POULTRY TECHNOLOGY

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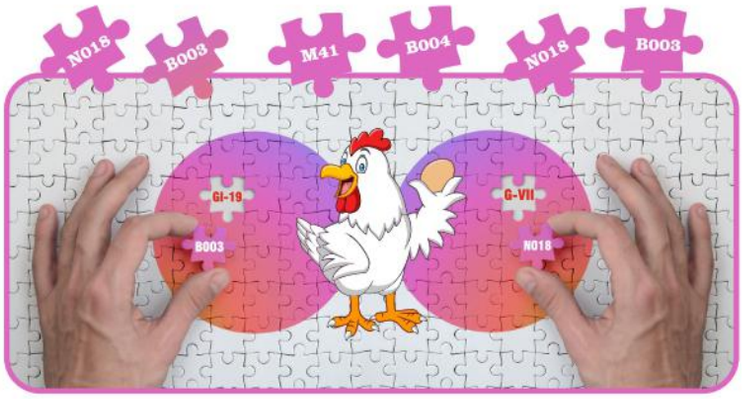

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From the Editor's Desk

Clever-ji-wal

Pakistan burns KFC in POK.

Pathetic ignorance of people being rolled out of their religious factories is pushing Pakistan into the dark age. They claim burning KFC is in support of Palestinians. But the investors, market and consumers are the poor Pakistanis. The tunnels of Palestine have actively run chain of KFC franchisees from Egypt to feed them. Keeping your citizens ignorant ignorance can be dangerous to the world.

Amused to note that - why in the world, the USA, China, Pakistan, so hyper and reacting to CM Kejriwals arrest ? – definitely requires more deeper understanding. There is no smoke without fire. The links about anti-nationals and all activities relating to money laundering will be in the open soon. Khalistani sympathizers, and anti India lobby are all up in arms against the arrest to save their own skins and not to open the Pandora's box. Imagine the audacity of the United Nations interfering in the internal affairs of the country; it's good for India as now the Deep State is getting exposed to Indians and others.

Kejriwal assumes the intelligentsia, educated citizens and authorities can be fooled with his hood winking tactics, like he has succeeded until now. His gullible freebie voters who are now victimized realise it with pain.

Indian politics is no more Indian, but has been globalized. The tremendous sustained growth Bhai India under the leadership of Sri. Narendra Modi is not tolerable by many vested interest across the world. Now we see many common enemies ganging up together against the country. We also see in domestic politics That the opposition is united with the common single point agenda of being anti-Modi- this is indeed, immature and ridiculous. The citizen of India should read this in time to avoid a danger.

AAP came into existence, using the face of Anna Hazare, lit, was hijacked by Arvind Kejriwal; The party was heavily funded by CIA through the Ford foundation and was therefore was a consequent recipient to Magsaysay award. The CIA finances several NGO through which they exercise influence regime, change and control of media, religious institutions and policy makers several political parties in the past where long-term beneficiary is of such an arrangement that answers why the world is so sensitive to anything happening in India, which actually is its own internal affairs.

Instead of humanity-which civilizations are supposed to evolve into they degrade themselves into religious wars. Some religion drive community and nations into wars, causing self destruction and harm to others. It's high time with awareness people stop playing politics and drive a wedge between people in the name of religion.

The people of Palestine are victims of the religious war lords who have their own personal agenda and keep Ingewar alive at the cost of innocent misguided, children, men, and women, without exception, whether in India or abroad, all these religious heads, have their own children, kit and studying living and prospering outside these Communities or their own country - this should be enough for people those who blindly follow them.

Farmers are generally happy with the market considering that it is supposed to be a lean season!

Editor

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फिर वही सबसे पुरानी समस्या या बीमारी फफूंद रोग या ब्रूडर निमोनिया या असपरजिलोसिस पर चर्चा की क्यों आवश्यकता है ?

एन्काउन्टर नं. 248:– सचमुच यह भारत परिवेश में सबसे पहले एवं सबसे पुरानी समस्या या बीमारी है। इसे सन् 1960 के दशक से देखता आ रहा हूँ और आज भी इसके दर्शन हो जाते हैं। पता नहीं क्यों पिछले एक सप्ताह में 3–4 फोन आ गये बिहार एवं उत्तर प्रदेश से जिस 4 दिन से 10 दिन के ब्रायलर चिक्स में 4–5 चूजों से लेकर 60–70 तक मोर्टिलिटी पहुंच गयी। इसमें अक्सर चूजे मुँह खोल कर सांस लेते हैं– कभी–कभी सीटी की आवाज भी सुनाई देती है। अधिकाँश इसे प्रारम्भ में CRD समझ कर एंटीबायोटिक लगा देते हैं। इससे फायदा होने की बजाए उल्टा नुक्सान ही होता है। जो फोन आये उसमें से एक केस ऐसा ही था। उनसे जब कहा फेफड़े की फोटो भेजो तो वह फफूंद रोग निकला। बाकी सारे केस भी फफूंद के ही थे।

इसका कोई समय निर्धारित नहीं है, कई बार तो एक दिन के चूजे में भी मिला है। यह कोई अचरज की बात नहीं है। यह समस्या पहले दिन से 3 सप्ताह तक कभी भी आ सकती है। जब किसान को बताया यह समस्या हैचर से आई है तो उसने तुरंत ब्रीडर को कॉल किया। ब्रीडर का कहना था कि "ऐसा कभी हो ही नहीं सकता। यह समस्या फीड से आई होगी।" थोड़ी देर बाद ब्रीडर का स्वयं फोन आ गया और वह लड़ने–मरने को तैयार थे। उनका कहना था कि "आपने कैसे हमारे ऊपर इलजाम डाल दिया। हम वाश करते हैं – स्प्रे करते हैं फिर फ्यूमिगेंट करते हैं। फिर अंडा ट्रांसफर करते हैं।" मैं सुनता रहा जब वह शांत हुए तब उनसे पूछा "क्या यह सब आप स्वयं करते हैं या स्टाफ करता है?" कहने लगे "स्टाफ करता है।" मैंने कहा "अभी स्टाफ से कोई बात मत नहीं करिएगा। जिस दिन अंडा सैटर से हैचर में ट्रांसफर करना है उस दिन किसी अच्छी लैब से डॉक्टर को बुला कर सैम्पल दें। 2–3 दिन में वह रिपोर्ट दे देगा। आपके सामने तथ्य आ जायेगा।" उन्होंने ऐसा ही किया। रिजल्ट ने उन्हें चौंका दिया। फंगस लोड (फफूंद) तो ज्यादा था ही, बैक्टीरिया लोड भी ज्यादा था। आज कल कलियुगी लेबर है ज्यादा समय स्मार्ट फोन पर लगाती है। असली काम शॉर्ट–कट से होता है।

कभी–कभी दूसरे दिन से ही मोर्टिलिटी होने लगती है। शेड में बुरादे की जगह बालू डाला गया है। इसके बावजूद ब्रूडर निमोनिया (फफूंद) के कारण मोर्टिलिटी शुरू हो जाती है। पहले चिक्स बॉक्स में "वुडवूल" का ही उपयोग होता था। यह तोल के हिसाब से आता था "ईमानदार" बेचने वाला वजन बढ़ाने के लिए पानी का स्प्रे कर देते थे। अकलमंद ब्रीडर वुडबुल को पहले धुप में सूखा कर तब बॉक्स में डालते थे। सूखने से पहले उसे फैला कर स्प्रे भी करते थे। बहुत से लोग ऐसा नहीं करते थे। अक्सर यह समस्या इस कारण से मिलती रहती थी। आज कल तो कागज के स्क्रैप भी उपयोग में आने लगे हैं।

अजीब विडम्बना है कि जब भी प्रारम्भ के दिनों में मोर्टिलिटी बढ़ने लगती है तो फीड पर शक–शुबहा किया जाता है जब यहाँ मसला हल ना हुआ तो सीधे हैचरी पर और यहाँ भी फेल हुए तो किसी बैक्टीरियल समस्या पर। इसमें जब हम असफल रहे तो "वायरल" कह कर अपना कालर और हाथ दोनों खड़ा कर अलग हो गए। प्रारंभिक समस्या में यह सबसे पहली समस्या है जिस पर ध्यान जाना चाहिए। यदि 'सा–डस्ट' लकड़ी के बुरादे पर पाला है तो इस समस्या को गंभीरता से लेना चाहिए और वहीं से जांच शुरू करना चाहिए। मैं वहीं से शुरू करता हूँ अक्सर समस्या शुरुआत में ही पकड़ में आ जाती है और इलाज भी आसानी से हो जाता है। भिन्न भिन्न चीजों का उपयोग विछावन के रूप में होता है। साडस्ट (लकड़ी का बुरादा), धान का छिलका, भूसा, मूंगफली का छिलका, वुड शेविंग (लकड़ी का छीलन) बलुही मिट्टी या रेत (बालू) इत्यादि का उपयोग होता है। इसमें फफूंद रोग के लिए सबसे खतरनाक गेहूं का भूसा या कोई और भूसा है। लकड़ी का बुरादा भी खतरनाक है परन्तु यदि इसको पहले भली भांति ट्रीट कर लिया जाये, वह भी ठीक से सूखने के बाद तो इस फफूंद दुर्घटना से बचा जा सकता है। बलुही मिट्टी या रेत और धान की भूसी काफी सुरक्षित है परन्तु धान की भूसी का ट्रीटमेंट कर लेना चाहिए, क्योंकि इसका जहाँ ढेर लगा है वहां जंगली पक्षी सदैव इसमें से कुछ चुन कर खाते हैं।

कुछ कारण आपको समझ में आ गये होंगे। इसके अलावा और भी कुछ कारण हो सकते हैं। वैसे तो कारण अपार हैं परन्तु यहाँ सक्षिप्त में विवरण कर देता हूँ।

फीड में नमी ज्यादा है और लम्प बन रहे है तो समस्या का आपको सामना करना पड़ सकता है। फीड यदि बुरादे में गिर रही है और जब एक दो दिन बाद चूजे चुगेंगे तो समस्या आ सकती है।

इसी प्रकार पानी से भी फंगस फैल सकता है विशेष रूप से यदि बर्तनों को प्रतिदिन ठीक से साफ नहीं किया जा रहा है। यहां पानी की टंकी की सफाई भी ठीक से कम से कम सप्ताह में एक बार करना जरूरी है।

चूजे डालने के बाद यदि बुरादे में नमी बढ़ रही हो और प्रतिदिन आप 'रेक' नहीं करते तो समस्या आ सकती है। यह मुख्य वजह हैं जिसके कारण समस्या की संभावनाएं बढ़ जाती हैं। वैसे और भी कारण हैं जिसे स्वयं आप अपने तजुर्बे से पकड़ सकते हैं।

इन सभी कारणों पर विशेष ध्यान रखें जिससे आप पूरा बचाव कर सकते हैं। अब आइये बात करते हैं जो इन फार्मों पर फफूंद रोग की समस्या आई। एक भी चूजा मरता है तो उसका पोस्टमॉर्टम अवश्य करें।

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जहाँ आप और अंगों का अध्यन करें वहीं फेफड़ों को विशेषता से ध्यानपूर्वक स्टडी करें। इसका रंग गुलाबी से लाली की तरफ जाता दिखेगा। प्रारम्भ में सूजी के दाने के सामान सफेद, गुलाबी या पीले दाने आपको दिख सकते हैं। अगर नहीं दिखे तो फेफड़ो को आराम से ध्यान से बहार निकाल लें और उनके पिछले हिस्से की इसी प्रकार स्टडी करें। यदि आपके पास अच्छा हाई पॉवर्ड लैंस हो तो उसका उपयोग करें। अगर पहली मोर्टिलिटी में दाने ना दिखें तो आप निश्चिन्त ना हो जाएँ। अगर उस फेफड़े का कोई हिस्सा कुछ गहराया है या लाल है या काले की और जा रहा है तो अच्छी कैंची या ब्लेड से पतली–पतली स्लाइस बना लें अगर कोई भी स्लाइस पानी में डूब जाये या आधा अंदर चला जाये और आधा ऊपर तैरता हो तो समझ लें ब्रूडर निमोनिया (फफूंद रोग) के लक्षण शुरू हो गए हैं। अगर नहीं हैं तो सभी स्लाइस पानी के ऊपर तैरते रहेंगे। अगर हैं तो दो–तीन दिन बाद यह दाने बड़े हो कर साफ दिखने लगेंगे। कुछ बड़े हो कर नन्हे मुन्ने गोभी के फूल लगने लगेंगे। बहर हाल जितना जल्दी इलाज शुरू करेंगे उतना ही ज्यादा फायदा होगा। इस प्रकार आप स्वयं जांच पड़ताल कर लें।

अब बात करते हैं इन फार्मों की जहाँ चूजे लकड़ी के बुरादे पर पाले गए थे। ध्यान रहे आरे मशीन पर पेड़ काट कर आते हैं वो आमतौर से ताजे होते हैं जिसमे नमी काफी रहती है। चीरने के बाद जो बुरादा निकलता है उसे एक जगह डंप करते जाते हैं। इसी नमी के कारण फफूंद यहीं बनना शुरू हो जाती है। आपने इस बुरादे को फार्म पर ले जाकर सीधे शेड में बिना किसी ट्रीटमेंट के डाल दिया। इस पर अखबार बिछा कर बच्चे छोड़ दिए। जब दो या तीन दिन बाद अखबार हटाया तो फफूंद का उन पर जबरदस्त हमला होगा। इसका कारण भी समझ लें। बुरादा भले ही आपने सुखाया हो जब डेढ़–दो इंच बिछा कर इसे अखबार से ढक देंगे और अखबार के ऊपर तापमान बनाएंगे तो बुरादे में जो भी नमी है वह ऊपर आएगी जिसे अखबार नीचे ही एकत्रित होने देगा। अतः अखबार के नीचे और बुरादे के ऊपरी हिस्से में अधिक नमी एकत्रित होने के कारण वहां पर सबसे अधिक फंगस उत्पन्न होगी। अखबार हटते ही यह हवा में फैलेगी और फफूंद रोग का कारण बनेगी। हमें करना क्या चाहिए? अखबार हटाने से पहले थोड़ा बुरादा सूखा कर कॉपर सल्फेट (नीले थोथे) का स्प्रे करें। इसके बाद इसमें 2 ग्राम ब्लीचिंग पाउडर और 3 ग्राम चूना प्रतिवर्ग फुट मिला कर तैयार रखें। अखबार को उल्टा मोड़ कर हटाएँ। अगर सीधा हटाएंगे तो जो भी फफूंद उसमें चिपका है, वह बुरादे पर गिरेगा या हवा में उड़ेगा। इसे उल्टा मोड़ कर इसमें सीधा आग लगा दें। जैसे जैसे अखबार को मोड़े 10 ML कॉपर सल्फेट प्रति लिटर पानी में मिलाकर बुरादे पर स्प्रे करते चलें। इसके बाद जो बुरादा आपने पहले से तैयार किया है उसे लीटर में मिलाकर रेक कर दें। यह सब बात हुई बचाव की। अब बात करते हैं समस्या आ जाने पर क्या करें?

