhance mucosal immunity, increase secretory IgA levels and reduce proinflammatory cytokines.
- **Gut morphology improvement**: They promote villus height, crypt depth ratio, and mucin production, ensuring efficient nutrient uptake and barrier integrity.

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4. ALLIED FACTORS INFLUENCING PROBIOTIC PERFORMANCE

The success of probiotic supplementation is not determined by the product alone. Several allied factors interact to influence probiotic efficacy:

4.1 NUTRITION FACTORS

• **Feed quality and composition**: The substrate available in feed influences microbial activity. Diets with high digestibility and low anti-nutritional factors favor probiotic colonization.

• **Feed enzymes**: Supplementation with xylanase, phytase and protease reduces undigested nutrients that could fuel harmful bacteria.

• **Protein and energy balance**: Excess protein in the hindgut encourages pathogenic growth; balanced nutrient formulation complements probiotic function.

4.2 WATER QUALITY

Efficacy of Probiotics also depend on clean, low-TDS, pathogen-free water for effective colonization. Chlorinated or contaminated water can reduce probiotic viability.

4.3 Environmental and management practices

• **Litter management, stocking density and ventilation**: Influence microbial load and stress, which impact probiotic performance.

• **Temperature and humidity**: Extreme heat or humidity can predispose birds to gut stress and dysbiosis.

4.4 Health and medication programs

• **Coccidiosis and enteritis control**: Effective anticoccidial programs reduce intestinal damage, enhancing probiotic colonization.

• **Antibiotic compatibility**: Some antibiotics may inhibit probiotic activity; therefore, strain-specific compatibility is essential.

4.5 Early-life microbial programming

The early establishment of beneficial microbiota (via hatchery sprays or early probiotic administration) provides long-term gut health and performance advantages.

5. B-Act® as a key solution for optimal gut health

• B-Act® is a probiotic developed by Huvepharma®, consisting of a single-strain, spore-forming *Bacillus licheniformis* (DSM 28710) with a minimum viable count of 3.2 × 10^9 CFU/g

• It is formulated to support gut health (intestinal microflora), help maintain gut integrity, aid nutrient digestibility and improve performance in poultry. Along with other beneficial modes of action and metabolites, *Bacillus licheniformis* is specifically known for producing a peptide called lichenicidin. It is a bacteriocin that inhibits the growth of *Clostridium perfringens*, the causative agent of necrotic enteritis, and helps in managing dysbacteriosis in poultry gut. Optimum results are achieved when B-Act® is administered at 500 g per ton of feed.

• B-Act® has good stability (pelleting temperature, processing, storage, etc) and does not reduce viability and it is compatible with many other feed additives (antibiotics, coccidiostats)

Benefits of using B-Act®

• Improved feed conversion, improved body-weight gain in broilers under both normal and challenged (enteric disease) conditions.

• For layers: improved egg production, better egg-shell quality, reduced protein excretion in manure (indicating better nutrient utilisation) when using B-Act®.

• Helps the gut ecosystem by competitive exclusion of pathogens + production of beneficial metabolites (so not just "fill the gut with benign bacteria" but actively influences the microflora environment).

• Economic benefit: use of this product leads to improved ROI

For more details, please contact our technical team

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ARTICLE

Comprehensive Approaches to Subcutaneous and Spray Vaccination in Poultry Production

[1]Dr. Sayyed Mushtaque and [2]Dr. Akash Wadal

Hatchery vaccination, encompassing both subcutaneous and spray methods, is vital in poultry production as it promotes optimal flock health, aids in preventing disease outbreaks, and complies with global industry standards. Vaccinating chicks at the hatchery, prior to distribution to farms, ensures early and consistent protection against key diseases such as Marek's Disease, Infectious Bursal Disease (Gumboro), and Newcastle Disease. This approach is widely regarded as a best practice in modern poultry health management.

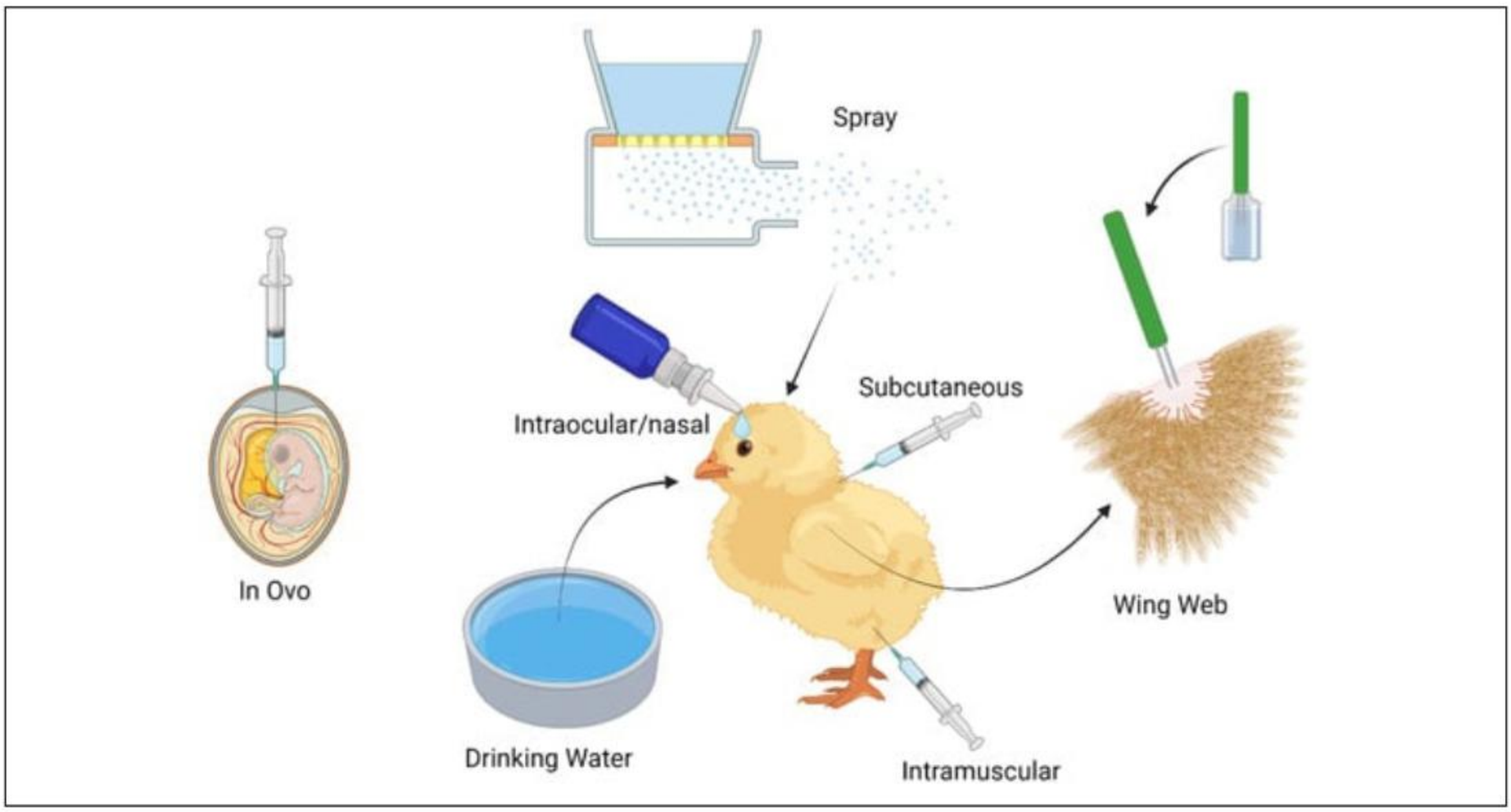
Operational and Economic Advantages

- **Improved Vaccine Quality Control:** Conducting vaccinations in a controlled hatchery environment allows for better monitoring, reduces human errors, and facilitates ongoing process improvements, resulting in higher quality vaccination outcomes.
- **Operational Efficiency:** Automated subcutaneous and spray vaccination systems enable rapid processing of thousands of chicks per hour, significantly minimizing labor and handling time compared to farm-level vaccinations.
- **Cost-Effectiveness:** Centralized hatchery vaccination lowers labor and resource expenses, reduces stress on birds, and minimizes adverse post-vaccination reactions associated with on-farm procedures.
- **Compliance with Industry Standards:** Many regulatory frameworks and industry guidelines recommend or mandate hatchery vaccination protocols, which supports compliance and access to both local and international markets.

By integrating early disease prevention, operational efficiency, and economic benefits, hatchery vaccination through subcutaneous injection and spray methods plays a pivotal role in fostering sustainable, cost-effective, and high-standard poultry production worldwide.

Subcutaneous (sub-cut) vaccination

- Subcutaneous vaccination involves injecting the vaccine beneath the skin, typically at the lower neck, or wing web in poultry.
- This method is used especially for oil-adjuvanted or aluminum hydroxide adjuvanted vaccines and some live vaccines.
- The vaccine is introduced as a small volume (e.g., 0.2 to 0.5 ml) with a needle inserted between skin layers and underlying tissues, avoiding muscle and bone.
- The immune system recognizes the vaccine antigen at the site of injection and mounts systemic immunity by activating immune cells locally and in lymph nodes.
- Accurate needle placement is critical to avoid adverse effects such as granulomas, tissue damage, lameness, or injection site swelling.



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- Subcutaneous injection stimulates a systemic immune response, providing protection against diseases with systemic involvement.
- Subcutaneous vaccination involves injecting about 0.2 ml of vaccine into the loose skin at the back of a day-old chick's neck. This procedure is carried out in the hatchery using either manual methods or advanced pneumatic, electronic, or IoT-enabled devices to ensure accuracy and speed. Proper restraint and gentle handling are essential to minimize stress and prevent injuries during vaccination.
- Common vaccines delivered by the subcutaneous route include those for Infectious Bursal Disease (Gumboro), Marek's Disease, and Newcastle Disease. These vaccines provide critical early protection against major poultry diseases.
- While manual vaccination tools can be used, they tend to be slower and less consistent. To improve efficiency and coverage, many hatcheries now utilize automated or semiautomated injectors capable of vaccinating over 2,000 chicks per hour. Automation delivers more uniform doses, reduces labor, and lowers the risk of human error.
- Operator skill and proper quality control are vital to success. Trained personnel who follow correct techniques achieve vaccination coverage rates above 98%, minimizing injuries and dosing mistakes. Common errors include incorrect injection angle, shallow needle insertion, or improper dose volumes. Quality control methods, such as using dye-marked vaccines, help verify accurate vaccine administration.
- Challenges include contamination risks from poor equipment hygiene or vaccine handling, which can cause infections or diminish vaccine potency. Handling stress from rough restraint also negatively affects chick health and performance. Troubleshooting often involves checking for equipment blockages, dull needles, injector malfunctions, vaccine wastage, and monitoring for adverse reactions after vaccination.
- Successful subcutaneous vaccination in hatcheries depends on proper techniques, appropriate vaccine selection, reliable equipment, and skilled staff management to ensure effective immunity and bird welfare.

Spray Vaccination

- Spray vaccination typically uses live attenuated vaccines delivered as a coarse mist of droplets sized between about 70 to 300 microns depending on equipment, usually sprayed 30 to 40 cm above the birds.
- The droplet size and uniform flock coverage are critical; droplets landing on the birds' eyes, nares, and respiratory mucosal surfaces provide direct vaccine uptake.
- Birds inhale some particles, allowing vaccine deposition in the mucosal lining of the upper respiratory tract, particularly the Harderian gland, a key site for immune response induction.
- Following landing on feathers and skin, the birds' natural preening behavior distributes the vaccine physically and ensures absorption via mucous membranes.
- The vaccine virus replicates locally in mucosal cells, stimulating local immunity mainly in the respiratory system, which helps protect against respiratory diseases such as infectious bronchitis, Newcastle Disease, and avian rhinotracheitis.
- Hatchery spray vaccination uses devices like vaccination chambers or automatic sprayers to ensure even distribution.
- Adequate moisture retention on the birds post-spray is essential for 10-15 minutes to allow vaccine uptake; birds should be dry before transport to prevent stress.
- Proper vaccine handling during mixing (using distilled or unchlorinated water and stabilizers) preserves vaccine efficacy.
- Fine aerosols (30-60 microns) can be inhaled deeper but may dry quickly; coarser droplets are preferred for surface mucosal infection.
- Spray vaccination is less stressful and more efficient for large flocks than individual administration methods.
- Spray vaccination primarily uses live, attenuated vaccines such as those for Newcastle Disease (ND) and Infectious Bronchitis (IB). The vaccine is freshly dissolved in high-quality, non-chlorinated water and administered through automated spray cabinets or conveyor-line spray systems within the hatchery. The ideal droplet size for the spray is between 100 and 150 microns, which allows the vaccine to settle on the chicks' feathers and upper respiratory tract without being inhaled too deeply, avoiding adverse reactions.

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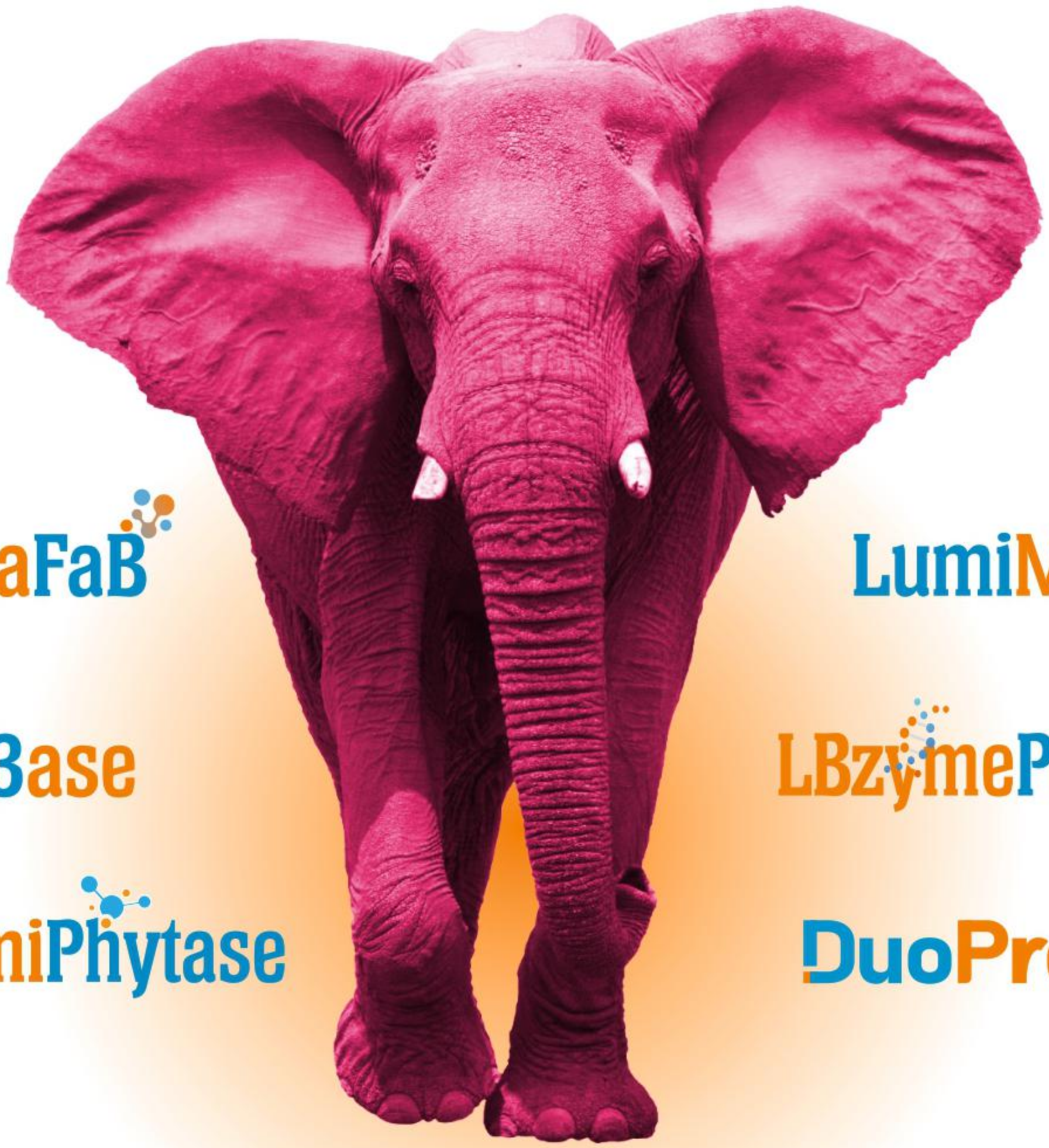

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- Achieving nearly 100% vaccine coverage requires precise adjustment and regular calibration of the spray equipment, including nozzle type and spray pressure. Periodic tests, such as using absorbent paper in empty boxes, help ensure uniform vaccine distribution.
- Automated spray systems are preferred for handling large quantities of chicks due to their consistency and efficiency. Vaccine storage and preparation are critical: vaccines must be kept refrigerated until right before use and never mixed with chlorinated or mineral-rich tap water, as such water can deactivate the live virus. All mixing containers must be clean and dedicated solely for vaccines to avoid residue contamination. Since vaccine potency declines quickly after reconstitution, it should be mixed and sprayed within hours.
- Following vaccination, chicks should be left undisturbed in their boxes for at least 20 minutes to allow natural preening, which aids in spreading the vaccine to mucosal surfaces, optimizing immunity. Observation for any adverse reactions and meticulous recording of batch numbers and vaccination details are essential for traceability and quality control.
- When performed correctly, spray vaccination ensures uniform flock immunity and supports an efficient hatchery vaccination workflow.