ध्यान रहे जब समस्या आ जाये तो कभी भी किसी एंटीबायोटिक का उपयोग ना करें। केवल एंटीबायोटिक में आप NEODOX का उपयोग कर सकते हैं। इसके उपयोग के बारें में आगे चर्चा होगी। इसमें सबसे कारगर है कॉपर सल्फेट (नीला थोथा या तूतिए का उपयोग)। निम्न फॉर्मूले से इसका घोल बना लें। प्लास्टिक या शीशे की बोतल का उपयोग करें घोल बनाने में।

फार्मूला :–

(1) कॉपर सल्फेट 100 ग्राम (बारीक पाउडर)

(2) सिरका 100 ML

(3) पानी 100 ML

सभी बराबर मात्रा में लेना है इसे ठीक से हिलाएं ताकि कॉपर सल्फेट पूरा घुल जाये। जरूरत पड़े तो धुप में 3–4 घंटे के लिए रख दें ताकि ठीक से घुल जाये। अब इसको आप पिला सकते हैं।

1 ML प्रति लीटर पानी के हिसाब से आप इसे 5–6 घंटे के पानी में पीने को दें।

इसी का 15 ML प्रति लीटर के हिसाब से स्प्रे करें बुरादे पर – दाना–पानी या चूजों को हटाने की जरूरत नहीं। किसी एक पानी में विटामिन A 5 ML 100 चिक्स के हिसाब से पिला दें।

यह सब आपको कम–से–कम 4–5 दिन करना होगा। मोर्टिलिटी यदि 2–3 दिन में कम न हो तो बुरादे में 2 ग्राम ब्लीचिंग पाउडर एवं 3 ग्राम चूना पाउडर प्रति वर्ग फुट मिला कर रेकिंग करें।

कभी कभी लीटर बहुत खराब होने के कारण या उसमे फंगस की मात्रा बहुत अधिक होने के कारण मोर्टिलिटी रुकने का नाम ही नहीं लेती। ऐसी अवस्था में बेहतर होगा कि यदि शेड में जगह हो तो धान की भूसी या बलुही मिट्टी पर चूजों को शिफ्ट कर दें।

अक्सर देखा गया जिस फ्लॉक में फफूंद रोग आता है तो ठीक होने के बाद उसमें एसाईटिस (पेट में पानी) की समस्या भी आ जाती है। इससे जब निपट लेते हैं तो उसमे CRD का प्रकोप आ जाता है। अतः हमें प्रारम्भ से ही फफूंद रोग पर पूरा ध्यान रखना चाहिए और इसे दूर रखने का जतन करते रहना चाहिए।

Mr. Shabbir Ahmad Khan

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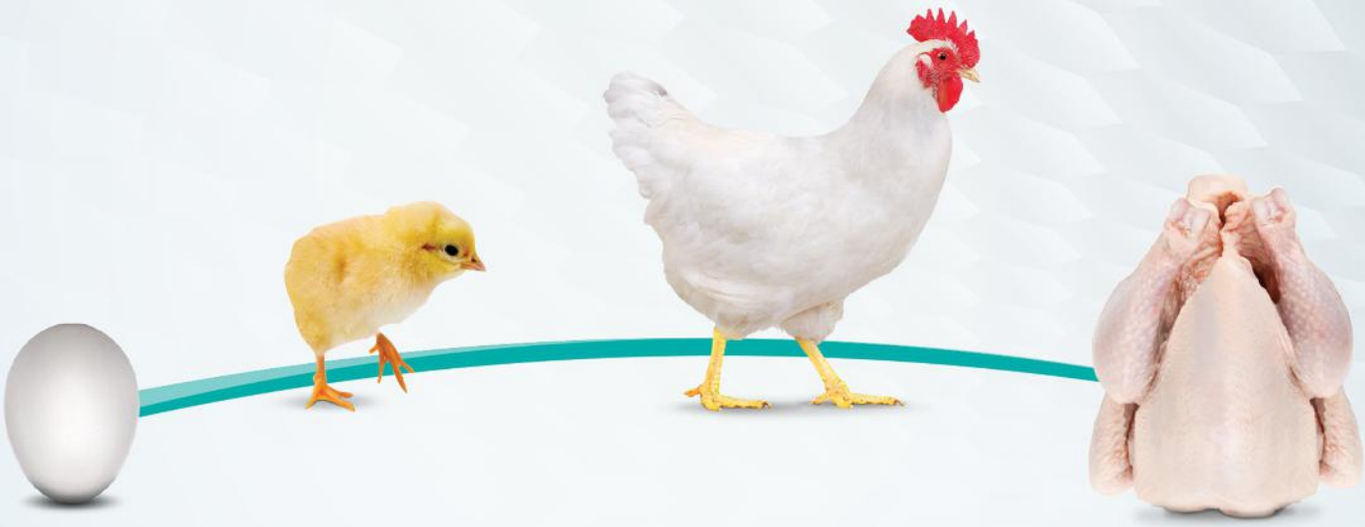

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ARTICLE

Taking Phytase Superdosing from Scientific Concept to Commercial Application: A UK Example

R.A.H.M. Ten Doeschate[1], S.L. Parker-Norman[1] and T.A. Sutton[2]
[1] AB Vista, a division of AB Agri Ltd.;
[2] ABN, a division of AB Agri Ltd.

Scientific research is based on carefully designed experiments, performed in carefully controlled conditions with the outcome measured as accurately as possible, using a range of parameters. In commercial practice, the reality is that performance is measured on farms with a variety of confounding factors influencing the few parameters that are ultimately considered.

In order to get nutritional concepts accepted by commercial nutritionists, it is often required to do 'commercial testing' to bridge the gap between these two realities. This paper gives a case study of a possible approach, and nicely shows some potential pitfalls in doing this.

Phytase superdosing has been shown to increase broiler performance, both in terms of growth rate and in FCR, combining in a typical improvement of 3-4 points weight corrected FCR as compared to the use of a standard dose of phytase. Commercial evaluations can take the form of replicated pen studies, house to house comparisons or farm to farm comparisons, either simultaneously run or compared over time. In this case it was decided to use a combined approach of comparing both across farms and time, as it was not possible to split farms and guarantee accurate collection of data.

Within a UK broiler integration successive crops on 25 farms over a four-month period were allocated either to Control or Superdosing in an alternating manner. This resulted, for most farms, in either one or two crops being fed Control diets with the other one being fed Superdose diets. For Control crops all feeds contained both xylanase and phytase at standard levels (Econase XT at 16,000 BXU/kg and Quantum Blue at 500

FTU/kg, AB Vista) and the diets were typical UK vegetable diets based on wheat and soya. For the Superdose crops the only dietary difference was an increase in the dose of the phytase from 500 FTU/kg to 1500 FTU/kg. Some (n=2) crops were excluded from final analysis where the killing programme was adjusted to produce Christmas birds or other identified factors affected the results. In the end, 32 Control crops and 23 Super- dose crops were used in the analysis.

Table 1 – The mean, min, max and standard deviation of the measured production parameters

	Mean	Min	Max	Standard Deviation
Av Wt (kg)	2.23	2.03	2.57	0.1
Daily Gain (g/d)	62.45	57.42	68.62	2.28
Feed / bird (kg)	3.63	3.3	4.16	0.19
Wt FCR (kg/kg)	1.66	1.54	1.84	0.05
Wt for Age (kg)	2.74	2.52	2.92	0.08

The main performance parameters (Average Weight, daily gain, Feed/bird, Weight for age, and FCR) for Control and Superdosed flocks were subjected to an ANOVA using the standard least squares procedure of JMP 13.0 (SAS Institute Inc., Cary, NC). The statistical model included QB dosage, farm, average age and month of clear date as co-variates.

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There were a number of significant co-variate effects of farm, average age and month of clear date. Farm had a significant effect on average weight, daily gain, EPEF, weight corrected FCR. Average age had a significant effect on average weight, feed consumption per bird and meat production per per square metre. Average performance measures, weight, daily gain, and weight for age were significantly ($P \leq 0.05$) increased in Su- perdose flocks. Superdosed flocks also had a tendency for a higher feed per bird ration and greater meat yield per square metre (see Table 2).

Table 2 – Effects of Superdosing on production measures

	LSM		
Variable	**Control**	**Superdosed**	**Significance**
Average weight (kg)	2.27 ± 0.07	2.31 ± 0.07	*
Daily gain (g/d)	63.79 ± 2.04	64.9 ± 2.05	*
Weight for age (kg)	2.79 ± 0.07	2.83 ± 0.07	*
Feed/bird (kg)	3.54 ± 0.17	3.61 ± 0.17	**

** Indicates ($P \leq 0.05$)*

*** Indicates a tendency ($P < 0.10$) towards significance*

Although most other parameters showed numerical improvements, there were no further statistically significant differences, demonstrating the inherent variability of parameters under commercial conditions. Financial calculations, done by the integration and taking into account the extra cost of the phytase, showed a difference in margin over feed and chick of £0.0098 per chick, which is an economically significant improvement.

This retrospective analysis of commercial performance and health data indicates that Superdosing provided significant system benefits including improved average weight, daily gain and weight for age as well as a tendency towards significant improvements in meat yield per square metre and higher feed consumption per bird. Whilst the average results are sufficiently interesting for the commercial nutritionist to base a decision on,

the dataset also contains some observations useful for future studies of this kind. Firstly, the range of results between farms was large, yet normal, for commercial conditions (see Table 1). Given the number of flocks/farms involved, this data can be viewed with some confidence however, if a given pair of farms or flocks were to be compared, then clearly any outcome could be possible, even though the conditions on these farms were fairly standardised and management was generally considered to be good. Additionally, there were a number of significant co- variate effects of farm, average age and month of clear date on production and health parameters showing the importance of considering these when making commercial comparisons.

Commercial evaluations require careful thought, planning and analysis to get the best possible conditions for comparing treatments. Where this is done and the results achieved are sufficiently convincing, then a promising scientific concept can be evaluated and translated into a commercial application.

Within a UK broiler integration successive crops on 25 farms over a four-month period were allocated either to Control or Superdosing in an alternating manner. This resulted, for most farms, in either one or two crops being fed Control diets with the other one being fed Superdose diets.

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Vets In Poultry (VIP) is Delighted to Announce the Inauguration of its New Office Situated

at Bibewadi, Pune on 28th March 2024.

This significant milestone represents a pivotal step forward in the association's ongoing efforts to align with its vision and mission. The new office will serve as a hub for collaboration, advocacy, and knowledge exchange, furthering the association's commitment to advancing the interests of the poultry sector.

The inauguration ceremony, led by Dr. Ajit Ranade, Technical Advisor and Dr. Ajay Deshpande, President, included a ribbon-cutting ceremony and cake cutting, symbolizing a new chapter in the association's journey.

Speaking on the occasion, Dr. Ajay Deshpande said, "At Vets In Poultry (VIP) we are committed to promoting the welfare and growth of the poultry farming community. The inauguration of our new office in Pune signifies our dedication to advancing our mission and serving our members and stakeholders. We are grateful for the support and participation of our esteemed guests and members. Together, we will continue to bridge the gap between industry and academia, driving innovation and progress in the poultry sector.

The inauguration ceremony was attended by Dr. Santosh Ire, Secretary and Vets In Poultry Committee Members Dr. Chandrakant Pathak, Dr. Jeevan Sonawane, Dr. Pankaj Tuptewar, Dr. Sujit Kulkarni, Dr. Sanjay Satbhai, Dr. Amol Pawar, Dr. Mangesh Mende and Dr. Anju Deshpande.

For more information

contact - 9850979652, vetsinpoultry@gmail.com

About VIP-Vets In Poultry

Vets In Poultry Association is a leading not for profit Assoction, dedicated to the advancement of the poultry sector. With a membership exceeding 1200+ veterinarians working in poultry, VIP-Vets In Poultry stands as one of the largest associations of its kind globally uniting professionals from diverse fields across India and the globe. Members encompass a wide spectrum of expertise, including academia, production, research and development, sales and marketing, field veterinarians, technical services, processing, and entrepreneurship.


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Mr. O. P. Singh

Managing Director, ABTL

Engormix, the largest global digital community specialized in agribusiness recently interviewed Mr. O.P. Singh on various aspects of the company's long-term role & plans.

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Understanding How to Preserve the Life of Hatching Eggs

MOHAMED SOBHY - Global Incubation Consultant, Petersime nv

Hatching eggs require careful management from the moment they are formed to the moment they hatch. Breeder farm conditions, egg handling conditions, incubation conditions… All these factors have an impact on chick embryo physiology and development, and consequently on the health and quality of new-born chicks. In this article, we examine the main factors that need to be considered to preserve the life of hatching eggs.

From breeder farm to hatchery

Incubators provide the optimum conditions for hatching eggs to become high-quality chicks. However, it is important to look further than that. The health and quality of a day-old chick is influenced by the complete 'history' of its hatching egg, from breeder farm to hatchery. It is therefore necessary to protect eggs against biosecurity threats, temperature fluctuations and improper handling during egg formation at the farm, storage at the farm, transportation to and handling at the hatchery.

1. Litter and nest management

The typical design of a breeding house involves a centre area filled with floor litter or litter nests. It is very important to keep the litter clean at all times to avoid potential contamination of the hatching eggs. The largest risk for the chick embryo comes from contamination immediately after the egg has been laid. As it cools down, the egg content retracts and suction from the outside to the inside occurs, meaning microorganisms can enter through the eggshell pores. If the environment is dirty, bacteria will gain entry to the egg. Eggs with dirty shells also carry harmful bacteria and are a biosecurity threat.

Any form of contamination will have a big negative impact on hatching results and chick quality:

- Weakened embryos
- Increased early embryonic mortality
- More exploders ('bangers')
- More dead in shell
- Increase in culls
- Higher first-week mortality

2. Egg collection and pre-selection

Laid eggs must be regularly collected to reduce the risk of breakage and contamination and all substandard eggs with, for instance, misshapen, cracked or thin shells must be removed.

In addition, an increased frequency of egg collections is important for the eggs' gradual cooling towards the 'physiological zero' (i.e. temperature at which embryonic development is slowed down). If an egg stays in the nest for too long, it increases the risk of a continued cell multiplication (more info under point 5).

3. Egg disinfection and on-farm storage

Eggs can either be disinfected at the breeder farm or upon arrival at the hatchery. The purpose of disinfection is to prevent bacterial multiplication. Several practices for egg disinfection can be implemented (depending on the local rules and policies), such as:

- Fumigation
- Spraying
- Fogging
- Washing (mostly used for duck eggs)

After the eggs have been disinfected, they can be stored in an environmentally controlled farm storage room until transport to the hatchery. If the farm has no dedicated egg storage room, eggs must be transported to the hatchery daily.

4. Egg grading

Farm personnel conduct the pre-selection of hatching eggs, whereas hatchery personnel are responsible for the final egg quality control. A careful check of the incoming eggs' external qualifications prior to incubation is strongly recommended. A good hatching egg should have the following characteristics:

- It is free from any deformities.
- It has a good shell quality.
- It is clean.
- Its colour is uniform within its batch.