Innovations and Workflow Optimization in Hatchery Vaccination

Automation Advances:

Recent advancements in automation technology have revolutionized hatchery vaccination by introducing integrated systems capable of performing both subcutaneous and spray vaccinations within a single seamless workflow. These modern machines—including pneumatic and electronic injectors as well as spray vaccinators—can manage vaccination of extremely large volumes, ranging from 40,000 to as many as 100,000 chicks per hour, optimizing operational speed while enhancing accuracy and biosecurity. The automation minimizes labor requirements and reduces handling stress on the chicks, thereby improving animal welfare. These integrated solutions also facilitate uniform vaccine delivery at an industrial scale and support quick transitions between different vaccine types, ensuring continuous and efficient production.

Data Monitoring:

Implementation of IoT technologies combined with electronic injectors and digital monitoring systems allows hatcheries to precisely track vaccination details for every chick and batch. Essential parameters such as vaccine dose administered, batch identification, and real-time equipment functioning are recorded automatically. This digital traceability is invaluable for maintaining stringent quality assurance, ensuring regulatory compliance, and providing opportunities for process optimization and continuous improvement in vaccination performance.

Biosecurity and Record Keeping

Preventing Contamination:

To safeguard vaccine and chick health during vaccination, rigorous disinfection protocols for equipment and staff are indispensable. Utilization of single-use needles, automated sterilization cycles for injection tools, and clearly segregated workflow areas for clean and potentially contaminated materials greatly enhance biosecurity within the hatchery environment. These practices lower the risk of cross-contamination, prevent vaccine degradation, and ensure a safer vaccination process overall.

Documentation Practices

Maintaining detailed and comprehensive records for each vaccination event—including vaccine batch numbers, time of administration, and responsible personnel—is critical for accountability and traceability. Such documentation supports rapid investigation and response should any adverse events arise post-vaccination. Additionally, sharing vaccination history with downstream customers, such as poultry producers and integrators, improves transparency and builds confidence in flock health management.

Equipment Failure:

- Routine calibration and preventive maintenance of automated injectors and spray systems are essential to prevent dosing inaccuracies and avoid operational downtime. Scheduled servicing and timely replacement of worn components help maintain consistent performance and reliability.
- Irregular vaccine coverage often stems from nozzle wear or misalignment. Periodic efficacy checks—like running dye tests or coverage audits—are effective measures to identify and correct uneven application, ensuring that all chicks receive the intended vaccine dose.
- Ongoing staff training and active process monitoring are vital to reducing human errors such as improper dosing, missed birds during vaccination, or inconsistent application techniques. Ensuring adherence to protocols enhances vaccination accuracy and bird welfare.
- Continuous improvement in hatchery vaccination hinges on adopting these technological advancements, maintaining robust biosecurity measures, thorough record-keeping, and fostering a well-trained workforce. These components collectively streamline operations, optimize vaccine delivery, and maintain the highest standards of poultry health management and production efficiency.

[1]Dr. Sayyed Mushtaque and [2]Dr. Akash Wadal

[1]General Manager-Breeder and Hatcheries

[2]Hatchery Coordinator - MH Region Premium Chick Feed Pvt. Ltd.

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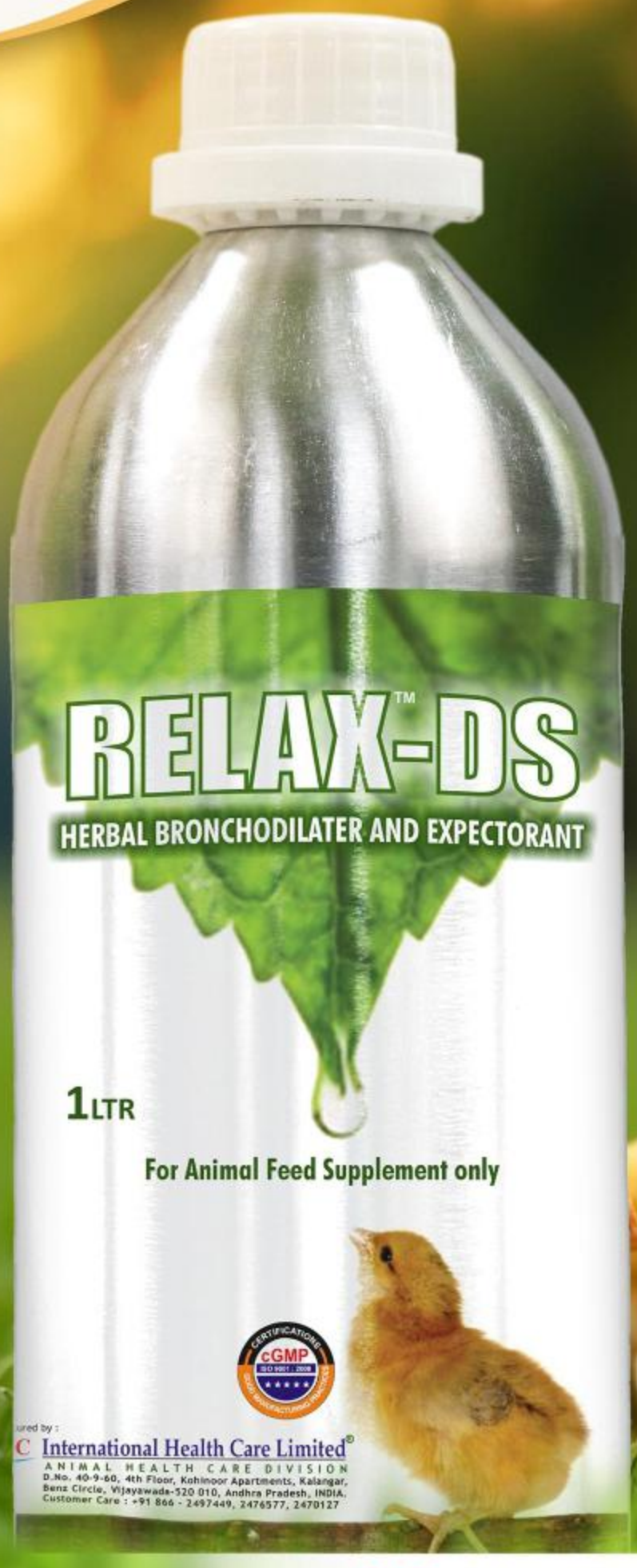

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ARTICLE

Mycotoxins and bacterial toxins can act synergistically in poultry

Mycotoxins and bacterial toxins can act synergistically in poultry, meaning their combined effect is greater than the sum of their individual effects. This interaction can significantly worsen the negative impacts on bird health, performance, and overall production.

How the Synergistic Effect Works:

Mycotoxins Compromise Immunity:

Mycotoxins, produced by certain molds, can weaken the immune system of poultry. They do this by interfering with protein synthesis, affecting both innate and acquired immunity, and reducing the production of antibodies.

Bacterial Toxins Exploit the Weakened Immune System:

When the immune system is already compromised by mycotoxins, bacteria and their toxins can more easily cause infections and disease. The weakened birds are less able to fight off bacterial infections, leading to a higher susceptibility to diseases.

®Additive Negative Effects:

The combined effect of mycotoxins and bacterial toxins can lead to more severe health problems, increased mortality, reduced growth rates, and poorer feed conversion efficiency compared to the effects of either toxin alone.

Consequences of Synergistic Effects:

Increased Susceptibility to Infections:

Birds are more vulnerable to bacterial infections like E. coli and viral infections like IBD and ILT.

Reduced Growth and Performance:

Mycotoxins can reduce feed intake, impair digestion, and lead to poor weight gain. Bacterial infections can exacerbate these issues, causing further growth retardation and decreased productivity.

Compromised Immune Function:

The combined effect can suppress the immune system further, making it harder for birds to recover from illness and increasing the risk of secondary infections.

Economic Losses:

Reduced growth, increased mortality, and higher treatment costs for secondary infections lead to significant economic losses for poultry producers.

Examples of Mycotoxins and Bacterial Toxins:

Mycotoxins:

Aflatoxins, ochratoxins, fumonisins, zearalenone, and trichothecenes like deoxynivalenol (DON) and T-2 toxin are common in poultry feed.

Bacterial Toxins:

E. coli and other bacterial pathogens can produce toxins that cause illness and death in poultry.

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ImmunoWall Leads the Conversation on Poultry Immunity at IMMUNE CONNECTION Workshop in Jaipur

The royal city of Jaipur became a center of poultry excellence on 16th September 2025, as Noble VetScience, in collaboration with ICC Animal Nutrition, Brazil, hosted the Immune Connection Workshop at the prestigious Hotel Le Méridien. The event gathered over 55 renowned poultry entrepreneurs from across India, fostering a vibrant platform for scientific exchange and practical learning focused on strengthening poultry health, immunity, and productivity.

The workshop commenced with a traditional lamp lighting ceremony and Ganesh Vandana, performed by Dr. C. S. Saraf, Mr. Anil Nikam, Mr. Sachin Tambe, Mr. Pankaj Gangwar,Mr. Anil kumar Singh, Mr. Ramesh Kumar, Mr. Raghubin Kumar, Mr Arindam Sarkar, Mr. Ayyagari Narsimlu andMr. Malla Reddy marking an auspicious beginning. Adding a special Rajasthani touch, Dr. C.S. Sarafwelcomed the distinguished guests with traditional Rajasthani pagadis, symbolizing honor and cultural pride. Each speaker—Dr. Sudheer Rukadikar, Dr. Jyoti Nandardhane, Dr. Ssu, and Dr. Fernando—was warmly felicitated, setting a tone of warmth and hospitality that reflected the spirit of Rajasthan.

The event was skillfully anchored by Dr. Anju Waghmare, whose enthusiasm and poise kept the audience engaged throughout.

Dr. Sudheer Rukadikar, renowned Poultry Health Consultant, opened the technical sessions with insights into key immunity challenges such as viral infections, nutritional deficiencies, and mycotoxins. He emphasized that strong immunity is essential for maintaining consistent performance and profitability. His visually rich presentation, supported by practical examples, made complex concepts easy for farmers to grasp.

Dr. Jyoti Nandardhane, Business Head, Noble VetScience, followed with a session on the uniqueness of ImmunoWall. She compared different yeast-based products and explained how ImmunoWall's higher MOS and ß-glucan levels deliver superior results in gut health and immune modulation. She demonstrated how MOS binds harmful pathogens while ß-glucans activate immune cells, helping birds fight infections naturally.

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Dr. Ssu, General Manager – Asia, ICC Animal Nutrition, Brazil, presented "ImmunoWall - The Key to Immunonutrition." He elaborated on how yeast cell wall components work synergistically to enhance gut integrity and reduce disease pressure, sharing global and domestic success data underscoring ImmunoWall's reliability.

Dr. Fernando, Global Product Manager, ICC Animal Nutrition, highlighted ICC's global expertise and sustainability-driven innovations, emphasizing the company's commitment to environmentally responsible and science-backed solutions for long-term poultry health.

A major highlight was the live yeast demonstration, led by Dr. Anju Waghmare and the Noble VetScience technical team. Farmers witnessed firsthand how ImmunoWall differs from other products, observing its superior purity, uniformity, solubility, and high insoluble fraction — clear proof of its premium quality.

Throughout the day, one message echoed among participants: "A healthy gut builds a strong bird." By reinforcing gut integrity and immunity, ImmunoWall empowers farmers to achieve better flock health, reduced antibiotic use, and consistent performance.





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ARTICLE

Sapodo

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Setting New Standards in Natural Ammonia Control for Poultry Going beyond Yucca for ammonia management

PhyGeno,the plant-based feed ingredient division of Avitech Nutrition is dedicated to enhancing the safety and nutritive value of animals through plant-based innovations. Drawing on its legacy of working with animals and combining ancient Ayurvedic knowledge with modern evaluation and manufacturing techniques, PhyGeno offers solutions that lead to healthier products for human consumption and minimal environmental impact. **Sapodo**, apolyherbal formulation is rapidly emerging as a natural choice to address critical ammonia challenges in poultry farming.

Understanding the Impact of Ammonia in Poultry Production

Ammonia, a natural byproduct of animal waste and decomposition, poses significant threats in poultry farms when present at high concentrations. Elevated ammonia levels are **harmful to both animal health and the environment**, leading to a cascade of negative effects on poultry production. These include **reduced body weight gain, impaired feed conversion, decreased survivability, and a weakened immune response.** Furthermore, high ammonia can cause respiratory illness, eye irritation, increased susceptibility to pathogens, and compromised immune responses in birds, ultimately impacting overall performance and profitability for farmers. Effectively controlling ammonia is therefore crucial for fostering healthy living conditions and improving bird performance.

Sapodo: A Comprehensive Strategy for Ammonia Management

Sapodo is a **natural phytogenic feed additive** specifically formulated for efficient ammonia control. It is a polyherbal formulation containing saponins and glycosides, among other bioactive compounds, which collectively enable a multi-pronged approach to ammonia management. Sapodo's strategy involves two key mechanisms:

- **Direct Binding:** Sapodo contains **bioactive compounds that directly bind lower gut and environmental ammonia levels.** This immediate action helps to neutralize existing ammonia, reducing its toxic effects on animals and improving air quality within the farm.
- **Urease Inhibition:** Beyond direct binding, Sapodo's bioactive compounds also **control ammonia production by inhibiting the urease enzyme.** Urease is responsible for converting urea into ammonia, so by inhibiting this enzyme, Sapodo addresses the root cause of ammonia generation, providing a more sustainable and long-term solution.

This dual-action approach ensures a **comprehensive reduction of ammonia** in the poultry environment, creating a healthier and more productive setting for animals.

Unlocking Superior Ammonia Management: Sapodo's Proven Advantage Over Yucca Schidigera Products

Comparative Efficacy: Sapodo's Demonstrated Superiority

To validate Sapodo's effectiveness, comprehensive in-vitro evaluations were conducted at the Avitech Centre for Nutrition Science (ACNS), comparing its ammonia binding capability against a commercially available Yucca product. The results **unequivocally demonstrate Sapodo's superior performance.**

Study 1: Quantitative Evaluation (B50 Value)

The first trial focused on estimating the B50 value, a key indicator quantifying the amount of an ammonia-binding substance needed to reduce ammonia concentration in an aqueous solution by 50%. A lower B50 value signifies a stronger ability of the product to bind ammonia.

Methodology:

The ammonia control agent was weighed, mixed with phosphate EDTA buffer, stirred for 10 minutes, and centrifuged. The supernatant was then used to prepare aliquots for B50 estimation. Samples were treated with ammonium sulfate solution, nitroprusside, and hypochlorite, followed by incubation, and optical density measurement at 630 nm to determine the percentage of free ammonia.

Results:

The study revealed that **only 3.6 mg of Sapodo was required to achieve a 50% reduction in ammonia** in the solution, compared to **5.4 mg of Yucca.** This critical finding indicates that **Sapodo is 50% more effective in binding ammonia than Yucca.**

Study 2: Qualitative Evaluation (Colorimetric Study)

The second trial employed a colorimetric study, utilizing the salicylate method based on the Berthelot reaction, to visually assess ammonia binding efficiency at different dosages.

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- Lowers respiratory issues and helps in strong immune response

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Methodology:

Stock ammonia solution was prepared. A reaction mixture was used to assess ammonium concentration with varying levels of ammonia binder (25 mg, 50 mg, 100 mg, and 150 mg). The color variation was then compared against an ammonia color chart.

Results:

- At **25 mg and 50 mg dosages**, Sapodo-containing test tubes exhibited a **light-yellow hue**, indicating a significant decrease in ammonia levels, whereas Yucca tubes showed a light green hue.
- More strikingly, at **100 mg and 150 mg dosages**, the Sapodo test tubes demonstrated a **complete reduction of ammonia concentration**, evidenced by a dark yellow color. In contrast, Yucca only showed a slight reduction, presenting a light-yellow hue at these higher concentrations.

The color variation clearly shows that **Sapodo is more effective as an ammonia control agent** compared to Yucca at different concentrations, demonstrating a **superior performance** in reducing ammonia production.

Beyond Binding: The Multifaceted Benefits of Sapodo for Poultry Productivity

Sapodo's superior ammonia control translates into a multitude of benefits for poultry farmers, directly impacting productivity and animal welfare:

- **Improved Nutrition:** Optimizes feed intake and ensures better nutrient utilization.
- **Enhanced Health:** Reduces susceptibility to respiratory infections and decreases the incidence of Ascites. Sapodo addresses issues more effectively than Yucca, improving bird performance.
- **Increased Productivity:** Improves overall performance and efficiency, leading to enhanced growth and productivity.
- **Farm Hygiene:** Significantly improves air quality and reduces offensive odor generated by manure.

Furthermore, Sapodo is **100% natural and safe**, **cost-effective**, and **compatible for inclusion in premixes or complete feeds**, demonstrating excellent stability through pelleting and extrusion processes.

Conclusion: A Cleaner, Healthier Future with Sapodo

Sapodo's **proven superior efficacy in binding and inhibiting ammonia**, as demonstrated by rigorous in-vitro trials, positions it as the premier plant-based solution for ammonia management in poultry farming. By effectively addressing ammonia-related challenges, Sapodo not only safeguards animal health and the environment but also significantly **boosts farm productivity and profitability**. With Sapodo, PhyGeno offers a clear path towards clean feed, a clean conscience, and a clean planet for generations to come.

EVENT CALENDER

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27-29 JANUARY – IPPE

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FEBRUARY 2026

10–13 FEBRUARY – 12TH KOLKATA INTERNATIONAL POULTRY FAIR

Venue : Biswa Bangla Exhibition Centre, Kolkata
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MARCH 2026

10-12 MARCH – VICTAM ASIA

Venue : BITEC Exhibition Center in Bangkok,
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JUNE 2026

28-30 JUNE – MIDDLE EAST POULTRY EXPO

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JULY 2026

13-17 JULY – WORLD'S POULTRY CONGRESS

Venue : Metro Toronto Convention Center,
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AUGUST 2026

4-6 AUGUST – SIAVS

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Stallen South Asia Hosts Technical Seminar on "Comprehensive Flock Protection: Addressing Mycoplasmosis, Infectious Bronchitis & Salmonellosis" in Pune

In continuation of its commitment to strengthen scientific knowledge and promote advanced disease control strategies in the poultry sector, **Stallen South Asia Pvt. Ltd.** organized a highly informative technical seminar in **Pune**, themed *"Comprehensive Flock Protection: Addressing Mycoplasmosis, Infectious Bronchitis & Salmonellosis."*

The event witnessed the participation of over **80 progressive poultry farmers, consultants, and technical experts**, who gathered to explore emerging disease trends, modern vaccine technologies, and integrated flock protection programs aimed at improving productivity and profitability.

The seminar opened with a warm welcome by **Dr. Sanjay Singhal, Chief Operating Officer, Stallen South Asia Pvt. Ltd.**, who shared the inspiring journey of Stallen — from its modest beginnings in the late 1990s as a pharmaceutical company to its current evolution into a biotechnology-focused organization. Dr. Singhal emphasized how Stallen has constantly adapted to the changing needs of the poultry industry, shifting from conventional drugs to next-generation biologicals and vaccines that align with global trends in responsible poultry production. He also spoke about the company's product range, collaborations, and upcoming innovations, reaffirming Stallen's vision to offer science-driven solutions that ensure healthier flocks and sustainable farming.

The technical keynote address was delivered by **Dr. Jayaraman K**, a veteran poultry health expert with more than **three decades of experience**. In his session, Dr. Jayaraman provided an in-depth overview of the disease triad — *Mycoplasmosis*, *Infectious Bronchitis*, and *Salmonellosis* — explaining how these infections interact, compromise respiratory health, and affect egg production, hatchability, and overall flock performance. He discussed diagnostic approaches, field management practices, and the role of vaccination in breaking the infection cycle. His presentation was both insightful and practical, blending scientific clarity with field relevance, which kept the audience thoroughly engaged. The interactive Q&A session that followed helped participants gain clarity on key aspects of disease prevention and control.

The final session was conducted by **Dr. Kishor Gedam, Product Manager, Stallen South Asia Pvt. Ltd.**, who presented Stallen's **comprehensive vaccine portfolio** imported directly from **FATRO, Italy**. He elaborated on flagship products such as **MYC-VAC** — a *Mycoplasma gallisepticum killed vaccine*, **MS-VAC** — a *Mycoplasma synoviae killed vaccine*, and **IB-OLVAC**, a *killed vaccine offering protection against Infectious Bronchitis and Newcastle Disease*. Dr. Gedam also introduced **BIOVAC SGP695**, an innovative patented **live vaccine for Salmonella gallinarum/pullorum, and enteritidis infections**, which is notably the **first water-administered Salmonella vaccine** available in the Indian market. Together, these products represent Stallen's holistic approach to flock protection — offering reliable, science-backed, and field-tested vaccination options to Indian poultry producers.

The event concluded with a heartfelt vote of thanks by **Mr. Macchindra Shinde, Regional Sales Manager (West)**, who appreciated the enthusiastic participation of the attendees and the valuable insights shared by the speakers. A networking dinner followed, allowing farmers, consultants, and experts to interact informally and exchange ideas for improving poultry health and productivity.

With this successful seminar, **Stallen South Asia** once again reaffirmed its dedication to knowledge sharing, innovation, and farmer partnership. The company continues to take confident strides toward building a healthier, more productive poultry industry — one that thrives on science, sustainability, and shared success.

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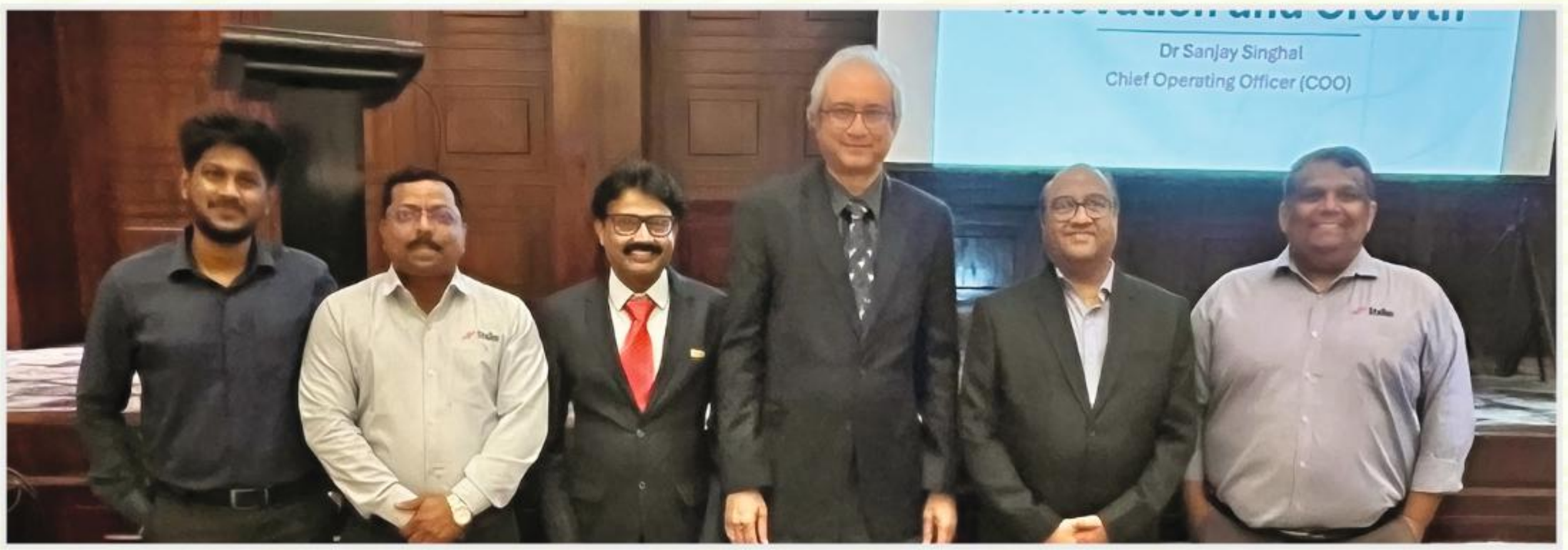

Announcement

PHYTOVET
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Mr. Amit Kumar Sharma

Phytovet Animal Nutrition Pvt. Ltd. - Powered By Nature & Science
as Business Head for India & International Markets

Phytovet Animal Nutrition Pvt. Ltd., an emerging leader in phytogenic and science-backed animal nutrition solutions, is pleased to announce the appointment of **Mr. Amit Kumar Sharma as the Business Head for India and international markets. Based in Mumbai, Mr. Amit Kumar Sharma** will spearhead the company's strategic growth and market expansion initiatives.

Incorporated recently in August 2025 and headquartered in Kharghar, Navi Mumbai, Phytovet is committed to delivering innovative, sustainable, and effective nutrition products that enhance the health and productivity of livestock, poultry, swine, aqua, and companion animals worldwide. The company operates on the guiding philosophy: *"Powered By Nature And Science."*

With more than two decades of experience in the animal nutrition industry, **Mr. Amit Kumar Sharma** brings visionary leadership and deep market expertise to drive Phytovetmission at a global level, focusing on bridging traditional knowledge and modern science for sustainable animal wellness.

Let us warmly wish **Mr. Amit Kumar Sharma** all the very best in his future endeavours. We are confident that under his visionary leadership, Phytovet will reach new heights of success and continue to thrive.

For further information, please visit www.phytovet.in or contact via email at info@phytovet.in.

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Reduce the use of antibiotics while meeting the rising demand for meat 7 levers to limit the use of antibiotics

Reducing antibiotic use in livestock and facing the increasing global demand for meat is a complex challenge. Experts from the TECHNA group have built a global approach around seven key points to address these issues.

There will be eleven billion people on Earth in 2050, while we are only seven billion today. This growth means that the global demand for meat will increase, and accordingly, consumption of meat is expected to double by 2050. New rules have compelled farmers to decrease the use of **antibiotics** to treat animal diseases. These regulations aim at limiting the risks of **antibiotic-resistant organisms** in animals, especially with regard to consumer safety (25,000 deaths per year). In 2011, the European Commission set up a plan of action against the looming threat posed by antimicrobial resistance (AMR).

France in particular has introduced several ECO ANTIBIO plans:

- ECOANTIBIO 1 (2012-2017: target to reduce the use of ABs by 25%, ->results down 37%,
- ECOANTIBIO 2: no reduction target announced, but a desire to maintain the reduction -> use continued to fall, but less sharply.

However, there is no miracle cure that could demonstrate the efficiency of an antibiotic without having major drawbacks. Only a methodical approach could help us reach this goal. Therefore, the answer does not lie in a closed form solution but it is, in fact, **multi-faceted**. The TECHNA. Group has identified seven fields in which various actions can be undertaken. These constitute a marked path for organizations willing to engage in the project of limiting antibiotic usage.

1. A sector-driven dynamic

Current farming practices pose major health and environmental issues that have barely been measured so far. Farmers are often isolated and they cannot easily engage in environmental efforts by remaining on their own. To be effective, the implemented solutions require the participation of all players and of every **link** in the **industry.** The dynamic needs to be a collective one. Awareness of the risks incurred can be raised through outreach efforts, **diagnosis** tools, and reflections on new organizational schemes. Holding joint round table meetings between various actors in the sector could help define the constraints and limitations of each of them. Such initiatives would help to identify each person's margin of maneuver and to define the most appropriate collective actions to take.

2. For animals, putting comfort first

To give its full potential, the animal must be reared in optimal conditions. In addition, new regulations regarding sustainable development have an impact on rearing choices when it comes to water, air, compound feed, prevention, stock raising. The setting of **husbandry standards,** of **diagnoses**, the evaluation of current techniques can change current practices and allow the emergence of new **alternatives**.

3. Nutrition is the key

The growth of animals is dependent on their nutrition, and also has an impact on their **health**. Furthermore, feed is often the main item on the budget of animal farms, as it often accounts for over 60-70% of productions costs. Therefore feeding expenses need to be optimised. **Precision nutrition** means that the right **doses** are given and that the correct **additive** mixes are formulated. This science allows for the application of accurate nutritional expertise and the precise matching between the ration's supplies and animals' needs. Also remember that **preventive nutrition** is necessary for improving; securing or correcting animals' performances at the upstream stage of the rearing cycle.

4. It all starts with the parents

Farm animals are more vulnerable to health problems when they are young, or during weaning in the case of mammals. Young animals are therefore dependent on their innate health passed on to them by their parents. For this reason, a particular attention must be granted to the management of **breeding females** so their **health capital** can be transmitted in the best possible conditions.

5. Being well informed to make the right decisions

Farmers are the pilots within their farms. They observe measure, decide and act. They must also be capable of reaping the benefits of their hard work. To make the right decisions and act accordingly, they need to be provided with **diagnosis tools**, indicators that can be applied as soon as possible, along with procedures for decision-making and acting. As such, the measures of **antibiotic reduction** will not appear to them as a series of new constraints but as a way to gain new skills.

6. The rational use of risky products

A reasoned use of medicines implies that **alternative solutions** should be implemented as a first-line strategy. Risky products should only be used as a last resort, should alternative solutions have already proved inefficient.

7. A constant quest for progress

Solutions are never designed to be permanent. It' is a state of mind, an openness to change, a constant quest for new solutions. Ongoing innovation means that alternative solutions are researched, that solutions assessment methods are reflected and feedbacks from the field constantly sought.

"If you want to go fast, go alone - if you want to go further, go together". Whatever your position in the industry, the global approach may be of interest to you. Thanks to our strategy, you can optimise health expenses while saving on production costs. For more information, please contact our experts!

Antoine Rousseau
Senior global Poultry Expert
Techna

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Legend SERIES 22

In our journey we visited many faces with our poultry Sector legends, and one among them is

Mr. Shabbir Ahmad Khan

Poultry Advisory and Technical Services (PATS)
Tropical Institute of Livestock Management and Health (TILMAH)

1. **Are you originally from Gurgaon?**

   Gurgaon is my Karambhoomi, though I belong to Faizabad (Ayodhya), Uttar Pradesh where I'm currently residing after spending 58 blissful years in Gurgaon.

2. **What is the best thing you like in your journey?**

   My journey began from Rani shaver poultry breeding farm, where I started my professional career with managing grandparent stock. This company was associate of Shaver's Canada, where chairman was Major general RN Nehra- where I learnt army discipline and hard work. Later I moved to Kegg Farms, the first pure line breeding operation in India as manager customer service division, where I gathered experience and confidence, working with Late Thakur Ram Avatar Singh, Mr. Shashi Kapur and chairman Mr. Vinod Kapur. These embarking years of my journey and the learning experience I amassed were the highlights of my career.

3. **What is the right motivation you like in the journey from starting till now?**

   Working with urban and rural, big and small farmers, solving their problems and getting back their smiles, fires my enthusiasm. Generally, I used to solve their problems with modern technology, combined with old technology. Mostly I get motivation from the Presistant journey of farmers in India.

4. **Why did you choose the Poultry / Livestock profession?**

   From my childhood I was fascinated with poultry birds, that my late mother kept in a small shed for consumption purpose- different varieties like White, brown and black Leghorn, RIR, new Hampshire, desi birds, etc. I was drawn to poultry profession due to my early interest in bird; but I also saw potential to produce cheapest healthy protein rich food for a deficient population. At the same time, I wanted to contribute towards the opportunity poultry gave to millions of people to generate livelihood, especially a secondary supplementary livelihood for low income farmers and to supplement their efforts.

5. **As compared to other big players in the industry, how is your organization different?**

   My organization is very small. Poultry Advisory and Technical Services (PATS) provides services to small and big farmers for their day-to-day management and solving their problems including diseases.

   Tropical Institute of Livestock Management and Health (TILMAH) provides poultry training to different sections and conduct trials for pharmaceutical companies. So there is no need of comparassion.