5. Egg storage and recommended temperature profile

Hatching eggs are generally stored at the hatchery before they are loaded into the incubators. The total storage time varies, in some cases reaching 10 days or more. The V-flow diagram below (see figure 1) visualizes the temperature profile that should be followed: The hatchery's egg storage room should be the coldest point along the breeder-farm-to-hatchery timeline. If there are uncontrolled temperature fluctuations in the process where specific points are warmer or cooler, then the embryo will be weakened, often resulting in an increased embryonic mortality, especially at the early embryonic stage.

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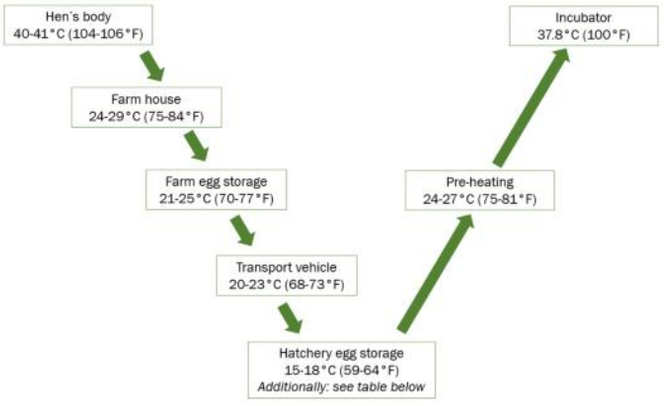

Figure 1: V-flow diagram with the recommended temperature ranges, from point of lay to incubator.

- At oviposition, the egg's temperature is close to the hen's body temperature, which is around 40-41°C (104-106°F).
- Once the egg is laid, it is important to gradually bring down the egg temperature towards the physiological zero to slow down embryonic development. This cooling process should start within 3 to 5 hours after oviposition. Particularly important are the storage conditions at the hatchery: They are essential to preserve the life of the embryos. The recommended temperature and humidity values depend on the number of days the chicken eggs are stored. It is generally recommended to fine-tune the absolute humidity in such a way to obtain 0.5% weight loss per week during storage and to maintain the relative humidity at an average of 70%.

Storage time	Storage temperature (constant)	Absolute humidity
Short term: ≤ 4 days	18°C (64°F)	9 g/kg
Long term: > 4 days	15°C (59°F)	7 g/kg

- As a next step, the eggs are pre-warmed (pre-heated) before incubation starts (the minimum pre-heating time is 4 hours; the maximum pre-heating time is 12 hours). Warming the eggs ensures that all the embryos have the same temperature when the incubation program starts; it also avoids condensation from forming on the egg surface.
- During incubation, an eggshell temperature of 37.8°C (100°F) is optimal.

Achieve substantial benefits with heat treatment during egg storage

It is well-known that hatch losses increase with each extra day of storage. By applying precise heat treatment in Petersime's dedicated X-Streamer™ Re-Store incubator, you can regain a substantial part of the hatch that would have otherwise been lost due to storage. The process also takes all embryos to a more advanced developmental stage, improves their robustness and ensures the best possible uniformity at the start of incubation.

As sharing know-how within the poultry industry is paramount to Petersime's mission, further findings and results of new studies will be shared in future articles.

In summary

There are various factors that influence the health and quality of new-born chicks. Hatching egg management is one of them. It is therefore essential to educate breeder farm and hatchery personnel on the importance of correct hatching egg management.

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आज़ादी का अमृत महोत्सव

भारत में पोल्ट्री का संक्षिप्त इतिहास

भाग–17

इन 75 सालों में पोल्ट्री कहाँ से कहाँ पहुंची ?

अभी कंसल्टेंट्स की ही बात चल रही है दो बहुत ही अहम व्यक्तियों की बात करना चाहूंगा।

Dr SC GUPTA सन् 1980 में गोविन्द वल्लभ पंत वेटरनरी कॉलेज से पोस्ट ग्रेजुएट कर के निकले एवं तुरंत ही उन्हें भारत के सर्वप्रथम प्योर लाइन ब्रीडर केग फार्म गुडगाँव में जॉब मिल गई। 3 साल ही काम किया होगा कि इन्हें वेटरनरी कॉलेज हिसार में अस्सिस्टेंट डीजीज इन्वेस्टीगेशन ऑफिसर की जॉब मिल गई। यह उनको एक बहुत ही सुनहरा मौका मिला बिमारियों की जांच पड़ताल में तजुर्बा हासिल करने का। अपने काम में डॉक्टर गुप्ता सदैव बहुत गंभीर थे। तीन साल बाद ही उन्हें एक बदलाव का मौका मिल गया। सऊदी अरब के ब्रायलर इंटीग्रेटर ब्रीडिंग प्रोजेक्ट में। वहां भी 3 साल कार्यरत रहें फिर भारत आ गये। केग फार्म इनकी प्रतिभा, आचरण से भली–भांति परिचित था अतः उन्होंने तुरंत ले लिया और उन्हें अपनी मॉडर्न लैब का हेड बना दिया। साथ ही केगफार्म की सारी यूनिट की हेल्थ से सम्बंधित समस्याओं का निदान भी करते रहे। काफी दिनों तक वह लैब के हेड बने रहे। इनके सामने बहुत सी भारतीय कंपनियों ने घास डाला पर इन्होने सदैव मना कर दिया और केग फार्म एवं इंडोवैक्स के साथ ही चल रहे हैं।

गुडगाँव रहते मेरा इनके साथ संपर्क लगभग 35 साल से अधिक रहा। मैंने लगभग 29 साल जॉब करने के बाद 1995 से कंसल्टेंसी शुरू कर दी। हर सप्ताह 25–30 विजिट करना पड़ता था। भिन्न भिन्न प्रकार की समस्याएं एवं बीमारियां मिलती। अक्सर मैं शाम को लैब पहुंच जाता और उन समस्याओं पर बातचीत होती। अधिकाँश हमारी राय एक ही होती। डॉक्टर गुप्ता का तजुर्बा भी केग फार्म के कारण एवं विभिन्न फार्मों के विजिट के कारण बहुत अच्छा और ज्यादा था। इन सब के बावजूद उनमें "डॉक्टर साहब" वाली "बू" नहीं थी। इन्हीं सब कारण से मेरा संपर्क आज भी बना हुआ है – हालाँकि में अब अयोध्या में हूँ।

जब केग फार्म – इंडोवैक्स के चेयरमैन श्री विनोद कपूर ने काफी स्ट्रक्चरल बदलाव कंपनी में किये तो डॉक्टर गुप्ता को लैब से हटाकर इंडोवैक्स के ऑफिस के एक केबिन में बैठा दिया। लैब में यह 3–4 कमरों के मालिक थे। मैं वहां उनसे मिलने गया। वहां उनकी चमक दमक कुछ कम थी। मैंने पूछा क्या बात है यह नया काम कैसा लग रहा है ? अभी तो बैठा हूँ आगे देखिये क्या होता है। उन्हें कंपनी के ग्रुप चीफ वेटरनरी ऑफिसर का पद दिया गया था। मैंने उनसे कहा यह आपके लिए गोल्डन चांस है। देश विदेश में जहाँ भी कंपनी का व्यापार है समस्याओं के निदान के लिए आपको जाना है। यह एक जबरदस्त एक्सपोजर हैं। रिटायर होने के बाद आपकी वैल्यू निरंतर बढ़ेगी। पता नहीं क्यों कंपनियां एक उम्र के बाद लोगों को रिटायर कर देती है जबकि ऐसे प्रोफेशन में बढ़ती उम्र के साथ तजुर्बा बढ़ता जाता है। जब चांदी से सोना और सोने से हीरा बनता है तो रिटायर करना कहाँ तक उचित है। जब तक एक्टिव हैं काम लीजिये। आज डॉक्टर SC गुप्ता हमारी पोल्ट्री इंडस्ट्री के लिए एक तजुर्बेकार प्रेक्टिकल वैज्ञानिक बन चुके हैं।

आइये अब बात करते हैं श्री सेलवन कानन (SELVAN KANNAN) की। एक शानदार सफर सन् 1980 में शुरू किया। एनिमल हेल्थ के लिए प्रीमिक्सेस (PREMIXES) से पोल्ट्री एवं डेयरी के लिए। सन् 1984 में लांच किया इंग्लैंड के बहुचर्चित वीरकोन (VIRKON) की भारत में यह मल्टीपर्पज डिसइंफेक्टेंट था जिसकी भारत को सख्त जरूरत थी। जल्दी ही भारत में फ्रांस के पहले सिंथेटिक एंटीबायोटिक को लांच किया। यह सच में अनूठा एंटीबायोटिक था। यहीं पर लॉन्चिंग प्रोग्राम श्री सेलवन कानन का खत्म नहीं हुआ। 1990 बोवन्स लेयर एवं हाईपीको (BOVANS & HYPEECO) ब्रायलर का ग्रैंड पैरेंट ही नहीं प्योरलाइन लॉन्च किया। यह नीदरलैंड की मशहूर ब्रीड थी। अगर श्री कानन को "डॉक्टर लॉन्चिंग" की उपाधि दूँ तो अनुचित नहीं होगा।

श्री कानन की विस्तार रुचि यहीं खत्म नहीं हुई। 1997 में साउथ इंडिया के मशहूर पायनियर ग्रुप के लिए हैदरबाद से पहला एक्सपोर्ट अंडों का शुरू हुआ। वह भी अगर मैं गलत नहीं तो जापान के लिए। इसके बाद वह निर्यात नामक्कल से होने लगा।

2003 में ट्रॉऊ नुट्रिशन (TROUW NUTRITION) भारत में लॉन्च किया। सन् 2018 तक इसमें कार्यरत रहे। 2018 में भारत में नावेलटेक फीड लॉन्च हुआ जिसमे यह फाऊंडिग मेंबर थे।

अंत में (2018) श्री कानन ने अपनी कंपनी लॉन्च की वैल्यू कंसल्टेंट्स (VALUE CONSULTANTS)। श्री सेलवन एक बहुत ही प्रेक्टिकल एवं दूरदर्शी है। यह कई बड़ी कंपनियों के एडवाइजर हैं। सन् 2008 से गसताव केसर (GUSTAV KESAR) के सर्टिफाइड ट्रेनर हैं। 12 से अधिक इंटरनेशनल सर्टिफाइड ट्रेनिंग प्रोग्राम कर चुके हैं। यह सब ट्रेनिंग मार्केटिंग, प्रोडक्ट्स एवं पोल्ट्री और प्लांट मैनेजमेंट पर होती है।

सोशल एक्टिविटी भी श्री सेलवन की बहुत रहती है। INBA- इंडिया नीदरलैंड बिजनेस एसोसिएशन के सेकेरेट्री भी रह चुके हैं। भारत के बहुत से पोल्ट्री इंडस्ट्री एसोसिएशन में काफी सक्रिय हैं। PFI – पोल्ट्री फेडरेशन ऑफ इंडिया के पिछले 20 साल से बोर्ड में हैं। देश–विदेश में भ्रमण, सेमीनार उनके लिए आम बात है। अच्छे लेखन के साथ रिपोर्ट बनाना एवं नयी कम्पनयों के लॉन्च में काफी रुचि है।

पोल्ट्री इंडस्ट्री के भिन्न भिन्न भागों में जो सबसे महत्वपूर्ण विभाग है, वह ब्रीडिंग है। आमतौर से हमारे यहाँ जो भी ब्रीडर है वह मात्र मल्टी प्लायर है – पैरेंट खरीदते हैं और चूजे निकाल कर बेचते हैं। असल ब्रीडर वह है जो अलग अलग लाइन मैनेज करते हैं – उसमें इम्प्रूवमेंट कर ग्रैंड पैरेंट एवं पैरेंट बनाते हैं। कोशिश करते हैं हर साल ब्रीड में कुछ न कुछ इम्प्रूवमेंट हो। इस काम को करने के लिए अलग सक्षम वैज्ञानिक होते हैं जो ब्रीडिंग या जेनेटिक्स के माहिर होते हैं। इस वर्ग के लोग भारत में बहुत कम हैं और जो है उनके दर्शन पोल्ट्री सभाओं में दुर्लभ हैं। हर सेमीनार में आपको नुट्रिशन मैनेजमेंट या डिजीज का माहिर मिल जायेगा परन्तु यह प्रजाति दुर्लभ है जो है

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वह पब्लिक में नहीं आती है। वास्तविकता जैसे मैं कह चुका हूँ इन्ही के परिश्रम या पराक्रम से पोल्ट्री उद्योग के सफलता की बुनियाद या नींव पड़ती है। इनके विषय में या इनके योगदान के बारे में ना प्रकाश डाला जाये तो यह स्तम्भ जो "आजादी के 75 साल के महोत्सव" पर है अधूरा रह जायेगा। भारत सरकार की और से भी कई ब्रीडिंग प्रोजेक्ट्स चलाये गए अधिकाँश उन्होंने "देसी" ब्रीड को लेकर उनकी उत्पादन क्षमता बढ़ाने में कामयाबी हासिल की। कुछ नस्लें अण्डों के लिए और कुछ नस्लें मीट के लिए निकली और कुछ नस्लें मिक्स्ड अर्थात अंडे और मीट दोनों के लिए निकली।

भारत में जैसे मैंने लिखा कई प्रोजेक्ट रूरल भारत के लिए शुरू किये जिसमे भारत सरकार के कई सेंटर के साथ कुछ भारत की यूनिवर्सिटी आगे आई। लार्ज स्केल कमर्शियल दृष्टिकोण से पहला प्योरलाइन ब्रीडिंग ऑपरेशन कैग फार्म गुडगाँव में प्रारम्भ हुआ और उसके कुछ ही समय बाद दूसरा ऑपरेशन पूना पर्ल्स–पूना में शुरू हुआ एवं तीसरा ऑपरेशन कुछ सालों बाद वेंकटश्वरा ग्रुप ने पूना में शुरू किया। कई और भी इस प्रकार के ब्रीडिंग फार्म भारत में आये परन्तु ज्यादा दिन टिक नहीं पाए इनके कारणों की समीक्षा फिर कभी।

दो नाम जिन्होंने कमर्शियल ब्रीडिंग में बहुत नाम कमाया वह हैं डॉक्टर GL JAIN एवं DR T KOTAIAH

DR JAIN ने अपना कैरियर भारत सरकार से शुरू किया। डायरेक्टर बने सेंट्रल पोल्ट्री ब्रीडिंग प्रोजेक्ट भुवनेश्वर के। वहां से 1977–1978 में निकल कर वेंकटेश्वरा ग्रुप के प्योरलाइन– ब्रीडिंग ऑपरेशन का सम्पूर्ण कार्यभार संभाला। BV-300 लेयर एवं COBB-100 ब्रायलर पर काम करना शुरू किया। यहाँ से जो उनका नाम जग जाहिर हुआ या रौशन हुआ आज तक बढ़ ही रहा है। इन दोनों ब्रीडों के जरिये वेंकटेश्वरा ग्रुप ने भारतीय पोल्ट्री जगत को बड़ी मजबूती के साथ फतेह किया। एक समय था जब इसका शेयर 90% से अधिक था। भले ही अब शेयर घटा हो परन्तु आज भी डॉक्टर जैन के यह लाडली और लाडले नंबर एक पर है। निश्चित रूप से डॉक्टर GL JAIN का भारतीय पोल्ट्री ब्रीडिंग में एक जबरदस्त महत्वपूर्ण योगदान है जिसकी जितनी भी सराहना की जाये उतनी कम है।