6. **Please tell us about your family.**

   My family consists of myself and my wife (Rehana Khan M.A., M.Ed.)-a great support to me as house wife an same time she is a known social- worker of Gurugaon.Two sons- both were in merchant navy. Elder son is settled in Malaysia with wife and two kids. The younger one is settled in Faizabad (Ayodhya) with wife and my granddaughter & grandson. Now he is running his own poultry farm, following my footsteps.

7. **What do you think about your organisation's roadmap of next 5 years?**

   In next couple of years, I am planning to train literate and illiterate young boys for different poultry jobs as industry needs skilled labour force for its growth. At the same time I want to train multi-purpose supervisors.

8. **What is your message to the next generation entering in this business?**

   My suggestion to young professionals working in the field-to be honest towards their profession. Don't overload the birds with medication. You have to

1966

learn the language of birds, they give every sign of their misery and problem- be it thirsty, hungry, cold, hot, sick or under stress.

Humble suggestion to them-respect seniors like Dr. R.N. Sreenivas Gouda, Dr. Chandrashekhar, Dr. V Ram Subah Reddy, Dr.Rama Rao, Dr. Prajapati. They are very experienced people, do not feel shy to consult them

9. What is your favorite eatery food?

I love to eat chicken and Biryani, Nihari and chicken kebabs. I particularly enjoy Gujarati, Kashmiri, Bengali and Madrasi cuisine and seafood.

10. What are your hobbies?

I like to read poultry research papers, see it translate into practical life and write articles for the benefit of farmers. I also like do some social-work and Gardening

11. Any remarks you would like to add?

The fact that theory and practical is learnt from two different sources. Theory we learn in classroom and practical, we learn in field from small and big farmers. Remember I will be learning and transmitting till I go to my grave.

Host by:
Dr. Ramesh Sikka
Founder Member
Anand Sikka Veterinarians Foundation (India)
+91 98909-63144 sikkaramesh44@gmail.com

Important information about Mr. Shabbir Ahmad Khan - Contributed by Dr. Ramesh Sikka

Date of Birth: 01 August 1943
Address: (Residence & Office) 7, Civil lines, Faizabad (Ayodhya), Uttar Pradesh
Mobile: 9811508838 | **Email:** shabbir.a.khan@gmail.com

Qualification: B.Sc. Ag, Ah & D in the year 1966 from Allahabad Agricultural Institute, now University. Poultry Training by Dr. Jim Gilmore, Poultry Expert from Canada

Active member of Poultry Federation of India since 1988. Executive member of the Federation for several years. Served as Vice-President (North Zone) Poultry Federation of India for 8 years.

Served as the Honorary Secretary of Poultry Federation of India for 6 years. (Elected unopposed)

Working Experience:

- **1980 - Present:** Poultry Consultancy under the flagship of Poultry Advisory and Technical Services (PATS). Started Tropical Institute of Livestock Management and Health in 2010 for training purposes.
- **1974 - 1979:** Worked with Kegg Farms Pvt. Ltd., first basic breeding farm of the Country, and later as head of Customer Service Division.
- **1966 - 1973:** Started Career with Rani Shaver Poultry Breeding Farm (In Collaboration with Shaver, Canada), as in charge of grandparent breeder operation. Later became Extension officer for India.

Publications:

Books written by me:

1. Book on Layer Management (Hindi)
2. Broiler Kranti - A Management Book (Hindi)
3. Book on Broiler Management (English & Punjabi)
4. Broiler Farming Pocket Book (Hindi)
5. Book on weekly Broiler Management for small and medium farmers (5th edition)

Articles written by me:

1. More than 550 technical and practical articles in English and Hindi were published in various poultry trade journals.
2. Regular column 'Tipsy Topic' in poultry guide the first magziene of Indiawas very popular among the poultry farmers (1970's-80s)

Trials and Experiments:

1. Various nutritional trials of national and international poultry products were conducted by me at farm level. A few reports are being used as advertisement by the pharmaceutical companies.
2. Trial on goat and dairy feeds were conducted in the field. Many feed manufacturers are adopting that trials.

Training & Consultancy:

Tropical Institute of Livestock Management and Health (TILMAH)

1. It was approved by Indira Gandhi National Open University in 2010 and every year trained 2 batches of their students
2. Trained independent batches of students from neighboring countries of Afghanistan, Maldives, Bangladesh.
3. FAO also sent their nominees of other countries for training.
4. Many Indian feed and pharmaceutical sent their batches for training
5. Individual farmers from various parts of country were walso trained.
6. Field staff for theory and practical training sent by Integrators.

Poultry Advisory and Technical Services (PATS)

It is a poultry consultancy which helps the farmers for their day-to-day management problems and disease problem.

Seminars:

1. More than 100 lectures/presentations on poultry nutrition, management and disease were delivered all over India. Also gave 4 presentations in Nepal and presentations in Bangladesh.
2. In house training programs conducted -

a. One in West Bengal.

b. Three in Bangladesh.

3. Two short courses on Poultry on behalf of Action for Food Production (AFPRO), an International NGO.
4. Faculty member for Poultry Education organized by All India Radio in 1979.
5. Gave talk on Doordarshan and All India Radio on Poultry.

Honour:

1. American Soybean Association - International Marketing / U. S. Soybean Export Council, Inc. honored me by presenting mementoes, as the recognition of my services to Poultry Industry.

2. Loins Club honored me by presenting certificates of honor at many occasions.
3. Indian Red Cross Society also honored me at many occasions.
4. As a founder member, honored by Poultry Federation of India.
5. Awarded Lifetime services to poultry industry on behalf of Pixie Publications, Karnal, Haryana by the Chief Minister of Haryana, Bhupinder Singh Hooda.
6. Poultry breeding and research Centre, Chandigarh, Government of India awarded lifetime achievement award for Rural Poultry Development
7. Allahabad Agriculture Institute, now Agriculture University honored an award for 55 years of services to poultry industry.

On Panels: I was on Panels on following educational institutions:

1. Kurukshetra University, Academic Council Member
2. MD University, Rohtak Executive Member
3. Indira Gandhi Open University; was on panel to finalize the syllabus on poultry course.

Social Activities:

Past President Lions Club, Gurgaon.

Member, Indian Red Cross Society.

Patron, Indian Handicap Welfare Association.

More than 60 years in the service of Poultry Industry

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ARTICLE

Liver Damage in Poultry

Dr. S.K. Maini
Consultant, Vesper Group, Bengaluru

The Liver of every type of poultry (Breeders, Broilers, Layers, Turkeys, Quails, Ducks etc.) of any age, breed, sex, at any stage of production, are constantly under threat from the mycotoxins, micro-organisms (pathogens), endotoxins, anti-nutrients, poisons, medicines, chemicals etc., The liver is an important accessory organ of the digestive system and the largest gland of the body, is located in the body cavity, adjacent to the heart, gizzard, spleen, gall bladder and the duodenal loop of the intestine. It is divided into two lobes, the right (larger in size) and the left lobes, joined cranially at the midline. In the chicken and turkey's, the left lobe is subdivided into the dorsal and ventral parts. Visceral peritoneum covers the liver and closely adheres to its surface.

Liver damage is a multifactorial mild and progressive metabolic disorder characterized by identifiable etiological factors, causing excessive fat accumulation in the liver and abdominal cavity, leading to poor performance, liver rupture, haemorrhage and sudden deaths.

The understanding of predisposing and complicating factors like the various stressor's, certain vitamins and trace mineral deficiencies, nutritional imbalance and disturbances, hormonal factors, certain managemental and environmental influences, use of poor quality and alternative ingredients containing inhibitory components in feed formulation, and farm history can significantly enhance diagnostic accuracy, treatment efficacy and quick recovery.

Liver damage may be classified as (1). Direct Liver Damage and (2) In-Direct Liver Damage.

Direct Liver Damage: Due to ingestion of mycotoxins, adulterants like heavy metals, poisons, chemical toxicities, anti-nutrients, tannins and the interfering components from the feed ingredients being used, certain drugs, medicines, their metabolites and incompatiabilities.

In-Direct Liver Damage: Metabolic disturbance that result from the stressor's causing hormonal interference.

Decrease in production, deficiency or failure to synthesise, transport and use an enzyme's and co-enzymes.

Due to maturity, start and rapid increase of egg production in layers and breeders, sudden changes in their dietary requirements, stress related to the egg production, onset of lights, hormonal changes in the body related to ovulation and egg production, increase in feed consumption, sudden increase in the requirement of calcium, phosphorus and vit D3, handling of birds for artificial insemination in breeders etc.

Metabolic disorders that result from high nutrient intake, rapid growth, high metabolic rate, pulmonary or systemic hypertension, and high egg production.

Other conditions that could be classed as metabolic disorders like lack of exercise, disease's and their treatments, Heat Stress, Insecticide and Pesticide sprays used to control pests.

Liver Damage in the field can be seen alone, or in combination with other conditions/organs, It may be seen as fatty liver, hemorrhagic fatty livers, fatty liver and kidney syndrome etc.

Causes of Liver Damage :

High-Energy Diets: Diets high in carbohydrates and fats can lead to excessive fat accumulation in the liver.

Nutrient Imbalances: Feed be well balanced with respect to Energy, Proteins, Vitamins and trace minerals and other essential additives. Deficiencies of essential nutrients like choline, biotin, selenium, and methionine can cause impaired fat metabolism.

Mycotoxins: Contaminated feed containing single or a combination of mycotoxins and their metabolites, cause mild to severe liver damage.

Environmental Factors: Heat Stress, poor ventilation and high temperatures can stress birds and contribute to the fatty liver condition.

Lack of Exercise: Limited movement in cages, birds density in the deep litter shed for broilers, can contribute to obesity and fat accumulation in the liver and abdomen.

Infectious Diseases: Some viral and bacterial diseases, such as Marek's disease, Lymphoid leucosis, avian hepatitis, and fowl cholera, can directly infect and damage the liver.

Drugs, Chemicals and Medicines : Excessive use of drugs (antibiotics, growth-promoting antibiotics, coccidiostats, etc.) in diets formulated for commercial poultry, as they have a negative influence on the liver function, since most of these chemicals are metabolized in the liver, causing an increase in energy expenditure that will deteriorate the productive performance of the birds.

Mostly it is seen as reversible damage, correctable and treatable with timely intervention with mitigation strategies. Prolonged damage will lead to irreversible damage like cirrhosis or fibrosis, not treatable..

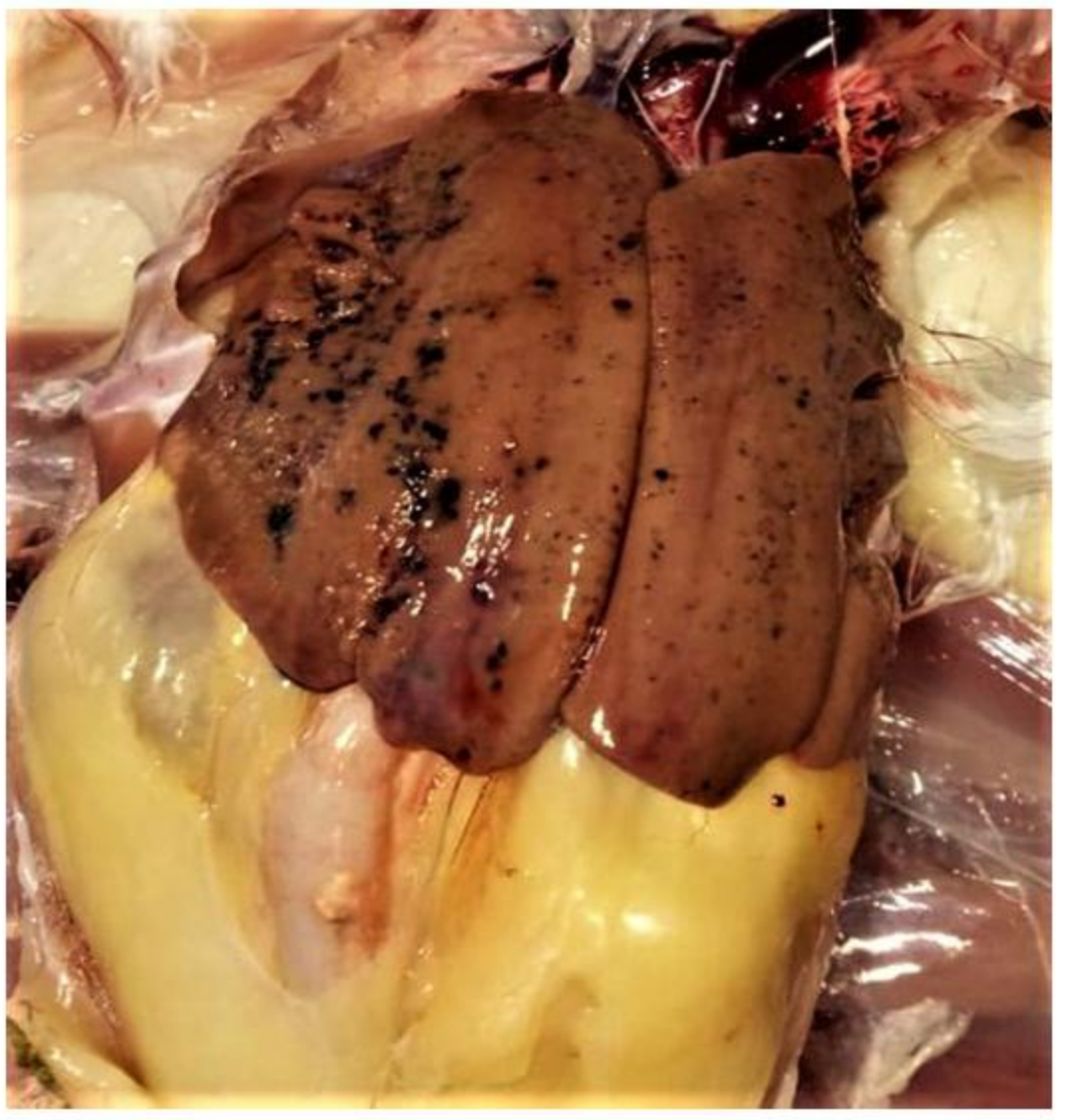
Early detection, dietary corrections, use of good quality feed ingredients, prevention of stress, mycotoxins, infections, timely and appropriate supportive care are some of the critical components in promoting hepatic repair, regeneration and recovery of the affected birds.

Mitigation Strategies: The following need to be added regularly per ton of the finished feed, avoid use of poor quality and mouldy feed ingredients, alternate feed ingredients be kept to minimum levels, .

Choline Chloride @ 1 Kg/ton (this takes care of fat mobilisation from the liver to keep it fit and fine).

Toxin Binders @ 1 Kg/ton (at least two different types of binders is suggested, so together they target maximum number of mycotoxins).

Toxol @ 1 Kg/ton (to ensure proper GI tract, liver and kidneys health, condition and functioning).