अब बात करते हैं DR T KOTAIAH की। इन्होने सन् 1972 में IVRI से पोल्ट्री साइंस से MVSC किया। सौभाग्य से इनके गाइड थे डॉक्टर SC MOHAPATRA जो स्वयं USA से पोल्ट्री ब्रीडिंग में PhD थे। बहुत जाने माने वैज्ञानिक थे। डॉक्टर कोटइया डिग्री हासिल करने के तुरंत बाद IVRI में रिसर्च असिस्टेंट रहे। वहां से निकल कर 1974–84 तक पूना पर्ल्स (इस्राइली प्योरलाइन) – पूना में जेनेटिसिस्ट रहे। उसमें उन्होंने काफी डेवेलपमेंट किया। इसके बाद कसीला फार्म जो हबर्ड ब्रायलर का प्योरलाइन लाये थे उनके साथ काम किया। इस ब्रीड ने अच्छी पकड़ भारत में पकड़ी थी। इसके बाद सन् 1987 से सन् 1995 तक स्वर्गीय सेठी के तारकेश्वरा ब्रीडिंग फार्म जिसमे प्योर लाइन आयत किया था उसके कंसलटेंट बने रहे।

दूसरों के साथ उन्होंने काफी मेहनत की लेकिन सन् 1995 में अपनी सोच बदली। इस सोच बदलने में उनकी पत्नी का जबरदस्त सहयोग था। अपना करने के लिए काफी फण्ड की जरूरत होती है। प्रारम्भ किया MANDAKINI RESEARCH FARM – हैदराबाद से जिसमे पहले ब्रायलर पैरेंट रखा और हैचरी लगाई।

इसका रिजल्ट अच्छा हुआ और डॉक्टर साहब ने सन् 2000 में अपना स्वयं का प्योर लाइन ब्रायलर ब्रीडिंग कंपनी INDBRO RESEARCH BREEDING FARM PVT LTD बनाया।

डॉक्टर कोटइया के कार्यों को देखते हुए NABARD ने उन्हें वेंचर कैपिटल असिस्टेंस द्वारा उनकी बहुत बड़ी मदद की। इसके बाद डॉक्टर साहब ने ड्यूल पर्पज रेनबो रूस्टर डेवेलप किया। धीमी गति से बढ़ने वाला रगीन ब्रायलर डेवेलप किया। ब्राउन एग लेयर भी डेवलप की गयी। असील जैसी ब्रीड में भी इम्प्रूवमेंट किया। अफ्रीका और नेपाल में पैरेंट स्टॉक भी निर्यात हुआ। यह सब कुछ डॉक्टर साहब की मेहनत, तजुर्बा पत्नी एवं नाबार्ड के सहयोग से हुआ। डाक्टर कोटइया साहब से आग्रह है कि एक सरल भाषा में ब्रीडिंग पर प्रैक्टीकल पुस्तक लिखें।

सन् 1970 के दशक की बात है डॉक्टर दलबीर सिंह देव – लुधियाना एग्री यूनिवर्सिटी ब्रायलर रिसर्च पर कार्यरत थे। उन्होंने सेंथेटिक ब्रायलर (SYNTHETIC) ब्रीडिंग स्टॉक डेवलप किया जो भारत के लिए एक सराहनीय कार्य था।

इसी समय बहुत ही उत्साहित करने वाली खबर बैंगलोर से आई। डॉक्टर MR CHAUDHARY जो सेंट्रल पोल्ट्री ब्रीडिंग फार्म बैंगलौर में कार्यरत थे ने एक WHITE LEGHORSE (HYBRID) लेयर डेवेलप की। नाम दिया गया HH260 निश्चित रूप से उस समय के हिसाब से सराहनीय कार्य था। उस समय केवल दो ब्रीड भारत में छाई हुई थी – एक अमेरिका की हाईलाइन दूसरी कनाडा की SX288 (शेवर)। HH260 से काफी उम्मीद थी। यह कमर्शियल भी की गयी परन्तु बाद में कहाँ लुप्त हो गयी पता ही नहीं चला। अगर इसे प्राइवेट ब्रीडिंग फार्म को देकर डॉक्टर चौधरी का डेवलपमेंट में सहयोग रहता तो आज यह ब्रीड कहाँ से कहाँ तक पहुंच जाती।

इस सन्दर्भ में स्वर्गीय डॉक्टर DK BISWAS का नाम भुलाया नहीं जा सकता। जॉइंट कमिश्नर पोल्ट्री भारत सरकार के हैसियत से उन्होंने चंडीगढ़, भुवनेश्वर, बॉम्बे एवं बैंगलोर स्थित सेंट्रल ब्रीडिंग फार्मों पर नेशनल पोल्ट्री ब्रीडिंग प्रोग्राम को गाइड किया।

पोल्ट्री ब्रीडिंग में एक बहुत बड़ा नाम डॉक्टर SC MOHAPATRA जिनके बहुत ही प्रमुख शागिर्द DR T KOTAIAH हैं। उन्होंने CARI द्वारा संचालित पूरे भारत में पोल्ट्री ब्रीडिंग प्रोजेक्ट्स का संचालन किया। बाद में वह हैदराबाद शिफ्ट हो गए एवं 10 यूनिवर्सिटी के ब्रीडिंग प्रोजेक्ट्स का संचालन किया।

भारत सरकार की और से काम बहुत हुआ परन्तु भारतीय पोल्ट्री जगत को इसकी कोई भी जानकारी नहीं मिली यह हमारी कार्यप्रणाली की बहुत बड़ी कमी है।

कुछ और जेनेसिस्ट काफी अच्छे तजुर्बेकार सालों से काफी गंभीरता से एक ही जगह कार्यरत हैं। वह आयरन गेट में हैं। उनके विषय में लिखना बिना इजाजत उचित नहीं होगा।

भारतीय उपभोक्ताओं की आवश्यकताओं को देखते हुए हमे अपनी ब्रीडिंग प्रणाली में बदलाव लाना होगा। मिसाल के तौर पर भारत में एक बहुत बड़ी डिमांड है तंदूरी चिकन की जो 1200–1300 ग्राम का जिंदा चाहिए। आप बताइये 40–50 रूपए का एक दिन का बच्चा लेकर हम कैसे 1200–1300 ग्राम का ब्रायलर काट देंगे। पैसा निकालने के लिए 2400–2500 ग्राम ही काटेंगे। बताइये तंदूरी का क्या होगा। हमें तंदूरी के लिए ऐसी ब्रीड चाहिए जिसके चिक्स सस्ते हो – जूसी हो "मीट टू बोन" रेशियो बढ़िया हो। हमारे यह वैज्ञानिक इस पर कुछ काम कर सकते हैं। हो सकता है उन्होंने कर रखा हो परन्तु पोल्ट्री इंडस्ट्री को खबर नहीं है।

हमे खेद है कि हम इस विशाल देश की पोल्ट्री जगत जो भारत के कोने–कोने में फैल चुकी है। हर जगह अच्छे कंसल्टेंट्स फैले हुए हैं। हम उन सबको अकेले कांटेक्ट नहीं कर पाए हैं। अतः उनके विषय में कुछ भी नहीं दे पाए हैं। इस विषय में हमारी पोल्ट्री मैगजीन डायरेक्टरी ला सकती है – समय जरूर लगेगा। कंसल्टेंट्स पोल्ट्री जगत के अनमोल रतन हैं जो समय समय पर समस्याओं का निदान करते रहते हैं।

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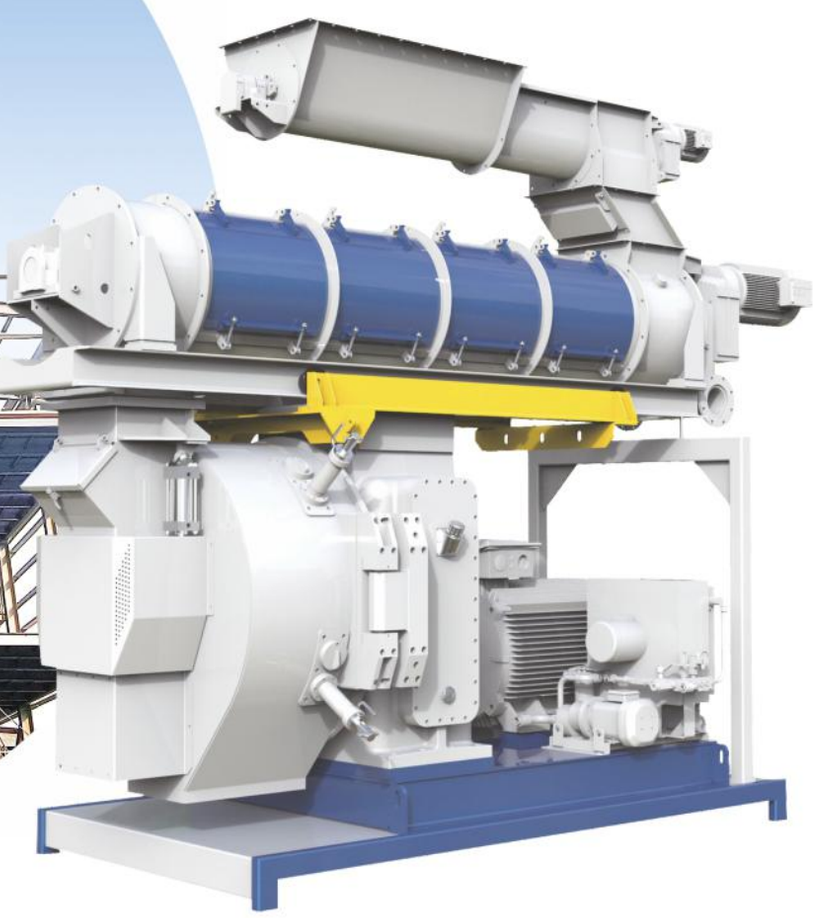

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NAVIGATING INDIA'S POULTRY INDUSTRY: INSIGHTS FROM A VETERAN, RICKY THAPER

A career spanning more than 35 years, Mr. Ricky Thaper has been associated with the Indian poultry sector, which has witnessed exponential growth in the last decades. The industry has transformed from predominantly a traditional backyard poultry into an organised commercial poultry. Currently commercial poultry accounts for 85% of total poultry production. In this exclusive interview with Poultry Technology, Mr. Ricky Thaper, Treasurer, Poultry Federation of India, explains the achievement of the poultry sector and identifies future challenges to sustain the growth of the sector.

Poultry Technology: Poultry growth in the last decade and reasons for the growth?

Ricky Thaper: The Indian poultry sector has played a crucial role in meeting protein and nutritional needs of a vast section of the population. While the production of agricultural crops has been rising at a rate of 1.5 to 2 percent per annum, that of eggs and broilers has been rising at a rate of 7 to 9 percent per annum. Over the past few decades, it has evolved into a mega-industry, positioning India as a major global producer of eggs and broiler meat. In just about four decades, India has transformed their poultry farming industry through major investments in breeding, hatching, rearing, and processing of chicken. India, as the second largest producer of eggs (138.30 billion in 2022-23) and the fifth largest producer of poultry meat (4.47 million tonnes) globally. Egg production in the country is growing at the Compound Annual Growth Rate (CAGR) of 7.35% over the past 9 years. India's total meat production has increased from 6.69 million tonnes (MTs) in 2014-15 (April-March) to 9.77 MT in 2022-23. According to FAOSTAT, the USA has 17% share in global poultry meat production followed by China (12%), Brazil (11.7%), Russia (3.8%) and India (3.5%). The annual poultry meat production is estimated at around 5 Million Tonnes and it is witnessing an annual growth of 6-7% as per trade estimates.. The Increase in the average income and the urban population has led to a tremendous increase in the poultry demand and a steady increase in consumption over the years.

Poultry Technology: Is India up to par with current driving technology?

Ricky Thaper: Automated feeding systems, temperature control systems, and data-driven management tools optimize resource utilization and reduce production costs of the poultry industry. This efficiency helps producers maintain competitive pricing and a steady supply in the country. Improvement in the feed formulations, automated systems for feeding and temperature control and state-of-the-art disease management practices revolutionized poultry farming. These innovations enhanced production efficiency, leading to increased output.

Poultry Technology: The water factor (availability and quality) to produce meat and eggs?

Ricky Thaper: The poultry sector is a water intensive sector as from production to selling of meat, water is used for rearing birds and for cleaning of meat. It plays an important role in regulating body temperature, metabolism, digesting food, and eliminating body wastes. At normal temperatures, poultry consume at least twice as much water as feed. Nipple drinking system is helping improve water use efficiency in the poultry farms. Water is an essential nutrient for poultry and therefore, supply of quality water is fundamental for good flock performance. The farmer can prevent many diseases in flocks by controlling the quality of the water which would lead to decrease in costs of management of poultry farm. Water is required for reducing air temperature in poultry houses (including evaporative cooling pads as in environmentally controlled (EC) sheds and fogging systems) and also to facilitate sanitation. Thus water remains a critical component of the poultry industry and the farms have been working towards ensuring that quality water is available to birds besides ensuring water saving techniques such as rainwater harvesting as well as recycling of used water.

Poultry Technology: For ensuring efficient supply chain

Ricky Thaper: Poultry producers and processors are streamlining supply chain operations to minimize waste and ensure timely distribution. Advanced logistics and transportation management systems facilitate the efficient movement of poultry products from farms to consumers. The transportation of birds has to improve for reducing mortality. For the processing industry, refrigerated vans as well as availability of cold storage facilities at the retail would improve the quality of poultry products available in the country.

Poultry Technology: What is the consumer asking for in India

Ricky Thaper: Chicken meat and eggs are perceived as healthier alternatives to red meat, driving up demand. Poultry products are often more affordable than other protein sources, making them accessible to a broader segment of the population. In the post Covid19 pandemic phase also because of demand for the protein rich food like poultry meat and eggs have increased sharply. The growing awareness regarding health and wellness is further driving the demand for a protein-rich diet. The shift in demand for live bird to fresh chilled and frozen poultry product market has been slow. Limited presence of poultry processing in India has resulted less availability of frozen chicken and other processed forms of poultry products.

Currently around 8% of the poultry meat produced in the country is processed which is likely to increase up to 20% in the next few years. Opportunity for expanding processing facilities for poultry meat would see a huge growth with consumers demanding ready to eat products delivered at home.

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Poultry Technology: How much does the government influence and participate with producing sector?

Ricky Thaper: The Government of India has been supporting the growth of the poultry sector through several initiatives like dedicated funds for setting up units, disease surveillance and providing support for ensuring supply of animal feed for the sector. The World Organisation for Animal Health (WOAH) has approved India's self-declaration of freedom from Highly Pathogenic Avian Influenza (HPAI) in specific poultry compartments. Compartmentalization is a crucial tool that enhances animal health, reduces the risk of disease outbreaks within and outside the compartment, and facilitates the trade of poultry and poultry-related products. The Department of Animal Husbandry & Dairying, has submitted a self-declaration of freedom from High Pathogenicity Avian Influenza in 26 poultry compartments in Maharashtra, Tamil Nadu, Uttar Pradesh, and Chhattisgarh to the WOAH.