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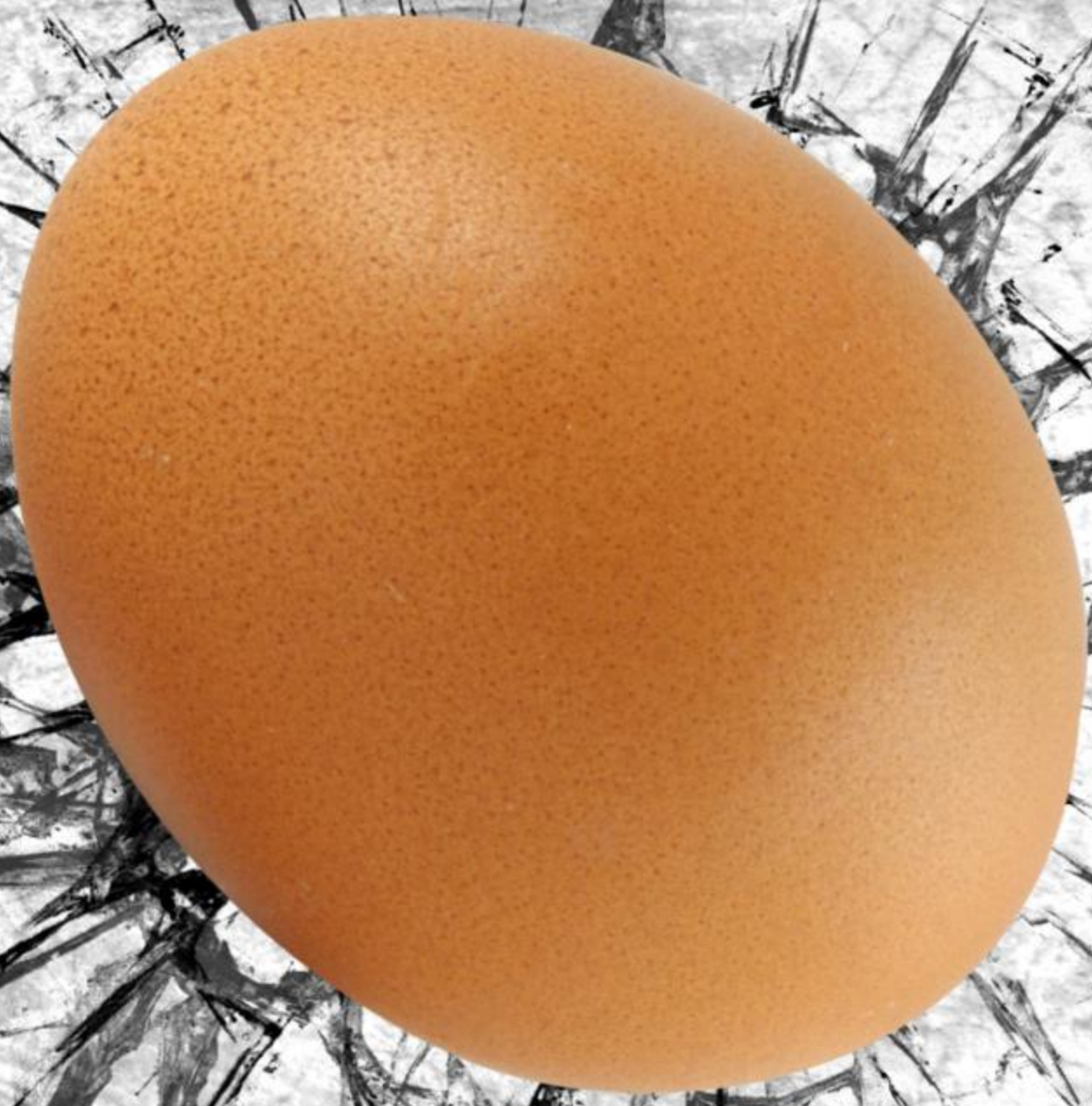

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Poultry Federation of India Successfully Concludes its 36th Annual General Meeting on the Theme "Survive & Thrive in Difficult Times" at Lucknow

The **Poultry Federation of India (PFI)** successfully organized its **36th Annual General Meeting (AGM)** on the theme *"Survive & Thrive in Difficult Times"* at **Ramada Hotel, Lucknow**. The event brought together over **1000 delegates**, including **farmers, breeders, feed millers, integrators, equipment manufacturers, policymakers, veterinarians, scientists, solvent plant representatives, media professionals**, and other stakeholders from **across India and abroad**, along with **99 sponsor organizations**.

The AGM commenced with **opening remarks by Mr. Ranpal Dhanda, President, Poultry Federation of India**, who welcomed all participants and expressed his gratitude to the **Department of Animal Husbandry, Government of India** for their continued support to the poultry sector. Mr. Dhanda highlighted PFI's vision for advancing India's poultry sector and announced the Federation's ambitious plan to **establish four modern laboratories across India** dedicated to enhancing quality standards, technological innovation, and the welfare of poultry farmers.

Following the President's address, **Mr. Ravinder Singh Sandhu**, presented the **PFI Annual Report (2024-25)**, detailing the Federation's **40 key meetings** conducted over the past year with government authorities, sector stakeholders, and policymakers. These initiatives focused on issues such as **broiler rate stabilization**, **raw material quality**, **maize price and availability**, and policy advocacy regarding the **closure of meat shops during the Sawan month**.

Mr. Sandhu also announced PFI's **strategic joint venture with VIV**, a leading global exhibition organizer, to host **"VIV Select India"** — an international poultry sector exhibition scheduled for **April 22-24, 2026, at Yashobhoomi Convention Centre, Dwarka, New Delhi**, which aims to promote technological innovation and global collaboration in the Indian poultry sector.

Mr. Rahul Khatri presented the **PFI Balance Sheet (2024-25)**, elaborating on the Federation's financial performance and transparency. The session was followed by several **technical and knowledge-sharing presentations** on topics such as *Global Exhibitions, Oil Quality, Raw Material Procurement, Biosecurity, Importance of Protein, Metabolic Syndromes, Innovation, and Glucose Oxidase*.

A **highly engaging panel discussion** on *"Viksit Bharat Mein Poultry Sector Ka Yogdan"* was moderated by **Dr. O.P. Chaudhary**, Retd. Joint Secretary, DAHD, Government of India. Esteemed panelists — **Mr. Ricky Thaper, Dr. Ajay Deshpande, Mr. Divya Kumar Gulati, Dr. Ajit Ranade, Mr. Mohan Reddy Kasarla, Dr. Sharad Singh, and Dr. Jatinder Paul Singh Gill** — shared valuable insights on policy frameworks, market trends, and the future growth trajectory of India's poultry sector. The day concluded with the **Bronze Sponsor Memento Distribution Ceremony**, honoring 52 valued bronze sponsors, followed by a **Vote of Thanks by Mr. Sanjeev Gupta**, Vice President (HQ), PFI.

Day 2 featured distinguished guests including:

Hon'ble Prof. S.P. Singh Baghel, Minister of State for Animal Husbandry, Fisheries & Dairying, Government of India (Chief Guest)

Shri Brijesh Pathak, Hon'ble Deputy Chief Minister, Government of Uttar Pradesh

Shri Mahipal Dhanda, Hon'ble Minister of Education, Government of Haryana

Shri Sanjay R. Bhoosreddy, Chairman, Uttar Pradesh Real Estate Regulatory Authority

In his keynote address, **Mr. Ranpal Dhanda** reiterated PFI's demand for the **implementation of HPAI vaccination in the poultry sector**, citing heavy economic losses faced by farmers. He urged the government to form a **committee comprising representatives from farmers, associations, departments, and experts** to study and recommend actionable solutions.

Mr. Dhanda also emphasized the need to address challenges related to **maize availability, quality, and pricing**, pointing out that rising maize costs—driven by ethanol diversion—are affecting poultry feed production. He cited PFI's successful initiative promoting modern maize farming across **1000 acres with 90 farmers**, resulting in yields of **40-45 quintals per acre**, compared to the traditional **10-15 quintals**.

He further raised concerns about **closure of poultry meat shops during the Sawan**, requesting policy intervention from the Deputy Chief Minister, and advocated for the inclusion of poultry under the **agriculture sector at the national level**, similar to Maharashtra's policy.

Mr. Vijay Sardana, renowned agri-economist, expanded on these issues, addressing the impact of religious closures on poultry trade, and highlighting challenges such as **retail hygiene, export potential, rural employment, infrastructure gaps at Ghazipur market, and women empowerment.**

Deputy Chief Minister Shri Brijesh Pathak assured that a **joint meeting** with senior officials and PFI representatives would soon be convened to frame concrete steps for poultry sector development. **Prof. (Dr.) P.K. Shukla**, President, Indian Poultry Science Association, stressed the importance of **eggs and chicken in combating malnutrition**, especially among children, and emphasized the role of women and farmers' empowerment.

Hon'ble Minister Shri Mahipal Dhanda called for a **central-level poultry policy** to ensure uniform implementation across states and addressed the issue of environmental challenges faced by poultry farmers.

Delivering his keynote, **Hon'ble Chief Guest Prof. S.P. Singh Baghel** remarked, *"A healthy mind resides in a healthy body, and a healthy nation is built upon both — which cannot be achieved without eggs and chicken."* He reaffirmed that **eggs are vegetarian**, and one of the **best sources of affordable protein**. He expressed strong support for the **formation of a National Poultry Development Board**, assuring that such an institution could propel the sector far beyond its current valuation of **₹1.2 lakh crore**, strengthening livelihoods for over **1.6 million people** engaged in poultry farming.

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A second **panel discussion** on *"Surviving & Thriving in Difficult Times"* was moderated by **Mr. Anuj Khare, Editor, Aaj Tak**, featuring eminent panelists including **Mr. Ranpal Dhanda, Mr. Naveen Pasuparthy, Mr. Uday Singh, Mr. S.S. Lakra, Dr. Pawan Kumar, Dr. Pawan Singh, and Mr. Mohit Malik.**

Expert presentations were delivered by:

Prof. (Dr.) P.K. Shukla on *"Indian Poultry Sector: Policy Interventions for Sustainable Growth and Farmer Prosperity towards Viksit Bharat"*

Dr. V.R. Tijare, General Manager, Venky's (India) Ltd. on *"Strategies to Promote Consumption of Chicken & Eggs"*

Dr. P.S. Mahesh, Joint Commissioner & Director, CEAH, Bengaluru on *"Disciplined Poultry Farming"*

The AGM concluded with **Super Platinum, Platinum, Diamond, Gold, and Silver Sponsor Memento Distributions**, followed by the **Vote of Thanks** delivered by **Mr. Ricky Thaper, Joint Secretary, PFI**, who acknowledged the contributions of all sponsors, delegates, speakers,media and the PFI Executive Committee for making the 36th AGM a grand success.

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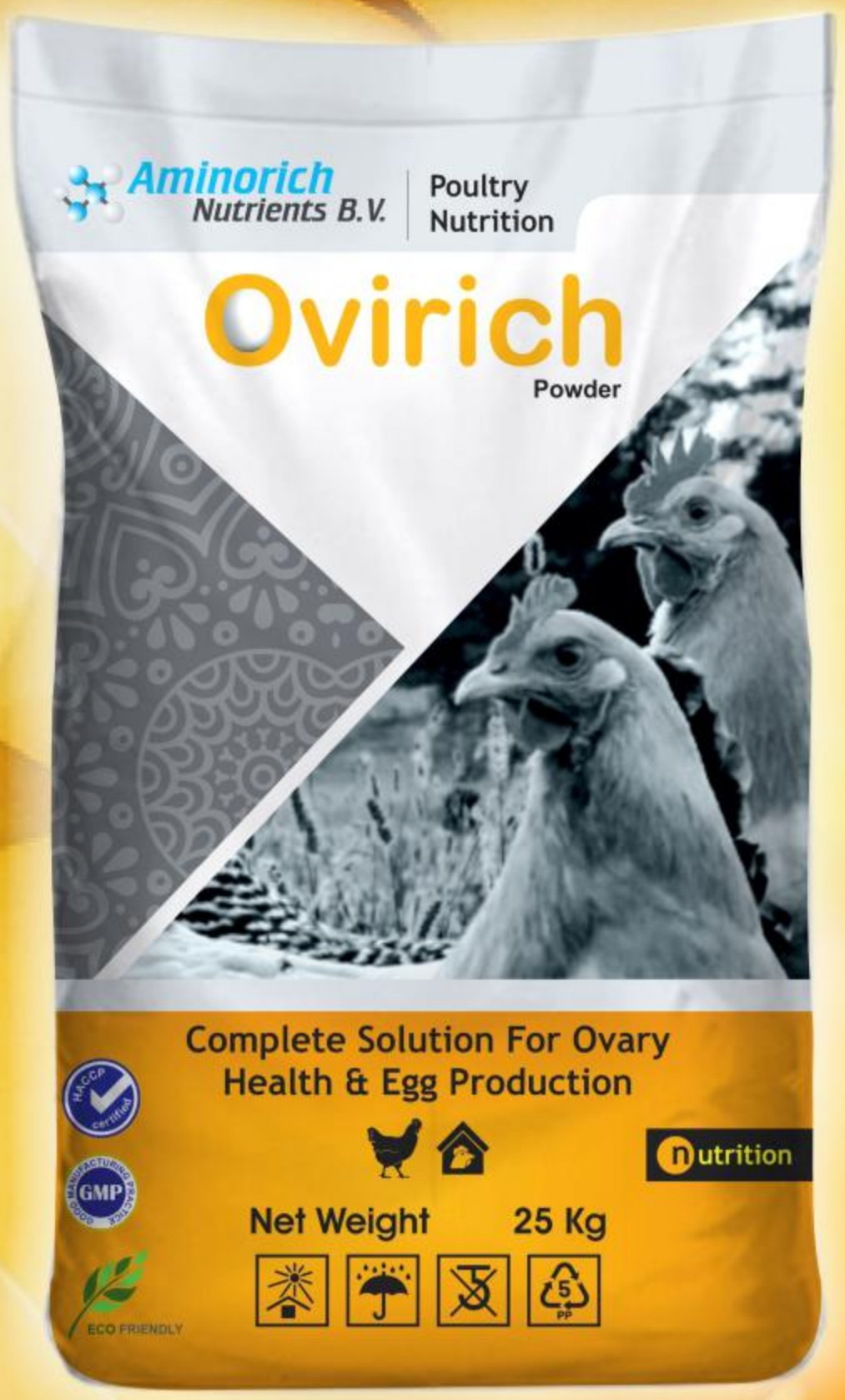

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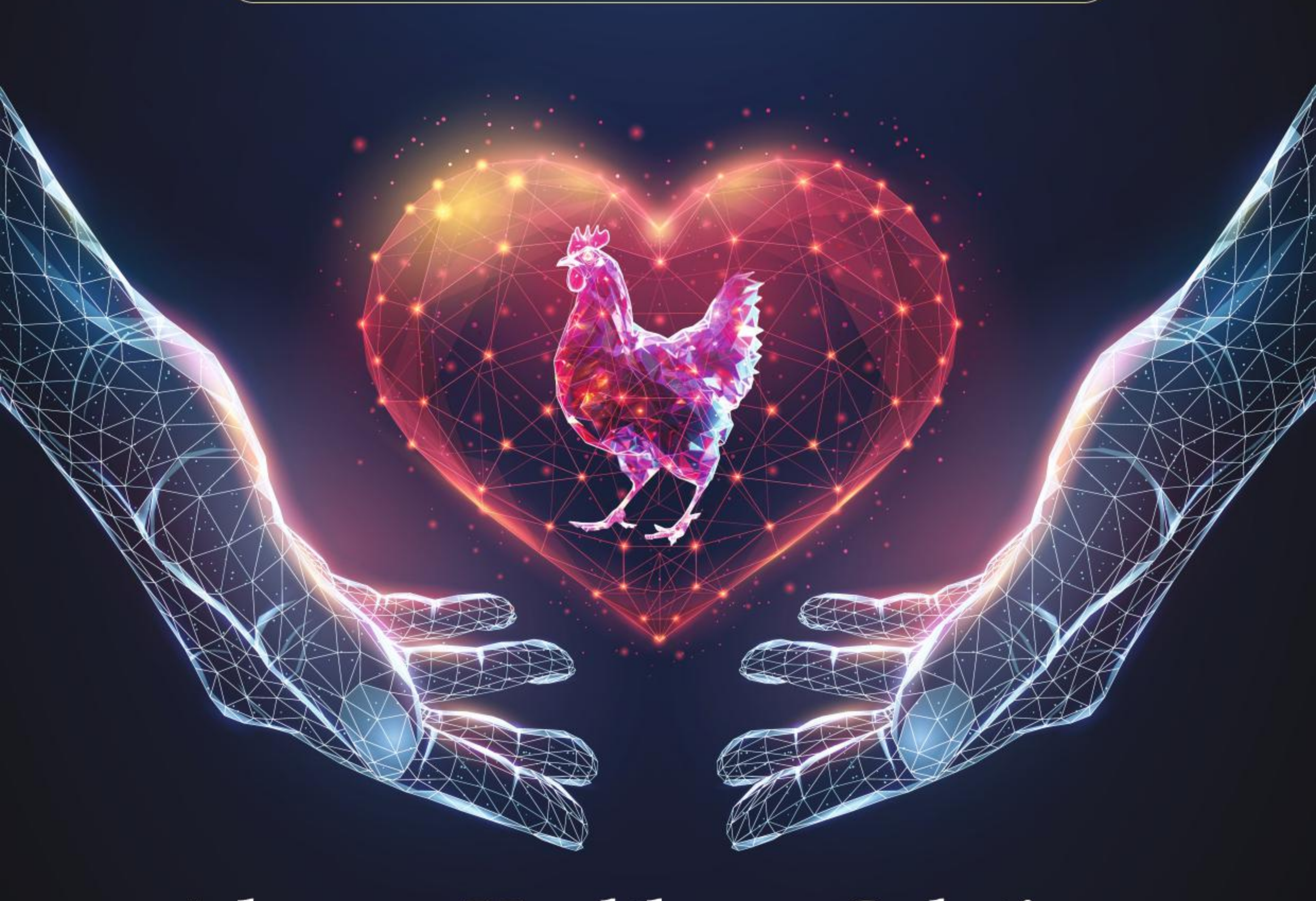