To support the livestock sector, the government has initiated several measures. The Animal Husbandry Infrastructure Development Fund (AHIDF) of

Rs.15000 crore is being implemented from June 2020, which has now been further extended for next three years. The key objectives of the scheme are to fulfil the objective of protein enriched quality food requirement of the growing population of the country and prevent malnutrition. The support is also provided for Meat processing and value addition infrastructure and establishment of animal feed plants including poultry feed. The National Livestock Mission has been revised and realigned with an outlay of Rs.2300 crore for the five years commencing from 2021-22.The mission aims at development of entrepreneurs in rural poultry.

Poultry Technology: What is needed for India to be at the forefront of the global poultry production?

Ricky Thaper: The increase in production of poultry meat is likely to be achieved by expanding the coverage of poultry farms, modernizing existing facilities and adoption of efficient production practices. The growth of the sector will depend on factors such as change in demand pattern, technology adoption, favourable government policies, feed availability amongst others. Application of Artificial Intelligence (AI) can help the poultry industry address environmental impact, animal welfare, and production efficiency and also automate animal identification and weighing, improving accuracy and efficiency. AI can optimize breeding processes by automating tasks like egg grading, identifying live embryos, controlling incubation.

Poultry Technology: The poultry industry's cooperation with USA Poultry and Eggs Export Council (USAPEEC)

Ricky Thaper: The Poultry Federation of India and USAPEEC recently has signed an MOU to jointly address protein deficiency and promote consumption of eggs and chicken in India. Mr. Greg Tyler, President & CEO, USA Poultry & Egg Export Council and Poultry Federation of India Team signed this agreement in the presence of Mr. Clay M. Hamilton, Agricultural Minister Counsellor, Embassy of the United States of America and delegates from India and USA. Several US Soybean and Corn Grower farmers also witnessed this MOU signing ceremony which will be a mile stone in promotion of consumption of eggs and chicken in India.

BULLETIN

Dr. Dinesh Bhosale

decided to be Freelancer

Dr. Dinesh Tukaram Bhosale is B.V.Sc. & A.H., M.V.Sc., Ph.D.(Animal Nutrition), besides having a Diploma in Business Management.He has been a Member of Extension Council and Research Council of Rajasthan Veterinary University and Maharashtra Animal Fisheries Sciences University; Skill Advisory Board for Dairying, ASCI; BIS animal feeds committee; Editorial board of Journal of Animal Nutrition and Feed Technology; Managing committees of Animal Nutrition Society of India (ANSI) and Animal Nutrition Association (ANA) and Management Committee of ICAR - National Institute of Animal Nutrition and Physiology. He was the Chairman of CLFMA of India, an association of Indian livestock sector during 2012-2014 and was Hon' Secretary during 2008-2012. He was the Organizing Secretary of 2ndnational conference ofAssociation of Avian Health Professionals at Pune in 2014, He is working actively with Poultry Federation of India as Vice President - West India since 2006. He isalso President of Vets in Private Welfare Association, Pune.

Dinesh worked with Venkateshwara Hatcheries Ltd. in his early career and later as a Technical Director – Poultry, Aquaculture & Livestock for Asia Subcontinent office of American Soybean Association, New Delhi for eight years. Then he worked with Alltech Biotechnology Pvt. Ltd. as Regional Technical Manager – Ruminants for South Asia and Southeast Asia region for two years. He worked as Regional Commercial Director – South Asia for AB Vista, British Company from 2007 till recently. After 30 years of service, he has decided to be freelancer. He will help companies, students, farmers and startups.

He is helping various NGOs like Paani Foundation, Swades Foundation, People Empowering Movement, Bhagirath Gramvikas Prathisthan and companies to promote Animal Husbandry as source of livelihood and as entrepreneurial activity for rural youths and Women SHGs. He is mentoring many startups in livestock sector. He delivered more than 1300 lectures to farmers and entrepreneurs all over India. He conducted Fodder Yatra to promote awareness in five states.

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Diseases Affecting the Egg Production and Quality in Poultry

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Former and Founding VC,KVAFSU, Bidar, Former Director, IAH&VB, Bangalore,
Former Prof. and University Head, Dpt. of Pathology, Veterinary College, UAS, Bangalore

Introduction

In recent decades, intensive poultry production has faced both positive and negative consequences. Although there are several nutritional factors causing production problems, the bacterial and viral infections largely affect the reproductive organs or create severe health problems and production loss and their quality. The pathogens with a tropism for the reproductive organs or those that cause debilitating health conditions demonstrate mild to severe adverse effects on the egg production process. Multiple factors, mainly including host species, strain of the organisms, any disease of poultry can adversely affect egg production and quality either directly by having effects on the reproductive system, or indirectly, by affecting the health of the bird.The entire farm economics directly depending on the egg production, any deviation in health jeopardise the farmer's economy.

Several factors can affect egg production of non-infectious origin. Among these factors are age, nutrition and water supply, environmental conditions such as light and stress, and processes such as molting, poor ventilation (increased noxious gases)in poultry establishmentsand nutritional errorscomprising of inadequate levels of energy, protein or calciumand Vit. D, Presence of mycotoxins such as aflatoxin, trichothecene, and ochratoxincan cause a drop in egg production. This is called as nutrition based health(NBH). Therefore, it is so important to supply laying hens nutritionally balanced toxin free layer /breeder feed as per the breed, age and season for optimal egg production.

Among infectious diseases, respiratory infections cause air sacculitis and in turn, infect the ovary and oviduct (Lung- oviduct axis). Diseases such as avian influenza, Newcastle disease, Infectious bronchitis, and Infectious Laryngotracheitis (ILT) and Coryza severely affect the egg production and quality of eggs. Egg drop syndrome '76 can cause flocks to lay shell–less eggs

The main production lossescan occurfrom variousinfectious agentssuch as bacterial and viral agents. This paper deals with such infectious agents that causes egg production loss and the mechanism of damage to oviduct in causation of production loss.

A. Bacterial Infections that Induce Ovary and/or Oviduct Disease

There are many bacteria that cause infectious diseases in laying hens have systemic effects on egg production (Table1).

Table1.Adverse effects on egg production and quality observed in different Bacterial diseases.

Bacterial Infections	Eggproduction loss(%)	Pathologic lesion
Colibacillosis (coli)	<10%	Oophoritis and salpingitis
Salmonellosis (Salmonella enterica enterica serovar Enteritidis)	%-10%	Regression of ovarian follicles
Fowl cholera (Pasteurella multocida)	<10%	Hyperaemic ovaries
Infectious coryza (Avibacterium paragallinarum)	10-40%	Ovarian regression
Mycoplasma gallisepticum (Mg)and Synoviae(Ms)	>20%	
Ornithobacterium rhinotracheale (ORT)Infection	10-15%	

1. Colibacillosis

Escherichia coli is a common bacteria found everywhere and appear as low pathogenic or highly pathogenic in nature. This bacterium cause both primary and secondary infection characterized by coli septicemia, hemorrhagic septicemia, coli granuloma, air sac disease, swollen head syndrome, venereal Colibacillosis, cellulitis, peritonitis, salpingitis, osteomyelitis, yolk sac infection and enteritis. In all viral respiratory disease, it causes secondary infection causing air sacculitis.

Avian Pathogenic Escherichia coli (APEC) is often isolated from avian species This belongs to the Enterobacteriaceae family. E. coli is present in the gastrointestinal tract of most animals and it is excreted in high amounts through feces. After intake, its colonization in the trachea, caecum and oviduct takes around 21 weeks.

Transmission can occur through contact with infected birds or through the intake of water and feed contaminated with feces, as well as via the inhalation of agents from dust and bedding materials. Transmission can also occur when **oophoritis and salpingitis develop in laying breeders, prior to the formation of the eggshell, or after it has been formed while passing through the cloaca.**

Fig.1.Egg peritonitis yolk material attached to ovarian follicles through strands.

Inflammation in the oviduct due to APEC results in the reduction of egg production and sporadic mortality. Exudate, which accumulates with the inflammation that occurs as a result of egg peritonitis causes formation of egg yolk that coagulates in the body(fig1). In addition, coli -septicemia, which affects egg production, can often be seen in young laying hens, but rarely in mature fowls.

2. Salmonella Infection

These are infections caused by Salmonella Gallinarum (S. Gallinarum) and Salmonella Pullorum (Pullorum), and include Pullorum disease (PD), Fowl typhoid (FT) and infections of chicks and hens that are characterized with septicemia. Adult fowls are prone to fowl typhoid, while young fowl are prone to Pullorum disease.

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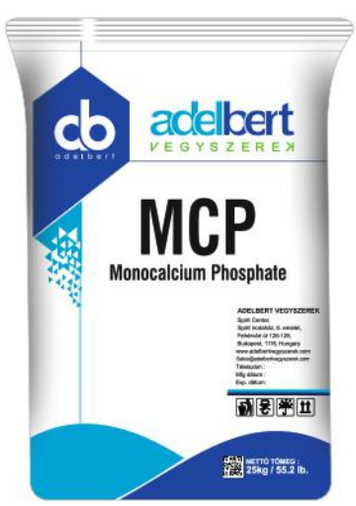

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The transmission sources of Salmonella Gallinarum (S. Gallinarum) are from hatcheries, feed and rats in poultry houses. On the other hand, Salmonella Pullorum (S. Pullorum) transmission can occur within 48 hours of hatching, in which case shell penetration and feed contamination occur at a lower rate. S. Pullorum localizes in the reproductive tract of layers, and more densely in the ovary and oviduct with sexual maturation and cause severe damage to ovarian follicles(fig,2).

The most common lesions are amorphous and cystic follicles as small nodules or regression of ovarian follicles and can be seen in chronic infection. In this case, the oviduct fills with a caseous exudate, causing the dysfunction of the ovary and oviduct, thus leading to peritonitis and loss of egg production.

Fig.2 Normal and regressed ovaries with atrophic follicles(Source: Shivaprasad 2000)

3. Fowl Cholera (FC)

This is a septicemic disease of poultry with high mortality and morbidity rates, caused by Pasteurella multocida (P. multocida) of the Pasteurellaceae family. Adult chickens are more prone than young fowls and broilers are more resistant to the disease than layers, resulting in deaths at higher rates in laying hens.

Transmission occurs through the digestive tract, respiratory tract, skin and conjunctiva, and is particularly transmitted through the feces or oral/nasal discharge of animals that have recovered from the infection.

The ovaries are infected cases of acute cholera in laying hens. Matured follicles take on a flabby and densely vascularized appearance, and the follicular content is released into the peritoneum as soon as the follicles rupture. The stroma of unmatured follicles and ovaries are hyperemic, which leads to a decrease in production in laying hens.

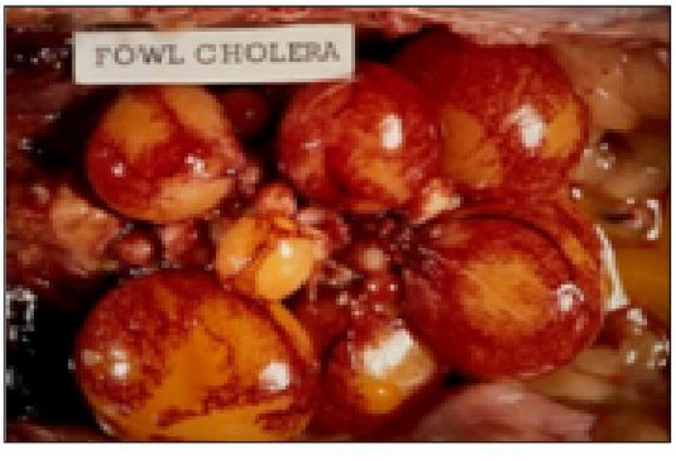

Fig.3.Fowl cholera Hyperemic ovaries (Source: Cornel University)

4. Infectious Coryza

Chickens are natural hosts of the agent Avibacterium paragallinarum (A.paragallinarum) . The disease is characterized by a swelling around the eyes and face. The agent is transmitted through secretions and excretions. Transmission can also occur through the exchange of machinery/equipment between farms, and also by personnel.Morbidity of the disease is 80–100%, while mortality is around 10%. It causes a 10–40% decrease in egg production.Feed and water consumption is usually decreased resulting in a drop in egg production.

5. Mycoplasma Infection

Mycoplasma synoviae (MS) and Mycoplasma gallisepticum (MG) are the cause of mycoplasma infections, for which chickens are natural hosts. MG causes chronic respiratory infections (CRD). The primary symptoms are coughing, panting, slight opening of the beak and reduction in feed intake. Decrease in egg production, co-inflammation of the cornea and conjunctiva, facial edema and tear secretion are clinically apparent. The infection spread through "lung-gut -oviduct axis". Oviduct thickening and salpingitis in laying hens are considered to be causes of decreases in production.

Chicks that hatch from the eggs of infected birds play a significant role in lateral transmission. The most significant route is transmission through eggs. Vertical transmission through infected eggs is observed. MS infection is seen in chickens older than 4 weeks of age. It is usually an upper respiratory tract infection. Strains isolated in recent years were frequently isolated from flocks with decreased egg production and egg defects. The agent causes the eggshell to become thinner, to lose opacity and to develop a rough surface. Thus, eggs tend to crack or break more easily. The agent causes decrease in egg production and more than 10% of eggs to be unfertilized. Mainlythe apex of the shell gets damaged(fig.3).

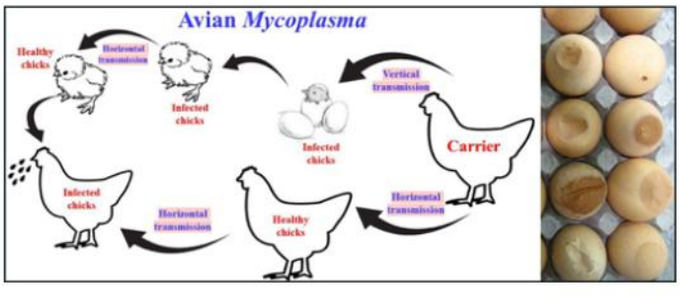

Fig 4.Vertical and horizontal spread of Mycoplasma infection, apex damage in eggs(Source: Poultry ScienceVolume 102, Issue 5, May 2023, 102553)

The joint strains cause inflammation in the joints and tendons. The oviduct strain causes eggshell abnormalities (EPS), which can lead to increased breakage and an indirect and direct reduction in egg production(Fig.4).

6. Ornithobacterium rhinotracheale(ORT) Infection

ORT is a contagious, fatal respiratory disease that causes growth deficiency. Its natural hosts are chickens and turkeys. It can be transmitted vertically, but also horizontally through aerosols or drinking water. The agent can be isolated from the ovary, oviduct, hatching eggs and unfertilized eggs.It affects production in commercial layers, and produce increase number of eggs of smaller size than normal and changes in shell quality are among the clinical symptoms of the disease.

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B. Viral Infections of Ovary and/or Oviduct Disease

Table 2. Adverse effects on egg production and quality observed in different viral diseases.

Viral disease that affect egg production	Drop in egg production(%)	Effect on Egg quality	Lesions in reproductive organs
Egg drop syndrome76	10-40%	Soft shelled or shell less	Uterine edema, Cystic lesions in oviduct, inactive ovaries
Infectious Bronchitis (IB)	Up to 70%	Misshapen eggs, rough and thin shells, eggshell discoloration, and watery albumen, eggshell apex abnormalities.	Ovarian regression, atrophied oviduct, Cystic lesions in the oviduct
Infectious Laryngo-treacheaitis (ILT)	Up to 58%	Blood stained eggs	
Newcastle disease	Up to 100%	Decreased shell thickness, soft shells, spotted shells, and decreased albumen height	Small and flaccid oviducts and inactive ovaries
Avian Metapneumovirus (AMPV) Infection	Up to 60%	Soft or thin-shelled eggs	Ovarian hemorrhages, inspissated yolk in shell gland and regression of ovary and oviduct
Avian Influenza (AI)	Up to 100%	Misshapen, discolored, and fragile eggs	Salpingitis
Avian Encephalomyelitis (AE)	Up to 75%	-	
Avian Hepatitis E Virus (HEV) infection	Up to 45%	-	Oviduct regression
Marek's disease	Up to 5%	-	Ovarian tumors
Leucosis	Up to 2%	-	Ovarian tumors

1. Egg drop syndrome-76 (EDS-76)

Egg drop Syndrome virus(EDSV) belongs to the genus adenovirus of the Adenoviridae family. Clinically the birds appear normal but produce egg discoloration and production of thin-shelled, soft-shelled, and shell-less eggs characterized the early outbreaks reported in the 1976. Hence the name EDS-76. Production of soft-shelled and shell-less eggs and leads to a sudden drop (10-40%) in recorded egg production or a failure to achieve a normal peak in production.

Ducks and geese are believed to be the natural hosts, but disease outbreaks commonly impact laying chickens. A drop in production and production of abnormal eggs are commonly seen in naturally occurring outbreaks(fig.5).

Naturally occurring outbreaks usually lasted 4 to 10 weeks, with a fall in egg production of up to 50%.Unlike IB no adverse effects on the internal egg quality of the eggs. Research investigating the pathogenesis of EDSV infection established the pouch shell gland as the primary site of viral replication, which was associated with the production of abnormal eggs. The lesions were minimal in mature chickens; however, uterine edema was observed.It is believed that pathological changes in the uterus of the infected bird may have interfered with the proper formation of the eggshells.

Fig 5. Gross Lesions EDS '76. A; Normal hens' reproductive system B; Inactive ovaries and shrunken oviduct and abnormal thin shelled eggs. (Source: From Wikipedia)

2. Infectious Bronchitis (IB)

The causative agent of IB, is a gammacoronavirus(IBV) in the family Coronaviridae, which exists as multiple heterologous strains. Mainly IBV initially infects the respiratory system of chickens but some strains have genital tropism. The extent of the reproductive disease may differ with the bird's age and the strain of the causative virus. In layers, infection at peak production leads to a severe fall in egg production, accompanied by a reduction in shell quality and a watery albumen (fig,6). Alsoimpacted oviducts, ruptured ova, internal layers, and cystic right oviducts are often a result of early IB virus infection. Infectious bronchitis is also known to affect shell pigmentation. Uniformity of pigmentation in brown eggs is poor. Pale eggs can appear 2 to 5 days after exposure to the virus.The production of pale or inconsistently colored eggs could be contributed by IBV-induced lesions in the uterus, which decrease the deposition of the main eggshell pigment, protoporphyrin IX. The glandular hypoplasia of the magnum, induced by IBV infection, could result in a reduction in the synthesis of albumen proteins and, consequently, a watery albumen and reduced egg weight.

Fig 6. IB: Clinical signs, wrinkled eggs and watery yolk

Infection of female chickens within the first few days of life can cause detrimental lesions in the developing reproductive tract. Cystic dilatation in the oviduct, which has been detected in false layers with a reduced peak in egg production, could be a consequence of IBV exposure at one-day old.

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3.Avian Metapneumovirus (AMPV) Infection

Avian Metapneumovirus belonging to the genus Metapneumovirus of the family Pneumoviridae . The term turkey rhinotracheitis (TRT) has been used to describe clinical respiratory disease in turkeys. In particular, manifestations suggest upper respiratory tract(URT)infection, include snacking, rales, sneezing, nasal discharge, foamy conjunctivitis, and swollen infraorbital sinus. Milder clinical signs are usually appreciated in chickens; however, swollen head syndrome (SHS) is thought to develop as a result of secondary bacterial infections.

Infection in laying birds usually contributes to a decrease in egg production and to reduced egg quality, soft shelled or thin shelled eggs.Lesions identified in the oviduct and ovary, including inspissated yolk or albumen in the oviduct, ovarian hemorrhages, and regression of ovary and oviduct.The pathogenicity of AMPV for the chicken's oviduct was shown to be higher in the uterus than in the magnum and isthmus, which suggests a different susceptibility of epithelial cells for the three parts of the chicken's oviduct.

4. Newcastle Disease (ND)/Ranikhet Disease(RD)

Newcastle disease virus (NDV), a RNA virus belonging to the Paramyxoviridae family. In nature, NDV primarily infects a wide variety of avian species and represents and ND is one of the most important poultry pathogens. Newcastle virus is classed into pathotypes velogenic, mesogenic and lentogenic. The viscerotropic velogenic strains cause high mortality and enteritic lesions. Neurotropic velogenic strains also cause high mortality with respiratory and nervous signs(fig.7).

Respiratory and nervous manifestations with an elevated mortality are commonly observed after the infection of non-vaccinated birds with virulent NDVs. A decreased egg production was reported in vaccinated layers challenged with a virulent ND.

Fig.7. Newcastle disease:Typical nervous tortacolis twisting of the neckand soft shelled rubbery eggs

The production of abnormal eggs, including soft-shell eggs and spotted-shell eggsare common. In the challenged specific-pathogen-free (SPF) hens demonstrated small and flaccid oviducts and inactive ovaries during necropsy examination. The uterus was reported to be the main target part of the oviduct for both live vaccine and virulent strains, which may explain the changes observed in the shell quality. The drop-in egg production was thought to be related to a decreased serum phosphorus level as a consequence of ND-induced kidney damage. Furthermore, the lower calbindin-D28k (CaBP-D28k), a calcium-binding protein, mRNA expression in the uteri of NDV-infected hens was suggested to have a role in the change in shell quality. The HI anti-NDV antibody titer levels showed a high correlation with protection against the negative effects on egg production.

5. Avian Influenza (AI)

Avian influenza viruses (AIVs) are classified as members of the genus Influenza virus- A of the family Orthomyxoviridae. Serological reactions to the surface glycoproteins, haemagglutinin (HA) and neuraminidase (NA), have been used for the subtyping of AIVs and, accordingly, sixteen subtypes of HA (H1–16) and nine subtypes of NA (N1–9) have been recognized. Influenza viruses are notorious for antigenic variation and hundreds of different subtypes exist because of antigenic drift and shift.

A large variety of avian species, both domestic and wild birds, have been shown to be susceptible to natural infections with AIVs. Poultry production has incurred huge impacts as a result of frequent outbreaks of either highly pathogenic avian influenza (HPAI) or low pathogenic avian influenza (LPAI).

The clinical signs that accompany infections with AIVs vary widely depending on the host species, age, immune status of the host, and the virus subtype involved. In chickens, for example, LPAI viruses developed disorders with mild to severe manifestations in respiratory, digestive, urinary, and reproductive systems. A sudden increase in mortality, up to 90%, may be the only indication of infection with HPAI viruses. Losses from reduced egg production have been encountered as a result of AIV infections.

Egg yolk peritonitis and salpingitis with edema in the oviduct are commonly observable lesionsarethe cause for egg production loss and shell quality. The significance of the widely distributed H9N2 as a primary pathogen in laying birds, infection cause a long-term decline in egg production. The virus replication-induced lesions in the infundibulum limits the reproductive functionality of the bird is the cause for drop in egg production.

6. Infectious Laryngotracheitis (ILT)

The causative agent for ILT is Gallid herpesvirus type 1 (GaHV-1), belongs to the genus Iltovirus, subfamily Alphaherpesvirinae of the Herpesviridae family . ILT is an upper respiratory disease of chickens, which is characterized by mild or severe respiratory manifestations accompanied by production losses. Like other members of the Herpesviridae family, GaHV-1 can establish latency in clinically recovered birds. Stressors such as shifting,rehousing, and an onset of laying could trigger the re-excretion of the virus in recovered chickens. A rapidly spreading ILT outbreak in a multiage (from 40 to 107 weeks) laying farms resulted in a decrease in egg production (up to 58%) and a slight increase in mortality. The gross and microscopic lesions were confined to the respiratory tissues; it was reasonable to infer that the fall in egg production was a secondary effect to the impaired heath status of the infected bird.

7. Marek's Disease

Marek's disease virus (MDV) cause a lymphoproliferative disease in chickens. MDV caused by cell-associated alphaherpesvirus, which was recently assigned to the genus Mardivirus within the family Herpesviridae. Live-vaccine-based control of MD is heavily practiced in laying flocks. Although clinical disease is not always apparent in infected flocks, a subclinical decrease in growth rate and egg production may be economically important. Once MDV is established, the majority of laying hens are likely to become infected regardless of any management. Longer cohort duration of virus damage the ovaries in laying hens result in greater egg production loss. The economic burden of MD comes from both direct losses from hen mortality and morbidity and indirect losses(e.g., egg production loss), caused by industry wide use of vaccines and control measures.

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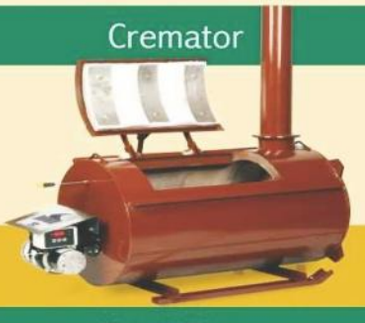

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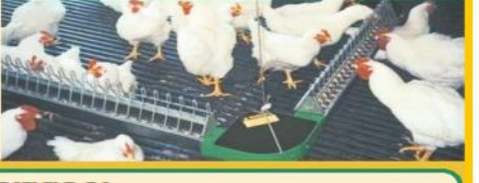

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8. Avian Leukosis

Avian leukosis virus (ALV) infection of chickens is a substantial cause of economic losses because of tumor-associated mortalities and negative effects on production. ALV is the type species of the genus Alpharetrovirus within Retroviridae family. ALV shedding into the eggs was associated with lower egg production, delayed onset of laying, small-sized eggs, thin-shell eggs, and reduced hatchability compared with non-shedding hens. Avian leukosis affected commercial egg layer flocks (white leghorn breed) demonstrate lower peaks of egg production (55% to 80%). On necropsy examination, a lack of ovarian activity and various visceral lymphomas were observed in non-laying birds. Important production criteria, including egg production rate, egg weight, and shell thickness, were negatively affected in chickens that harbored endogenous viral (ev) genes of ALVs in their genomes. ALV subgroup J, associated with extreme losses in meat-type chickens since the late 1980s, was first reported to cause myeloid leucosis in commercial layer flocks in 2002. Since then, several reports have described a dramatic reduction in egg production accompanied by ALV-J induced tumors in egg-type chickens.

Fig.8.Normal and cancerous chicken ovary. (A) Gross anatomy of normal ovary with a hierarchy of developing follicles; (B) ovary classified as suspected; (C) ovary taken from a hen with metastatic late stage ovarian cancer;(Source: Erfan Eilati)

9. Avian Encephalomyelitis (AE)

AE is caused by vertically egg transmitted avian encephalomyelitis virus (AEV) and is a member of the Picornaviridae family . In young chickens, the neurological nature of the disease involves clinical signs, such as ataxia, paralysis, and tremors. Often clinical AE has been encountered in layer pullets following the application of live AE vaccine.

In laying birds, AE can negatively influence egg production and hatchability. Avian encephalomyelitis was diagnosed in breeding hens that experienced a transient decline in egg production (upto 20%). Additionally, a significant late embryonic mortality in the fertile eggs produced by these hens was reported. In a commercial laying flock, a dramatic fall in egg production (up to 75%), lasting for 2 weeks, was associated with encephalomyelitis. However, some naturally occurring outbreaks in non-vaccinated laying flocks showed lower rates (7.5% to 18%) of drop in egg production. The infected adult birds do not exhibit neurological disorders that usually appeared in the chicks hatching from eggs produced around and during the time of the egg drop. Virus replication in the ovary could be the most probable cause of the temporary decrease in egg production.

10. Fowlpox Fowlpox(FP)

FP is a common poultry viral disease and is characterized by cutaneous nodular lesions and/or fibro-necrotic lesions on the mucous membranes of the upper respiratory and/or digestive tracts. Avianpox viruses m(APV) are members of the Avipoxvirus genus in the family Poxviridae.

The decrease in the production of eggs in laying birds is as a result of the poor conditions of infected birds and the intensity of the proliferative lesions. Egg production may drop up to 15% in some flocks affected with FP.

11. Other Viral Infections

Avian hepatitis E virus (HEV) belongs to Orthohepevirus B species within the Hepeviridaefamily.In layer and broiler-breeder chickens, the virus has been associated with big liver and spleen (BLS) disease and hepatitis-splenomegaly (HS) syndrome. The two diseases have often been correlated with increased mortality (1–4%) and reduced egg production (10–45%) in broiler breeder and laying hens. Apart from the characteristic hepatosplenomegaly, oviduct regression is associated with production loss. In some breeder flocks infected with HEV, the hatchability was 36% to 46% lower than the expected level.

External parasites

There are a great number of external parasites that affect poultry by generating anemia, allergies, irritation, and secondary infections. Among these external parasites are lice (Menopon gallinae), fleas (Echidnophaga gallinacea), mites (Dermanyssus gallinae), flies, and ticks (Argas spp.). These parasites cause a decrease egg production as debility and loss of feed metabolism.

Helminths (internal parasites)

Helminths comprise internal parasites of three types: cestodes, nematodes, and trematodes. These worms invade different systems and organs and cause a wide range of lesions in laying hens. There is a large group of helminths that are parasites of the digestive system which affect the feeding processes of the poultry. As a result, laying is reduced. Among the most common examples of these parasites are:

- **Nematodes:** Ascaridia galli, Heterakis gallinarum, Capillaria.
- **Cestodes:** Raillietina

Coccidiasis

Coccidiasis is a subclinical disease characterised by merepresence of the coccidian organisms in the intestinal mucosa caused by protozoa of the genus Eimeria spp. and it will not cause clinical disease as coccidiosis. But, a marked effect on the digestive system of hens, preventing the correct absorption of nutrients; and cause drop in production.

Conclusions

In recent decades, intensive poultry production has faced both positive and negative consequences. Although there are several nutritional factors causing production problems, the bacterial and viral infections largely affect the reproductive organs or create severe health problems and production loss and their quality.The pathogens with a tropism for the reproductive organs or those that cause debilitating health conditions demonstrate mild to severe adverse effects on the egg production process. Multiple factors, mainly including host species, strain of the organisms, and age and immune status of the host, all play a major role in the type of reproductive disease. The systemic alterations caused by these organisms may have a negative influence on egg production and quality.