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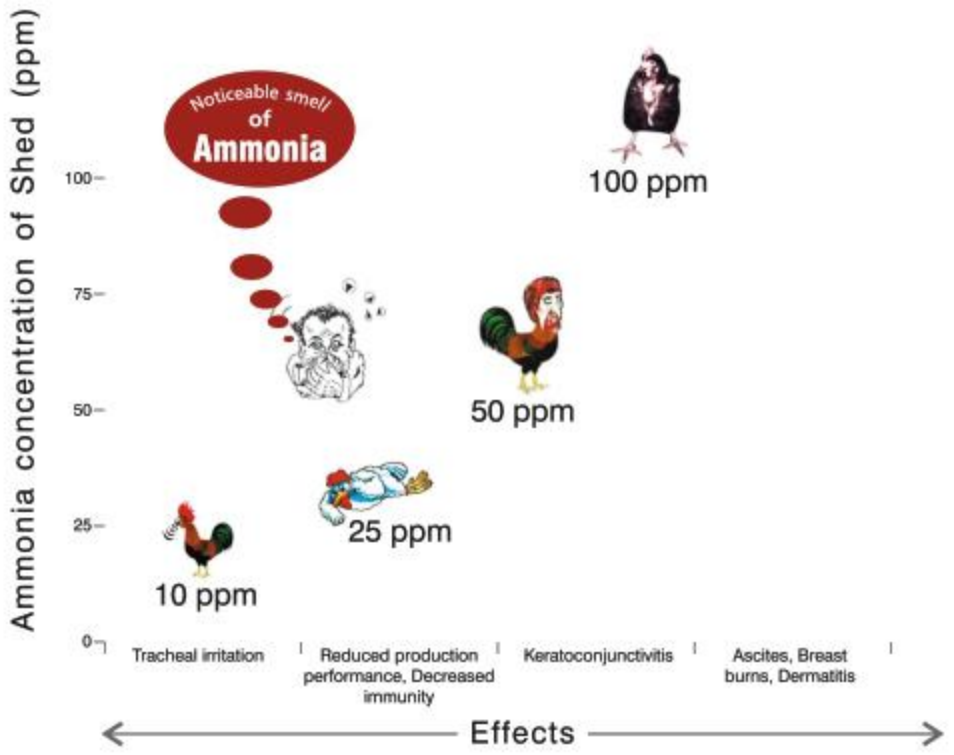

Ammonia menace and welfare concern in poultry houses

Above 25 ppm of ammonia concentration in poultry shed leads to noticeable smell, eye irritation and reduction in growth and production indices.

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Science based natural solution for ammonia control in poultry house

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- For minimising the level of atmospheric and systemic ammonia and other noxious gases.
- To create healthier living conditions, reduce stress levels and to improve farm environment.
- For enhancing the level of beneficial gut microflora and to reduce disease susceptibility especially intestinal and respiratory diseases.
- For better farm productivity and profitability.

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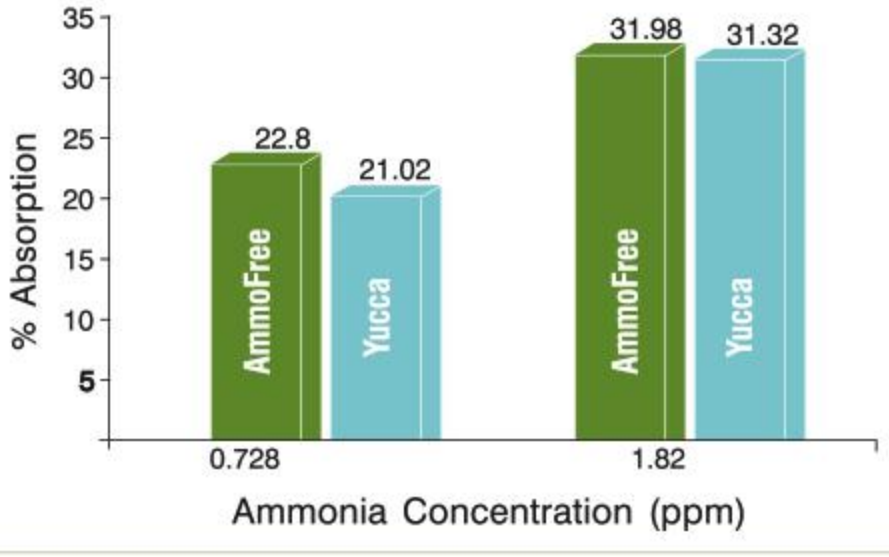
double dosage when the level of ammonia is more than 25ppm.

PRESENTATION

1 kg & 10 kg bag

SCIENTIFIC VALIDATION

Effect of AmmoFree and Yucca extract on absorption of ammonia



Effect of AmmoFree* at broiler farm in winter (14° - 15°C) with noticeable ammonia concentration

Group	Livability (%)	Birds showing respiratory discomfort	Faecal NH3 (g/kg dry faeces)	
			Day 21	Day 42
Control	95.00	7	3.86	3.92 (+1.55%)
AmmoFree 200g/ton	96.67	X	3.95	2.71 (-45.75%)

Trial at Commercial Poultry Farm under technical guidance of Dr. Rama Subba Reddy

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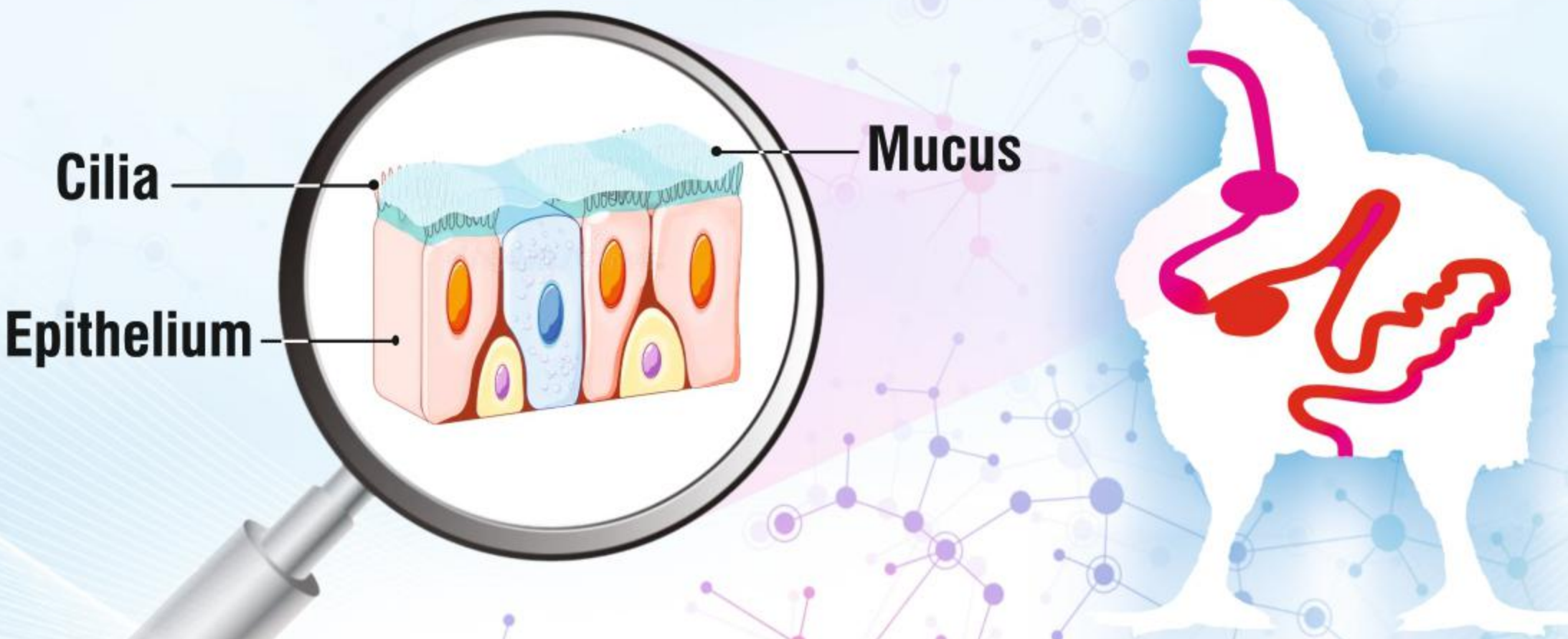

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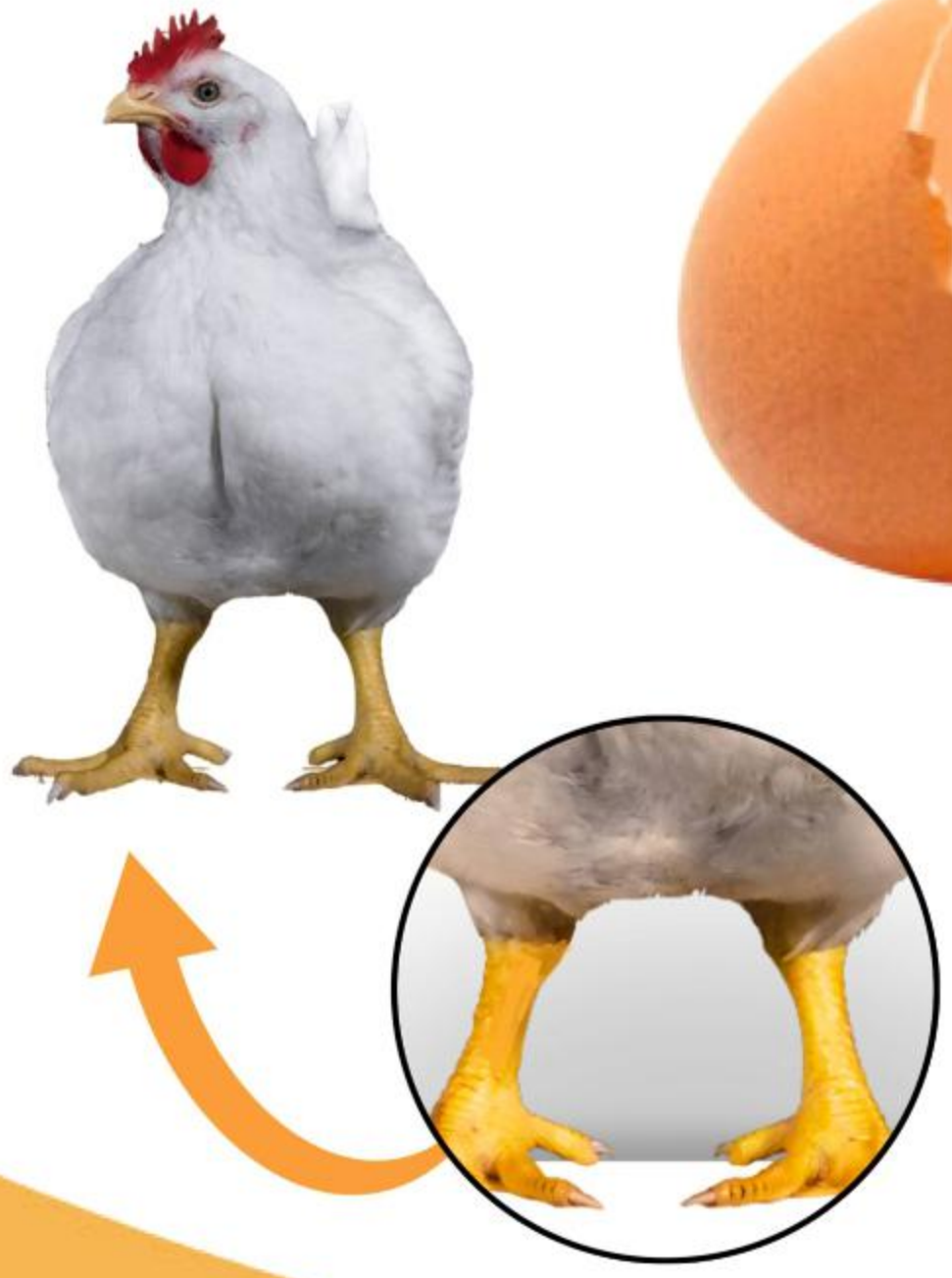

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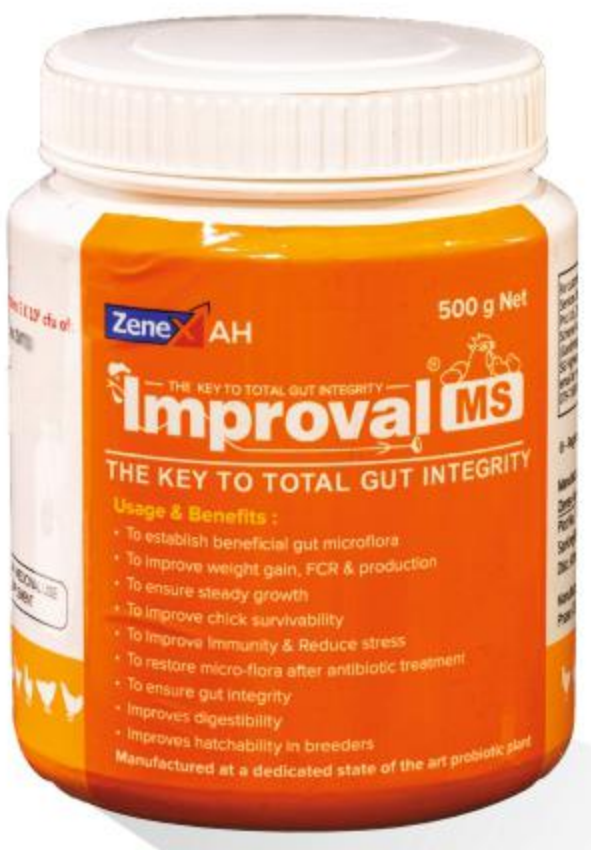

#1 FCR point represent third/last decimal point of 1000

*Majority of field trials were conducted at same farm with multiple sheds in integrations across various geographical locations and at different time of the year. Some of the integrators were generous in sharing complete production indices while others communicated the summary of the trial results. In the field trials, Improval MS was compared with antibiotic/probiotic/antibiotic + probiotic/probiotic + prebiotic control. Detailed reports availble on request.


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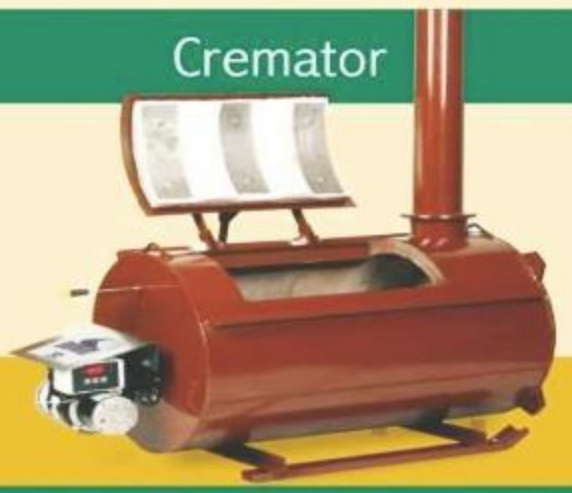

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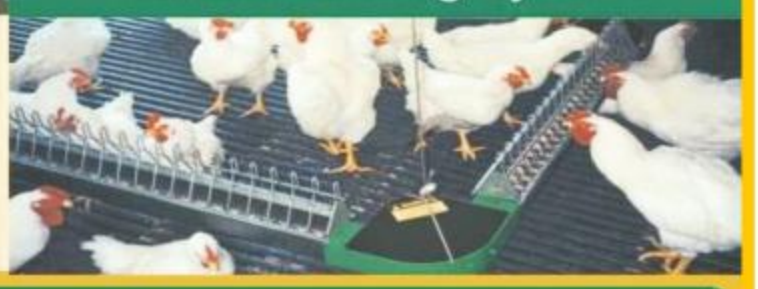

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Venkateshwara B V Biocorp Pvt. Ltd Hosts "venworld Connect – Get Connected with the Knowledge" Technical Seminars Driving Better Layer Nutrition In Haryana



The Venworld team recently organized a Layer Farmer Seminar in Haryana, bringing together a large number of poultry farmers for meaningful knowledge exchange. The technical seminar, held on **Friday, 14 November 2025**, in **Kurukshetra**, witnessed excellent participation from farmers across the region. Conducted under the theme **"Advances in Layer Nutrition with the Eggxtra Approach,"** the event highlighted modern nutritional practices for better egg production and strengthened disease prevention core elements essential for sustainable and productive layer farming.