Using advanced techniques such as molecular analysis, microscopy, isolation and detection, would help in further understanding the pathogenesis of reproductive diseases caused by these infections. Further, an analytical and biological methodologies would help in understanding these diseases. Although there are a number of effective disease prevention protocols in place on poultry farms, still the bacteria and viruses continue to be a major constraint for the sustainability of egg production.

(**Acknowledgements:** The author thanks the google contribution of photos in this article)

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Nano Zinc for Poultry

PROSPECTS

Dr. Rajesh Reddy - MVSc (VPH)
Product Manager
Glamac International Pvt. Ltd

Industry and zinc in poultry

With the rise in demand for high quality poultry feed, Poultry farmers and Feed manufactures are always on a lookout for poultry health and growth promoters.Zinc (Zn) is an important microelement in poultry nutrition. Zinc is vital for proliferation of cells and their differentiation. The importance of zinc in nutritional biology was first reported by Raulin (1869), when he observed that zinc was required for growth of Aspergillus Niger. The enzyme carbonic anhydrase was identified and purified in 1940. It contains a metalloenzyme zinc at 0.33%, which catalyses the breakdown of carbonic acid into CO2 and H2O.Being a component of carbonic anhydrase, zinc facilitates transport of CO2 from tissues to lungs. Zinc is an essential component of both DNA and RNA polymerase enzymes. Zinc has been found cofactor in more than 300 metallo-enzymes which is essential for enzyme structure, bone development and growth. It is vital to the activity of a variety of hormones including glucagon, insulin, growth hormone, and the sex hormones. It also plays a key role in the immune system.Consumers, producers, Poultry feed manufacturers and others related with poultry industry has developed a good attraction towards the role of zinc in poultry nutrition.

Zinc as antioxidant.

Zinc is an indispensable part of the antioxidant system in animals. Antioxidants combat 'reactive oxygen species'(ROS) and protect the body from the harmful effects of ROS, in various ways. Zn is a major part of the antioxidant enzyme superoxide dismutase (SOD), which helps defend the body against ROS by converting superoxide anions into hydrogen peroxide. Zn reduces oxidative stress by antagonism of the redox-active transition metals (inorganic copper and iron), preventing the formation of hydroxyl radicals from hydrogen peroxide (H2O2). Zinc interferes in the Fenton reaction, by competing with the binding sites of transition metals (iron, copper, and zinc), serving as, a donor of electrons for such reactions.

Zn appears to indirectly suppress oxidant stress by the stimulation of certain substances which have antioxidant properties. It effects in two ways; acutely and chronically. The acute effects of Zn include antagonism to redox-active transition metals and by protection of protein sulphahydryls; while chronic effects involve indirect protection from pro-oxidants due to induction of other substances, e.g.,metallothionein, which are cysteine rich proteins that serve as antioxidants by scavenging ROS. Zinc-dependent metallothionein are found in different forms in animals, especially in the pancreas, liver, intestine, and kidney of chickens, where it serves as an antioxidant in these tissues and, under different conditions of oxidative stress such as toxicity of certain drugs, they prevent oxidative DNA damage and mutagenesis and ethanol toxicity.

Zinc as immunomodulatory agent.

Immunity and stress related issues are pivotal for the poultry production. Studies have shown overwhelming evidence that supplementation of Zinc can improve growth, augment immunity, enhance antioxidant capacity, increase endocrine secretion, and interact with other minerals in the gut. The effectiveness of Zn depends upon its absorption from the gut and bioavailability in blood. Zinc acts as a non-pharmacologic booster for immunity in broiler chicks and as a stimulator for cellular and humoral immune system.

Zinc as a moulting inducer.

Over-supplementation with Zn as an alternative agent for the induction of moulting agent for layer hens, which produced more eggs of higher quality in the second production cycle as compared to other methods of moulting. Chickens tend to lose weight during the process of moulting; however, the weight loss was temporary and body weight recovered after the resting period in supplemented hens.It has been postulated that high concentration of Zn (10,000-20,000 mg/kg) in feed of laying hens causes the follicular atresia followed by cessation of eggs. Zinc interferes in availability of calcium (Ca) which plays an important role in gonadotrophin secretion (LH) which is required for the egg laying process.

Zinc and Egg

Zn has been reported to increase the overall eggproduction of laying hens. Increased mineral deposition in the eggs of laying hens has been seen after supplementation with organic forms of Zn alone, and in combination with other trace minerals, copper, manganese, and chromium. Better egg quality in terms of increased egg mass, egg albumin, globulin, shell thickness and total protein in laying hens after Zn supplementation. Macro-minerals like calcium and phosphorous, and vitamin D3 are major nutrients which are responsible for eggshell qualityin laying birds. Additionally, for mineralization process some enzymes are linked with macro-minerals. One of the enzymes is carbonic anhydrase, a zinc dependent enzyme essential for supplying carbonate ionsto convert calcium into calcium carbonate needed for eggshell formation in laying hens.Zinc concentration in birds is directly related to activity of this carbonic anhydrase enzyme. Zinc and manganese are cofactors of metalloenzymes which are responsible for carbonate and mucopolysaccharides synthesis and are important in eggshell formation. The increase in egg production and enhanced production performance after Zn supplementation has been attributed to its anti-stress and anti-oxidative properties.

Zinc and reproductive health.

Zn has been found in high amounts in the male reproductive tract and plays an important role in physiology of spermatozoa and the cases of its deficiency has been associated with reproductive dysfunction including shrinkage of seminerfous tubules and lower testicular weight. It has been suggested that Zn can bind with free radicals produced by abnormal spermatozoa and thus prevent healthy sperm from the damage of oxygen reactive species. Zn is also part of copper-zinc superoxide dismutase and cofactor of metalloenzymes and thus involved in important functions inside the spermatozoa. Zn has a vital role in breeders in terms of improving the egg production, fertility, hatchability, embryonic development, and availability of the hatched chicks.

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• Dr. Sumon Nag Chowdhury: +91 9051512590

Zinc and Bone Health

Zinc has been postulated to have a stimulatory impact on mineralisation, formation of bone and the preservation of bone mass. The metal directly activates aminoacyl-tRNA syntheses in osteoblastic cells, and it activates synthesis of cellular protein. Furthermore, Zn deactivates osteoclastic bone resorption through inhibiting osteoclast-like cell formation from marrow cells.

Zinc and Feather

Zinc is a component of 1000 transcription proteins, and it has been suggested that the alteration in Zn status affects the gene expression of a plenty of genes by activation. As a reflection of its role in gene regulation, it is required for the synthesis of different proteins. Two key structure proteins, keratin, and collagen, both require Zn. Any deficiency leads to decreased keratin and collagen formation leading to some deficiency signs such as poor feathering in poultry.

Zinc Deficiency

Reduced appetite is the first sign to be noted in Zn deficiency which further leads to loss of taste. The sense of taste is mediated through the salivary zinc dependent polypeptide. Low salivary zinc concentration leads to a reduction of taste and reduced appetite.

In chicks its deficiency results in various bone abnormalities, skeletal malformations, poor bone mineralisation, stunted growth, and immunological dysfunctions. In layers' deficiency of Zn is accounted to decreased egg hatchabilitySeveral trials have shown improvements in production from poultry when Zn was added to the diet. Improvement in terms of body weight gain, better egg production and egg quality in laying hens.

Supplementation of high dietary Zn in chicken results in elevated levels of Zn in the liver, kidney, pancreas, spleen, and gizzard. Dietary Zn supplementation has an inverse relationship with Fe and Cu content of the liver in laying hens. while the copper content of the liver, pancreas and gizzard decreased with increasing Zn supplementation in the feed.

Recommended Dosage

The commonly used cereal grains in broilers diets are rich in phytate that may reduce absorption of zinc.Zinc is not always readily available in the diet of poultry, which is why it is often added to commercial poultry feed as a supplement. As suggested by NRC Zinc requirement of poultry is 40 mg/kg of feed.

Environmental Challenges and Zinc

Heat stress can extremely trouble the balance between the generation of reactive oxygen types and the antioxidant system. The oxidative stress result from heat stress led to an increased radical production, which induces oxidative damage and lipid peroxidation to cellular membranes.This leads to physiological changes, including reduced feed intake, decreased metabolic heat production, lower performance in productivity, and a decrease in growth rate and feed efficiency. Zinc supplemented along with Vitamin C has proved to decrease the effect of cold as well as heat stress.

Current Practice

The dietary need for zinc supplementation is well established in poultry feed and is routinely practiced.Earlier depending upon cost and availability zinc supplementation in poultry feed was used at a formulation of Zinc Oxide (ZnO) (72% Zn) and Zinc Sulphate (ZnSO4H2O) (36% Zn). The main difference between these source compounds is that most inorganic compounds do not have carbon; however organic compounds always contain carbon and have carbon-hydrogen bonds (C-H).

Most (80-90%) of the supplemental Zn used in poultry diets comes from ZnO source, which is less bioavailable than Zn sulphate for poultry. However, the sulphate (acid salt) is more water soluble, allowing reactive metallic ions to promote free-radical formation. This can support in chemical reactions responsible for the breakdown of vitamins and eventually the destruction of fats and essential oils, down rating the nutritive value of the diets.

Innovation with Nano Zinc

Absorption, Bioavailability, and Efficacy

Nanotechnology has a great potential to be used in poultry production with new tools for the enhancing the ability of poultry to absorb nutrients and therefore improving growth performance, nutrient digestibility, and productive performance of poultry.Nano zinc (ZNOPs)isultrafine object that behaves as a whole unit in terms of its properties having particle size from 1 to 100 nm. ZNOPs have attracted great attention as an alternative to feed supplements to both organic and inorganic zinc source. In addition, ZONPs have been demonstrated to exert more positive effects, producing better results, due to their novel properties, such as smaller size, increased surface area, a high number of surface-active centres, stronger adsorbing quality, catalytic efficiency, increased bioavailability, absorbability, and exerting a superior efficacy.

Since there are almost unlimited possibilities concerning levels and sources of zinc there is still more research needed. Using zinc as nanoparticles size can be used at lower doses and can provide better result than the conventional zinc sources. Nanoparticles zinc oxide can act as antibacterial agent, modulates the immunity and production of broilers.

Pollution and Zinc

Although currently poultry farmers routinely add Zinc in poultry diet above the NRC recommended level to avoid the possibility of its deficiency, this practise has been linked to environmental pollution since the extra levels of Zn cannot be utilized by crops. With Nano Zinc given the increased bioavailability of organic Zn, it may be possible to supplement this essential element well below the practiced level resulting in less Zn excretion without compromising the performance of the birds and pollution of the environment.

Conclusion

- The prospects of nano zinc in poultry nutrition are indeed profound. With its enhanced absorption, bioavailability, and efficacy, nano zinc stands poised to revolutionize poultry farming practices, enabling producers to achieve optimal growth, immunity, and reproductive performance while minimizing environmental impact.
- As we venture into this era of innovation, the integration of nano zinc into poultry diets holds the potential to redefine standards of excellence in poultry nutrition, ushering in a new era of sustainability and efficiency for the poultry industry.
- In conclusion, the future of poultry nutrition appears promising with the introduction of novel products like CYNKA HBR, (from the R&D platform of Glamac)containing nano zinc solutions. As we continue to explore innovative ways to enhance poultry health and productivity, nano zinc offers a compelling avenue. With its superior bioavailability and potential to address zinc deficiency effectively,
- Nano zinc essential oil complex acts as a gut-acting anti-inflammatory and healing agent, repairing gut villi, and exhibiting antioxidant, antiviral, and antimicrobial properties.CYNKA HBR represents a significant advancement in poultry nutrition. By leveraging nano zinc technology, poultry farmers can optimize the health and performance of their flocks, ultimately contributing to a more sustainable and efficient poultry industry.

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- Layer 25% Concentrates
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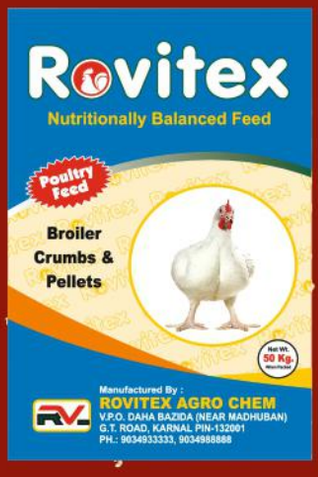
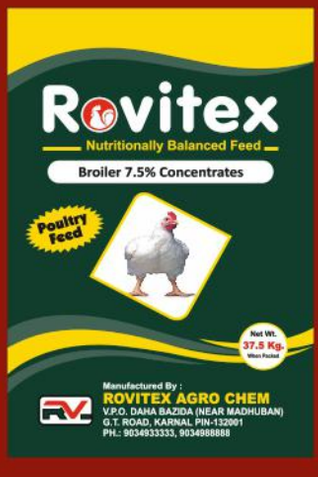
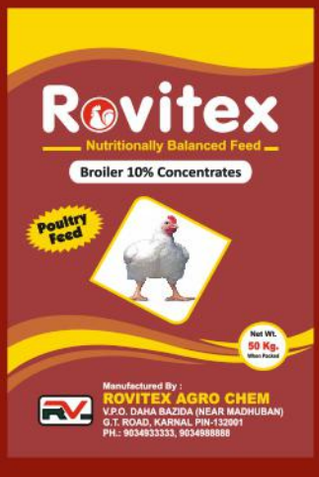
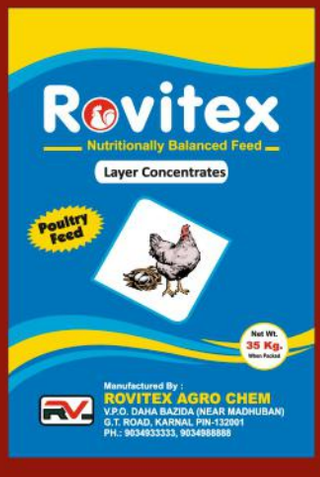
- Broiler Starter Crumbs
- Broiler Finisher Pellets









ROVITEX AGRO CHEM

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Unveiling Success: Indian Herbs Specialities organized Spectacular One-Day Technical Seminar at Namakkal, Tamil Nadu on March 15, 2024

The Spectacular One-Day Technical Seminar organized by **INDIAN HERBS** in Nala Hotel, Namakkal, Tamil Nadu, on March 15, 2024, was a resounding success, leaving an indelible mark on the attendees and organizers alike. The event served as a beacon of knowledge and innovation in the realm of layer farming, offering a platform for industry stakeholders to converge, exchange ideas, and glean insights from leading experts.

The seminar's thematic focus on 'Layer nutrition and management' addressed crucial aspects vital for the sustainable growth and productivity of layer farming operations. Through a meticulously curated program, participants were exposed to practical knowledge and cutting-edge research, empowering them to enhance their practices and optimize their outcomes.

The esteemed presence of Dr. D. Chandrasekaran and Dr. Abhijit Mishra, distinguished poultry nutritionists, as the 'Guests of Honour', elevated the seminar to a prestigious platform. Their profound expertise and rich experience lent credibility to the discussions, enriching the audience with invaluable perspectives and best practices.