The seminar began with a welcome address by **Mr. Shashi Bhushan,** AGM-North Zone, who emphasized Venworld's on-going commitment to providing farmers with advanced technical expertise and forward-looking feeding solutions. He highlighted the company's mission to promote science-based practices that drive productivity, profitability, and long-term sustainability in the poultry industry.

Expert Technical Sessions

Advances in Layer Nutrition

The technical sessions formed the core of the event. **Dr. Roshan Sarode, Manager - Nutritional Services**, delivered a detailed and practical presentation on recent developments in **layer nutrition** and their impact on overall flock performance. He explained how precision nutrition during early growth significantly affects pullet body weight, frame development, flock uniformity, and ultimately egg size and consistency during the laying cycle.

Dr. Sarode further elaborated on the **Eggxtra 5% Layer Premix**, designed to deliver precise and balanced nutrition throughout the bird's life. He highlighted the Eggxtra 5% Layer Premix, an enriched formulation containing essential vitamins, minerals, enzymes (phytase and xylanase), liver tonics, toxin binders, antioxidants, coccidiostat and other vital feed additives which are required for the consistent layer performance. He explained that farmers simply need to include an energy source (maize), a protein source (such as soybean meal), and a calcium source (like marble grit), while the remaining **5%** is fulfilled by the Eggxtra premix ensuring a complete, balanced, and scientifically formulated feed. He also highlighted that Venworld's specialized Nutritional Services Team designs customized feed programs tailored to each farmer's specific requirements. This expert support helps farmers explore different locally available feed ingredients, optimize formulations, and achieve cost-effective, performance-driven nutrition solutions.




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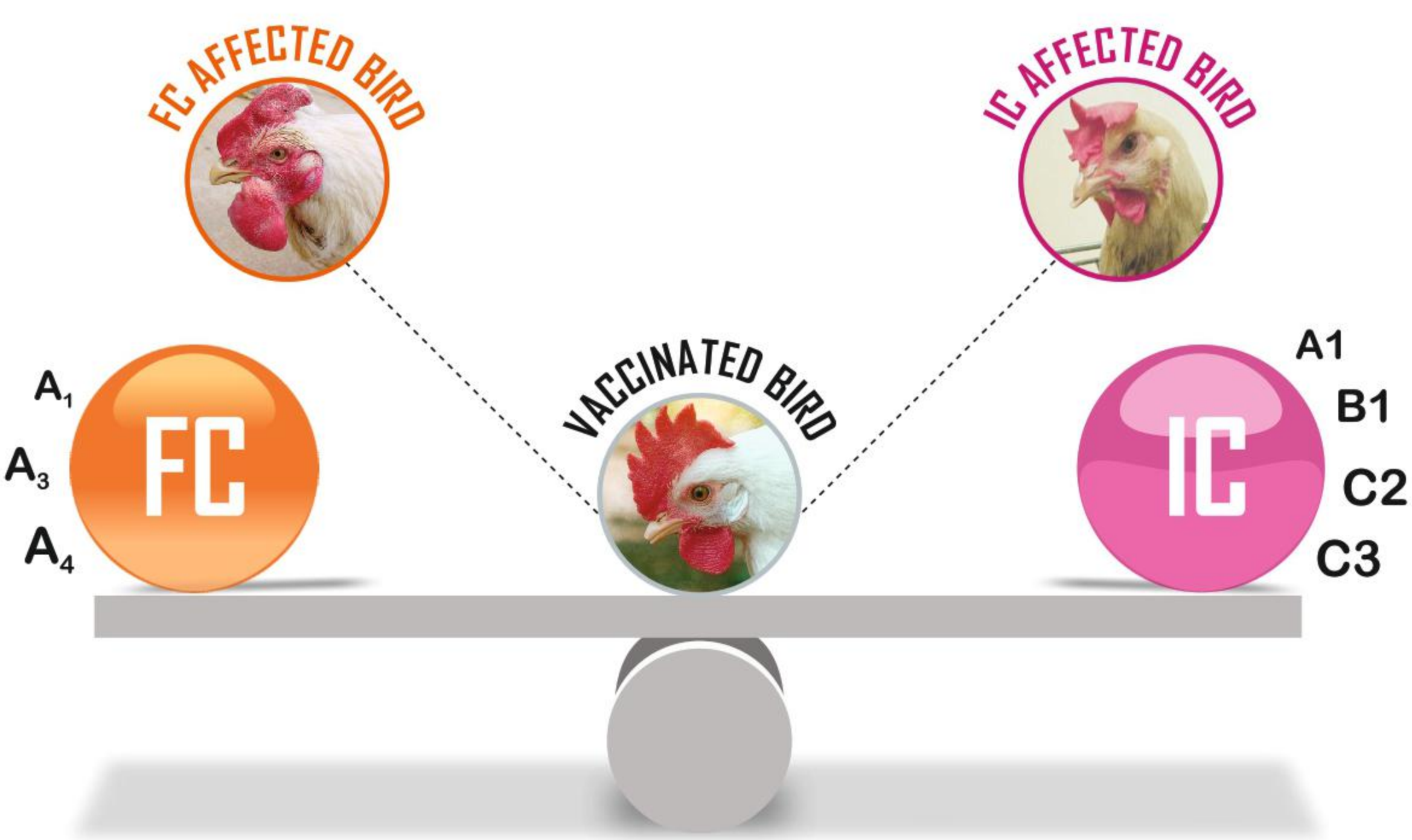

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This approach minimizes mixing errors, simplifies feed preparation, and guarantees consistent nutrition from the feed mill to the farm, ultimately resulting in improved flock performance and reliable egg production.

Prioritizing Poultry Health Through Vaccination

In another important session, **Dr.Narendra Sharma, Technical Manager**, addressed the increasing disease challenges in poultry, focusing particularly on viral infections that lead to poor weight gain, reduced feed efficiency, immune suppression, organ damage, and compromised egg quality. He emphasized the importance of preventive vaccination and introduced Venworld's LPAI vaccine, **VenGem,** which offers strong protection against low pathogenic avian influenza. Reinforcing the principle that "prevention is better than cure,"Dr. Sharma encouraged farmers to follow well-planned vaccination schedules to maintain flock health and productivity.

An environment of open communication prevailed throughout the seminar, with farmers actively sharing their practical experiences and seeking solutions to on-field challenges. The high level of participation reflected the poultry community's growing interest in scientifically proven nutrition programs, safe feed management practices, and holistic flock health strategies.

"The seminar was held under the leadership of Mr. Deepak Khosla, General Manager - Sales and Marketing, Venky's India Limited and Dr. Sunil Nadgauda - DGM- Technical Pune" Special appreciation was extended to the entire Venworld sales team, especially **Mr. Sandeep Saini** and **Mr. Ram Mehar**, for their dedicated efforts in planning and executing the event successfully.

In conclusion, the seminar not only deepened farmers' understanding of layer nutrition, disease prevention, and vaccination practices, but also strengthened their connection with Venworld. The event reaffirmed Venworld's position as a trusted partner in enhancing poultry health, productivity, and overall farm profitability.

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ARTICLE

Mycotoxins in the finished Poultry Feeds

Dr S.K.Maini
Poultry Consultant, Hyderabad

Multiple mycotoxins in finished poultry feeds originate mostly from the feed ingredients, having higher than normal levels of moisture, improperly handled, stored and transported.

Data reported as per a recent Mycotoxins Survey (2025), conducted by dsm-firmenich, states that 82 % of the samples collected and analysed were positive for the mycotoxins, their metabolites and masked toxins and some of the new and emerging combinations of mycotoxins and their metabolites.

Using the latest detection methods, the liquid Chromatography-Mass Specrometry (LC/MS)., it is reported that an on average 42 different mycotoxins and their metabolites were present in each sample. They also reported 10 out of 10 samples tested were contaminated with Fusarium toxins, another alarming information they put forth was 98 % of the tested samples contained a combination of 10 or more metabolites. All these have negative effects on the birds health, its immune system, performance and the farms profitability.

The best looking feed ingredients also contained higher than normal levels of mycotoxins and their metabolites, as a result of these the birds continue to suffer, industry experts, farmers and farm manager's blame the mutations of the field Virus, the migratory birds, new and emerging diseases, vaccine failure etc., hardly any one looks towards the actual problem of multiple mycotoxins, the presence of their metabolites, the masked mycotoxins and the new and emerging types.

Three main issues need to be attended to and looked into very seriously, (1) The proper mitigation methods for these mycotoxins, as no single toxin binder, rotation of the binders or even a combination of binders is good enough to solve the problem totally. (2) the immuno-suppression leading to vaccine failure and repeated disease outbreaks with higher than normal mortalities caused by the presence of multiple mycotoxins, their various combinations and due to the presence of their metabolites and the (3) the damage done to the Gastro intestinal tract, and the associated organs like the liver, pancreas, kidneys and the overall disturbed metabolism. Presence of multiplemycotoxins and the complications created by their metabolites, are a very serious and complicated issue for the poultry industry, not easy to understand and solve, as several systems of the birds body are simultaneously involved, in ruining its health and performance.

No single product, practice or procedure can take care of all the above mentioned issues, each one has to be adequately and appropriately tackled that involves sufficient knowledge of good management, nutrition, prevalent diseases, their prevention and control, timely and proper vaccination program, hygiene and sanitation plus a lot of common sense.

The economic impact of the damage due to the presence of multiple mycotoxins, complicated with their metabolites is very difficult to calculate, but on annual basis it runs into several thousand crores.

Listed below are some of the items that directly and indirectly impact the farm, its performance and profitability.

Item	Direct Cost	Indirect Cost
Contamination with mycotoxins	Increases risk of diseases immune-suppression	Testing and monitoring is expensive
Reduced Feed efficiency and performance	Poor performance of the birds, less weight gains, lack of uniformity and overall poor Performance	Disturbance in timely marketing, break in poor growing cycle
Treatment Cost	Much higher usage of medicines and Veterinary cost	Difficult to market/sell sick birds
Reproduction in the Breeders	Poor production, fertility hatchability and liveability	Reputation and name seriously affected, future sale impacted
Morbidity and Mortality.	Sick birds don't perform, Dead birds disposal also costs money.	Confusion, loss of Confidence and financial losses

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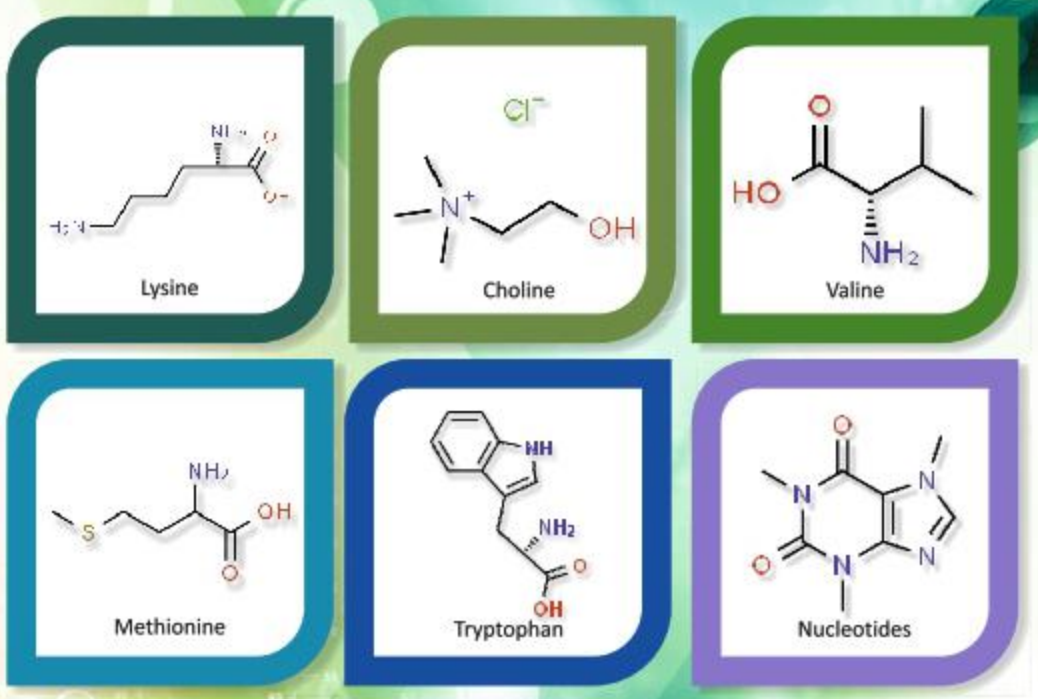

To achieve high efficiency poultry farming, a finely balanced feed formula with high bioavailability of feed nutritional fractions especially of critical ingredients including limiting amino acids, trace minerals etc., are required. To attain this balance, supplementation becomes extremely crucial to attain maximum bird performance and productivity.

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ARTICLE

Effects of Vitamins on Hatchability in Poultry A Review

Dr Rajeeb Kumar Roy
Dr Debashis Dutta

Hatchability is a key parameter in poultry production, reflecting both fertility and embryo survival during incubation. Vitamins play pivotal roles in numerous physiological and biochemical processes related to reproduction, embryonic development, antioxidant defense, and metabolic regulation. This review synthesizes current literature on how different vitamins (A, B complex, C, D, E) affect hatchability, embryo mortality, chick quality, and related parameters. Evidence supports the positive roles of many vitamins, though effects often depend on dosage, timing (maternal diet vs in-ovo injection), storage conditions of eggs, and breed/strain. Understanding optimal vitamin supplementation can lead to improved reproductive performance, reduced mortality, and better chick vigor.

Introduction

- **Hatchability** = proportion of fertilized eggs that produce live chicks. It depends on fertility, embryo survival, egg quality, storage, incubation conditions.
- Vitamins are organic micronutrients essential for normal metabolism. Deficiency or suboptimal supply can impair embryo development, cause increased mortality, deformities, weak chicks.
- Vitamins can be supplied via maternal diet, via in ovo injection, or other means.

This review examines main vitamins studied (A, B complex, C, D, E), their mechanisms, experimental findings, and gaps for future research.

Vitamins and Their Roles Related to Hatchability

Here are the different vitamins, mechanisms by which they influence hatchability, and empirical evidence.

Vitamin	Mechanisms relevant to hatchability	Empirical findings
Vitamin A	Important for cell differentiation, epithelial integrity, vision; influences fertility of hens/cocks; supports immune function; may reduce embryonic malformations linked to vitamin A deficiency.	In *Anak 2000 breeders*, combined administration of vitamin A + E improved fertility and hatchability significantly: before treatment fertility ~ 46%, hatchability ~ 40.5%; after ~ 76.9% fertility & ~ 76.8% hatchability. journal.funaab.edu.ng
B Vitamins (B1, B2, B12 etc.)	Coenzymes in energy metabolism, growth; needed for nucleic acid and protein synthesis; influences embryo mortality; support nervous system development.	A recent study injecting vitamins B1, B2 and E in ovo in Cobb 500 eggs found that hatchability rates were *not significantly affected* , but late embryonic mortality decreased, chick weight increased, and other biochemical parameters improved. jappmu.journals.ekb.eg
Vitamin C mortality.	Strong antioxidant; may help reduce oxidative stress especially during heat stress or long storage; supports capillary integrity, reduction of embryo	In ovo injection studies: in chickens, vitamin C injection did *not* significantly change hatchability (though there were improvements in embryo survivals etc.), but in ducks, injections of vitamin C produced large improvements (difference ~32.5 percentage points in hatchability) compared to control. PubMed
Vitamin D (esp. D3)	Regulates calcium metabolism; necessary for eggshell quality; embryo skeletal development; influence on fertility and embryonic death.	- Turkey hens fed low D3 (300 IU/kg) had reduced hatchability compared to those fed higher levels (900 or 2700 IU/kg). PubMed - A study in "two local strains" of chickens with varying levels of dietary D3 showed effects on fertility & hatchability depending on age, strain, supplementation. EKB Journals - Also in ovo injection of D3 (with E) improved hatchability in some studies. veterinaria.org

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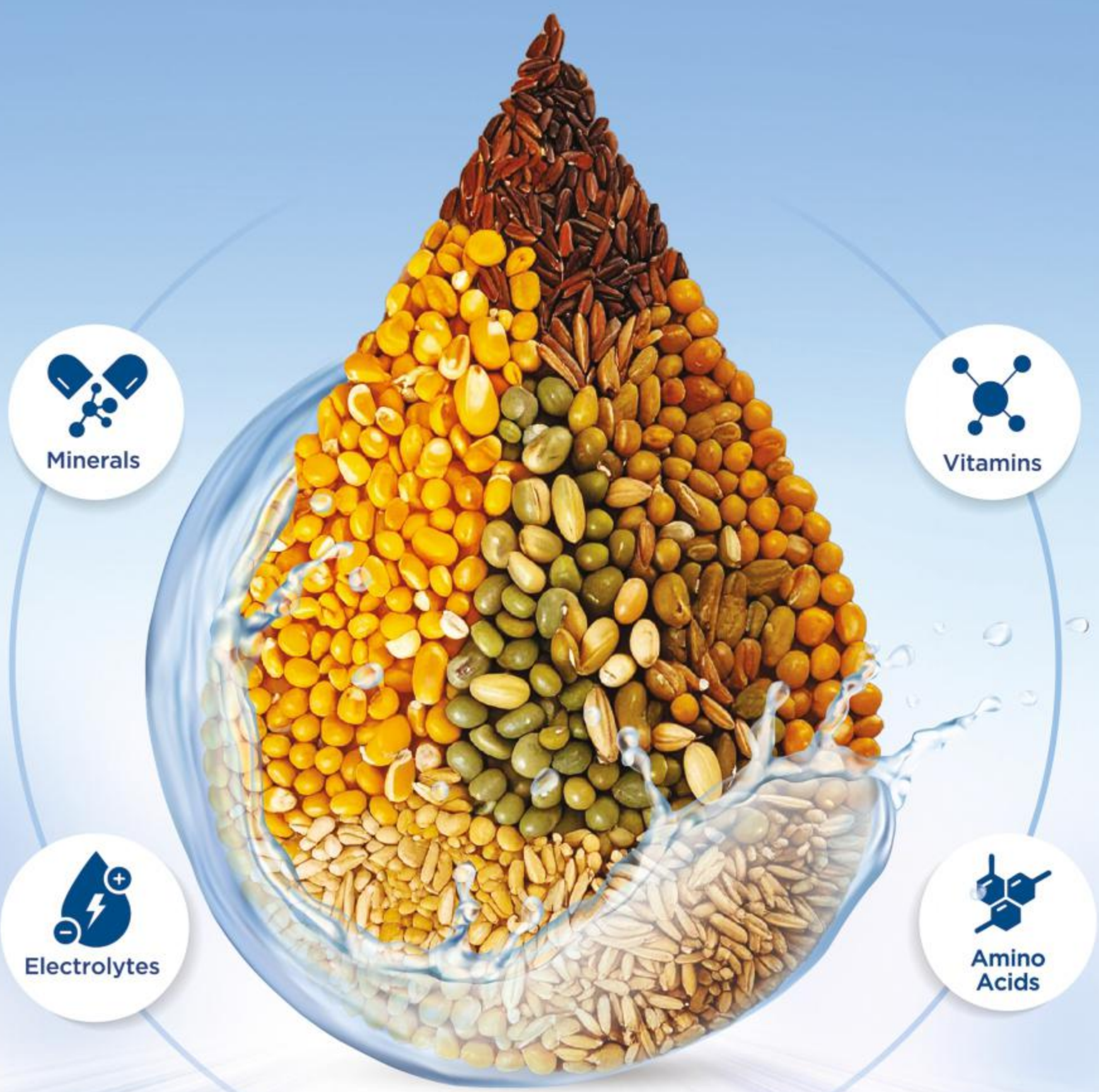

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Vitamin E	One of the most frequently studied; potent antioxidant; protects lipids, membranes during oxidative stress; helps embryo survival during storage and incubation; supports immune function.	Many findings: • Maternal dietary vitamin E at higher levels (200-400 mg/kg) increased hatchability of fertile eggs, decreased early embryonic mortality, improved antioxidant markers. PubMed • In ovo feeding of vitamin E increased hatch rate, improved hatchling quality and oxidative state; higher doses (e.g. 60.4 IU in one study) gave best results. PubMed • But some studies found that up to certain levels no additional benefits, and beyond may be less effective or wasteful. E.g. in the vitamin E supplementation in a ration with fish oil, increased fertility but **no significant effect** on hatchability or hatch weight. Directory of Open Access Journals

Factors Affecting the Effects of Vitamins on Hatchability

From the literature, several modifying factors are important:

1. **Dosage**: too low → deficiency; too high → possible toxicity or diminishing returns.
2. **Form / Route of administration**: maternal diet vs in ovo injection. In ovo injections (late incubation) can give direct benefit to embryo, but timing is critical.
3. **Egg storage**: Eggs stored for long periods see more oxidative damage; vitamins, especially antioxidants (E, C) can ameliorate damage during storage. Vitamin E dietary supplementation shown to be more effective when eggs stored 14 days. MDPI
4. **Breed/strain and age**: Different strains have different baseline vitamin requirements; aged breeder hens may deposit less nutrients; strain may affect sensitivity.
5. **Environmental stressors**: Heat stress, humidity, incubation environment; nutritional stress; oxidative stress. Under stress, vitamin requirements often increase.
6. **Interactions among vitamins and with other micronutrients**: e.g. Vitamin E with selenium; Vitamin A with E; Vitamin D with calcium; B vitamins with folate etc. Synergistic or antagonistic effects matter.

Case Studies / Key Experimental Findings

- **Maternal Vitamin E**: In Ross 308 breeder hens, increasing dietary vitamin E to 200-400 mg/kg improved hatchability of fertile eggs, improved antioxidant status of embryos and newly hatched chicks, lowered early embryonic mortality. PubMed
- **In Ovo Vitamin E Feeding**: Injection of vitamin E at day 17–17.5 of incubation resulted in higher hatch rate, better chick quality (body weight, physical quality), improved intestinal development. Best results observed with ~60.4 IU VE in one study. PubMed
- **Vitamin D3**: Turkeys receiving only 300 IU D3/kg had lower eggshell quality and reduced hatchability vs those getting higher D3 levels. Embryo malformations (shortened upper mandible) observed under low D3. PubMed
- **Vitamin C in Ducks**: In ovo injection of vitamin C in Pekin duck eggs on certain days (day 12 or 20) increased hatchability significantly over controls. PubMed
- **Combined Supplementation**: Vitamin E + selenium in guinea fowl improved incubation response, embryo development, post-hatch growth. PubMed

Limitations, Inconsistencies & Gaps

- Some studies do *not* find significant effects on hatchability despite positive effects on embryo mortality, chick weight, or biochemical parameters. Example: the in ovo feeding of B1, B2, E in one study showed no significant difference in hatchability but better chick weights. jappmu.journals.ekb.eg
- Variability in experimental designs: differences in breeds, incubation conditions, egg storage, maternal nutrition background, making comparisons difficult.
- Dosage standardization lacking: what is "optimal" vitamin level often depends on context; risk of excessive levels not always well studied.
- Long-term effects post hatching (e.g., growth, immunity) less often measured in relation to hatchability.
- Little work on certain vitamins (some B vitamins, vitamins K) in relation to hatchability.

Practical Implications & Recommendations

Based on the reviewed evidence, the following practices are likely to improve hatchability via vitamin strategies:

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- Ensure breeder hens have adequate dietary vitamin E, especially under conditions of egg storage or environmental stress.
- Monitor vitamin D3 levels in breeder diets to ensure proper eggshell formation and embryo development.
- Use in ovo injection of antioxidant vitamins (E, possibly C) in late incubation periods to enhance chick quality, reduce late embryo mortality—particularly in settings where breeders are under heat stress or eggs are stored for long.
- Combine vitamins with other micronutrients (selenium, trace minerals) to exploit synergistic effects.
- Regularly evaluate fertility, hatchability, embryonic mortality, and hatchling quality to adjust supplementation regimes, since breed, age, environmental factors influence needs.
- Avoid oversupplementation; test for residual effects or toxicity (though most studies show safety in ranges used).

Conclusions

- Vitamins have a substantial impact on hatchability in poultry, mainly through supporting embryo survival, antioxidant defense, and proper physiological development.
- Among vitamins, vitamin E, vitamin D3, and combinations (vitamin A + E, vitamin E + selenium) show the strongest, most consistent positive effects.
- In ovo injection of vitamins offers a valuable tool in certain cases, but isn't always necessary or effective for hatchability itself (though improves chick quality often).
- More standardized studies are needed to determine optimal levels for various strains and management conditions, especially under stress (storage, heat, etc.).
- Ultimately, optimizing vitamin supplementation in breeder diets (and when appropriate via in ovo methods) is a cost-effective way to improve hatchability, reduce embryonic mortality, and obtain healthier chicks.

Dr Rajeeb Kumar Roy
MVSc

Dr Debashis Dutta
MVSc, PhD (Pursuing)

RR Animal Healthcare Limited

BULLETIN

डा. मोहन लाल कंसल

20.02.1937 - 08.10.2025

श्रदाजंलि

दुखी मन से लिख रहा हूँ कि अब हमारे बीच डॉक्टर मोहन लाल कंसल नहीं रहे। यह हृदय विदारक खबर दिनांक 08 अक्टूबर 2025 को लखनऊ में आयोजित पोल्ट्री फेडरेशन के AGM में सैकड़ों लोगों के बीच आई। सभी शोकाकुल थे क्योंकि डॉक्टर साहब ने एक बहुत लम्बी पारी लुधियाना यूनिवर्सिटी से लेकर अपनी पोल्ट्री फार्मिंग तक खेली, जिसमे उन्होंने बहुत से नए आयाम पोल्ट्री इंडस्ट्री को दिए। इसमें प्रमुख है उनका शोध और "डिजाइनर एग" को लेकर। उन्होंने उम्र और आवश्यकता अनुसार भिन्न–भिन्न प्रकार के डिजाइनर एग बनाये। बैक्टीरिया फ्री की गारंटी दी और यही नहीं लम्बे होल्डिंग समय के साथ 'महक' की भी गारंटी दी। सभी लैब टेस्ट में खरे निकले।

डॉक्टर मोहन लाल कंसल जहां एक वैज्ञानिक थे वहीं 'प्रैक्टिकल' भी थे। भारत में फीड एडिटिव्स की भरमार है, नित नए–नए आते जा रहे हैं। उन्हें उपयोग में लाने से पहले अपने फार्म पर उसका ट्रायल लेते फिर उसे बड़े पैमाने पर उपयोग में लाते। उनके पास ट्रायल रिपोर्ट्स का खजाना था जो उनके आकस्मिक निधन के साथ हमने खो दिया– बहुत बड़ा सरमाया चला गया।

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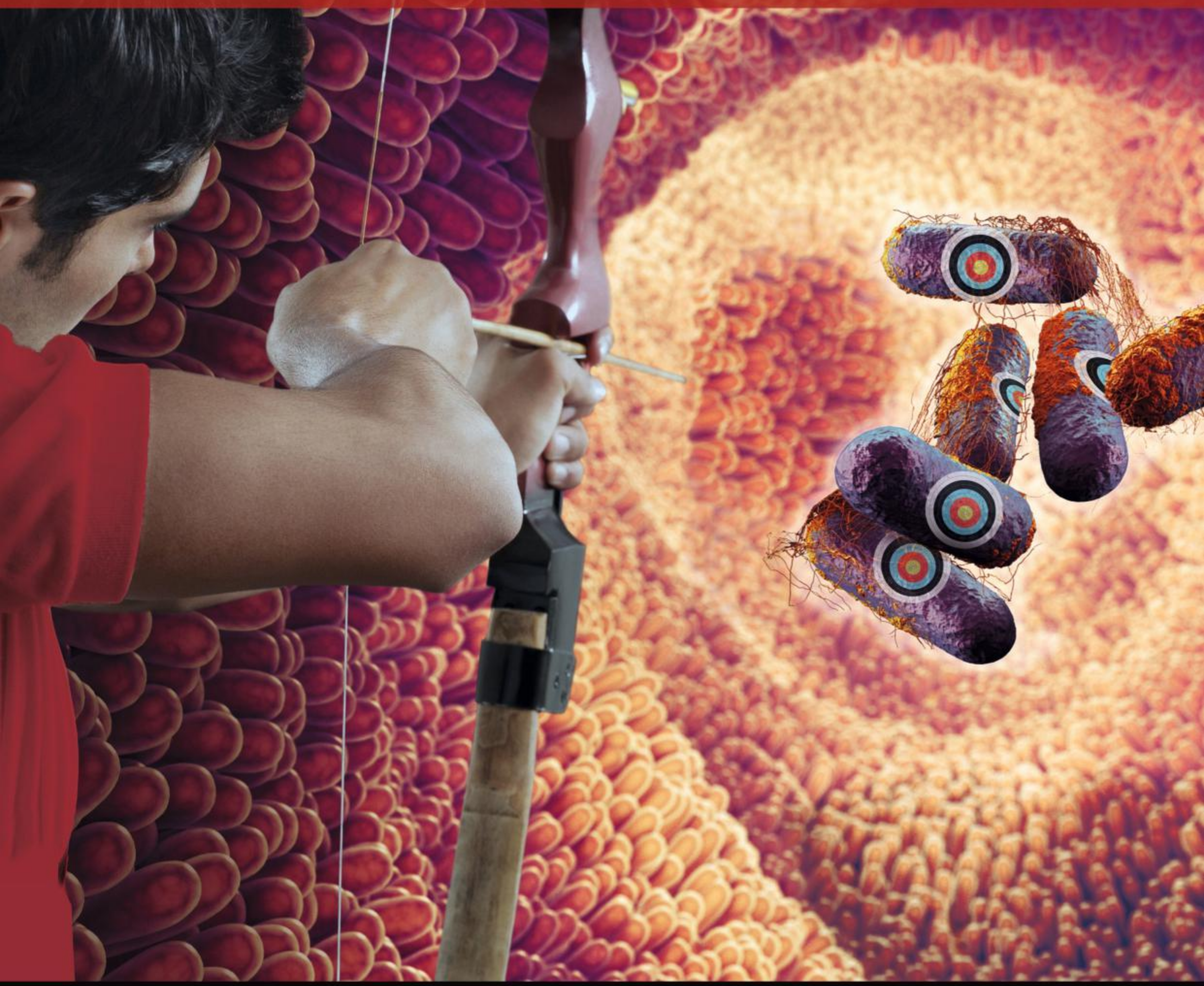

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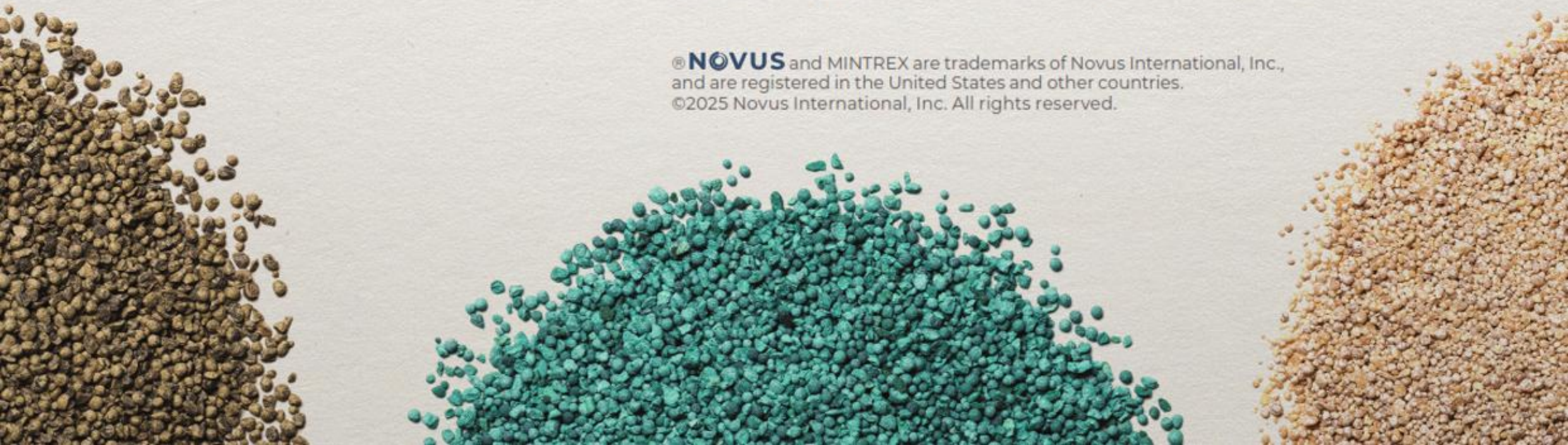

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