Key highlights of the seminar included insightful sessions on mitigating 'Summer Stress Management', delivered by Dr. D. Chandrasekaran, and gaining 'Practical Insights into Layer Nutrition', elucidated by Dr. Abhijit Mishra. These sessions were complemented by Dr. Shivi Maini's presentation on 'Novel Phytogenics for Summer Stress Mitigation in Layers', offering innovative solutions to prevalent challenges in layer farming.

Furthermore, the active participation of over 100 top layer farmers, integrators, feed millers, and patrons underscored the event's significance and relevance within the poultry community. The vibrant exchange of ideas, experiences, and best practices fostered a collaborative spirit, nurturing a conducive environment for collective learning and growth.

The enthusiastic engagement of the Tamil Nadu Sales team, led by Mr. Paramartha Roy, National Sales Manager, and comprising Mr. Balu, Mr. Ramesh, and Mr. Senthil, further exemplified **INDIAN HERBS** dedication to fostering strong customer relationships and providing unwavering support to the farming community.

In essence, the Spectacular One-Day Technical Seminar not only served as a platform for knowledge dissemination but also as a catalyst for fostering innovation, collaboration, and sustainable growth within the layer farming ecosystem. It epitomizes **INDIAN HERBS** commitment to driving positive change and empowering stakeholders across the agricultural value chain.

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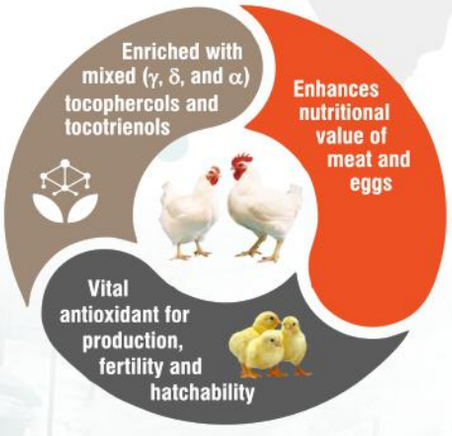

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Oxidative Stress
MINIMIZE THROUGH FLAVONOIDS

DEEP CHAND VASHISHTHA
M.Sc , MBA
NSM- Bioncia International Pvt Ltd

The term **"Stress"** is widely used to describe a set of physiological and behavioral changes. Factors that trigger stress, so-called stressors, initiate these changes to cope with the challenges.

Oxidative stress is downstream of all these stresses. Oxidative stress in the cells/tissues results from an imbalance between free radical production and endogenous antioxidant defense and leads to lipid peroxidation, protein nitration, DNA damage, and apoptosis.

Oxidative Stress in commercial poultry result from environmental, nutritional, microbiological, and management factors which negatively impact poultry health and production.

Oxidative stress — what is it?

Metabolic processes in cells require oxidative reactions. During these standard processes ,reactive oxygen species (ROS) are produced. ROS are essential metabolites involved in enzymatic reactions, mitochondrial electron transport, signal transduction, activation of nuclear transcription factors, and gene expression. However, due to their reactive nature, ROS can have adverse effects and damage cell walls.

ROS can be neutralized by endogenous antioxidant mechanisms and radical scavengers like poly phenols. In a balanced system, there are enough antioxidants to neutralize ROS. As soon as this system is not balanced anymore and there are more ROS than available antioxidants ,oxidative stress is marked mostly due to increased oxidative processes and ROS production. This leads to cell and tissue damage (e.g., liver cells, mucosal cells).

How to counteract oxidative stress?

Several nutritional strategies are available to alleviate oxidative stress and enhance animals 'health and welfare status. The physical form of the diet, feed composition, and quality of single feed ingredients used are primary tools to control and improve performance and health.

Adding synthetic or natural antioxidants to diets, limiting lipid peroxidation in feed is common practice, and single product will not solve antioxidant purpose So we need add more . This is not wealthy for poultry practices because it is prices issue .

However, evidence on the beneficial effects due to the application of Active Flavonoids additives as antioxidants is increasing. This is something we have known about human nutrition for years .Diets rich in vegetables and fruits have increased antioxidants' intake and thereby reduce oxidative stress and inflammation, thus minimizing the risk of developing diseases.

Flavonoids feed additives show clear potential to reduce oxidative stress. Recent literature and research data indicate a higher efficacy of such natural antioxidants than the customarily used synthetic antioxidants or vitamin E.

Flavonoids (also named as bioflavonoids) are naturally occurring secondary plant metabolites found in all plant species and known to exhibit a number of benefits. Due to their possible role in health promoting and preventing from chronic diseases, they could be known as "functional ingredients" and "health promoting biomolecules". Flavonoids have shown various biological effects including antibacterial, antiviral, gut modulatory, antioxidant, hepatoprotective, hypocholesteremic and immunomodulator activities.

Conclusion

Oxidative stress is not associated with a disease but can result in performance losses and higher susceptibility of poultry to diseases. This results in an economic impact on livestock production. Recently, much attention has been paid to nutritional strategies to counteract oxidative stress. One promising way is the supplem - entation with Active Flavonoids feed additives, as these active substances have shown immense potential for their anti-oxidative properties and efficacy.

EVENT CALENDER

AUGUST 2024

06 - 08 SIAVS 2024

Venue : Anhembi Parque
São Paulo – Brazil
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SIAVS
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SEPTEMBER 2024

05 - 07 SELECT CHINA 2024

Venue : Nanjing, China
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SEPTEMBER 2024

17-19 SPACE 2024

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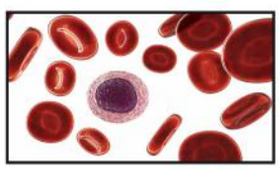

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Keeping flocks healthy, productive and profitable through gut management

Wouter Van Der Veken, Global Product Manager Probiotics, Huvepharma

The relationship between a healthy gut and optimal performance is undeniable and managing the gut efficiently can contribute to a greater overall production profitability.
As such, the gut and its microbiota can be seen as the motor of performance, which has to be fed, maintained and protected throughout the production cycle. In recent years the use of alternative feed additives to support exactly this has increased.

This ties in with the rise of probiotics: beneficial micro-organisms incorporated into feed or drinking water to balance and enhance the gut microbiota, resulting in a health and/or performance benefit.

The current probiotic market offers multiple options and there are plenty of products to choose from. However, three questions should be considered before the right choice can be made.

- First of all, what is the intended benefit?
  Some probiotics are more focused on digestion, whilst others eliminate pathogens more effectively. Keeping the intended benefit in mind when choosing a probiotic is essential, as probiotics also have their limitations.
- Secondly, is the probiotic stable and, as such, can it be used in standard feed processing? There are great differences in stability amongst probiotic products, most noticeably between spore formers and nonspore formers. It is this spore-forming capacity which makes a probiotic more adept to deal with feed processing, whilst it also protects the micro-organism throughout the digestive process until it reaches its location of action.
- Thirdly, are multiple probiotics used in the same product or not? Multi-strain products inherently introduce a certain aspect of competition, especially if the strains used are part of the same genus (Bacillus for example). Due to their similarities they are expected to compete for similar requirements, such as nutrients, potentially diminishing the intended effect.

Products of choice

With regard to these three questions and their answers, spore-forming and single strain probiotics are often the preferred products of choice. B-Act, with spores of Bacillus licheniformis (DSM 28710) as an active component, is a good example.

It ensures healthy, productive and profitable flocks by supporting the birds' gut microflora, both directly and indirectly. The micro-organism has genes coding for multiple digestive enzymes and as such improves digestibility and availability of nutrients, whilst it also produces potent bioactive substances aimed at pathogen control. In particular, Clostridium perfringens, the pathogen responsible for the development of necrotic enteritis and a major player in dysbacteriosis (two major production diseases in poultry), is actively and efficiently controlled by B-Act.

The combination of these two modes of action results in healthier, more productive birds, leading to a better profitability in the end. To put this into numbers a statistical analysis was done on 11 recent performance studies, looking at general improvements in feed conversion rates (FCR) and final body weights (BW).

On average, B-Act supplementation led to 3% heavier birds compared to control flocks, whilst the FCR dropped with similar percentages. These numbers were even higher for flocks under a necrotic enteritis challenge, where adding B-Act to the feed or drinking water (WSP formulation) improved technical performance greatly.

Compared to the challenged control flocks, an average FCR improvement of 13% was achieved for challenged birds supplemented with B-Act, with higher BW of up to 26%. As such, supporting a healthy gut leads to productive and profitable poultry. With an average return on investment (ROI) of 8.3, B-Act offers an interesting solution to achieve this. The above confirms the interest in probiotics as alternative feed additives, combining economics with health standards in the most rewarding way.

To know more, please contact Huvepharma technical team
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ARTICLE

How Mycotoxins Influence Your Layer Pullets' Egg Production Potential

- A majority of the layer's production potential is determined in the first 5 months
- Targeting what mycotoxins affect pullets before the peak of lay reduces the risk for health and nutrition challenges later in production which can impact on your flock ROI
- Detoxifying mycotoxins protects your nutrition and health investments during the rearing period to prepare your layers for higher egg production with better quality eggs

The global layer industry is expected to produce over 94 million tons of eggs in 2024, a 1.3% increase from last year (OECD-FAO Agricultural Outlook 2023-2032). Eggs will continue to be in high demand for human consumption as they possess the optimal balance of protein, energy, and vitamins. The genetic potential of current layer breeds could produce over 400 eggs in 100 weeks per year, but subclinical challenges from mycotoxins is one aspect preventing birds from achieving their potential.

The 2024 dsm-firmenich world mycotoxin survey found that 97% of finished poultry feed was contaminated with at least 1 mycotoxin and there can be additive and synergistic effects when multiple mycotoxins are present.

To prevent the effects of mycotoxins, they must be adsorbed or deactivated. Clays and other materials with adsorption capacity are only effective for adsorbable mycotoxins like AFLA. Mycotoxins such as FUM, DON, ZEN, OTA and T2 are poorly adsorbed and require different strategies for mitigation such as enzymatic degradation. The main feed ingredients in a layer diet —corn, wheat, soy, and by-products— are often contaminated by various mycotoxins. Common mycotoxins affecting poultry include: aflatoxins (AFLA), zearalenone (ZEN), trichothecenes (DON, T2), fumonisins (FUM) and ochratoxin A (OTA). Even at low levels, mycotoxins predispose birds to nutritional and health challenges.

The effects mycotoxins have on layers include:

- poor feed conversion and body weight gain
- immunosuppression
- fatty liver syndrome
- damage to reproductive organs
- skeletal issues
- visible lesions

These effects have a direct impact on the flock's disease responses, uniformity, and bone health. The quality and quantity of eggs produced can also decrease. The rearing period (0 to ~ 18 weeks) is the time which mycotoxin risk management provides the greatest insurance to health and performance programs since chicks are more susceptible than laying hens to the subclinical and clinical challenges from mycotoxins (Qing et al., 2022).

Rearing period is crucial

The focus of the rearing period is to invest in good health and nutrition of the pullet with the expectation that this allows her to meet or exceed the high production expectations as a layer (Hy-line® Technical Update, 2016). This means setting birds up with good muscular-skeletal growth, gut development, and immunity. The return on investment (ROI) during rearing is high, as the volume of feed needed is low, but the benefits of the birds reaching their genetic potential are great. Effective mycotoxin risk management at this time offers a high ROI as the feed investment is relatively short but the long-term benefits of reducing the risk and impact of (sub)clinical challenges from mycotoxins can be seen throughout production.

Three important components of good pullet development which mycotoxins can affect are:

- Uniform body weight gain
- Skeletal development
- Stress management (transfer, vaccines, disease)

Uniform body weight gain

Pullets may not reach expected body weight if there is inadequate nutrition due to formulation errors, overcrowding, improper feed particle size, or feed refusal due to poor quality or mycotoxins (Hy-line® Technical Update, 2016). Mycotoxins cause reduced body weight due to the damage in the bird's intestinal tract and liver (Tomaszewska et al., 2021, Carvalho Martins et al., 2023). Low levels of FUM disrupt the intestinal barrier and damage the liver, altering nutrient absorption and predisposing the pullets to gastrointestinal challenges later in production (Tomaszewska et al., 2021). The combined toxicity of OTA and AFLA reduces body weight and average daily gain, increases feed conversion, while also causing inflammation in the liver (Qing et al., 2022).

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Pullets with lower body weights have a reproductive tract with fewer and smaller egg follicles in development, influencing how they will come into lay and the egg size they will produce (Celliers, 2020).

Skeletal development

Skeletal bone in the pullet is 95% formed by 3 months of age while the medullary bone is developed from 3-4 months of age- both of which have direct impact on the egg production and persistency (Celliers, 2020). Low levels of FUM cause negative structural changes and development of pullet bone and bone tissue, increasing the risk of bone fractures during lay (Tomaszewska et al., 2021). This can also affect eggshell quality, as the bone acts as a reservation for the key nutrients needed to make the eggshell. Maintaining calcium absorption will support the pullets for better performance during lay (Grignon Dumoulin, 2016) and can impact eggshell quality, particularly during late lay (one of the main factors in being able to extend the laying cycle to 100 weeks).

Stress management

Pullets are regularly handled during the rearing period to check flock body weights, uniformity, administer vaccinations, and collect blood for health monitoring (Grignon Dumoulin, 2020). The regular body weight and uniformity checks ensures the producers that nutrients are being properly utilized and offer the additional benefit for a physical check on the bird to examine bone and muscle development, feathering, and if oral lesions are present. Inability to overcome environmental and microbial stressors can be caused by mycotoxins like AFLA, FUM, OTA, DON and T2 because of their impact on immunomodulation (Bhuiyan et al., 2021, Hou et al., 2022, Qing et al., 2022, Carvalho Martins et al, 2023). The birds are then less responsive to vaccines and more susceptible to disease. It has been shown that vaccine efficacy is reduced in pullet flocks when mycotoxins are found in their feed (Hou et al., 2022; Carvalho Martins et al, 2023).

Protecting your birds

Mycotoxin prevention starts with analyzing your feed. This can indicate which mycotoxins could be affecting your birds and give guidance to the producers on which mitigation strategy would be the best investment. If at the farm, you are seeing oral lesions or impaired feathering, which can be checked for during weight checks (Wyatt et al., 1975). If expected body weights or vaccine titers are not met or there is increased incidence of failure to thrive, mycotoxins should be considered.

Preventing challenges during lay like thin eggshells, cracked eggs, and bone fractures can start with incorporating mycotoxin risk management as an integral part of the health and nutrition plan for your pullets.

To protect birds from the negative effects of mycotoxins, they must be adsorbed or deactivated. Clays and other materials with adsorption capacity are only effective for adsorbable mycotoxins like AFLA. Mycotoxins such as FUM, DON, ZEN, OTA and T2 are poorly adsorbed and require different strategies for mitigation such as enzymatic degradation. The addition of a mycotoxin deactivator has been shown to support body weight gain and vaccine efficacy (Danicke et al., 2002).

Mycotoxin risk management will help protect your pullet nutrition and health investment, support your pullets going into lay and safeguard your return on investment.

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RECORD-BREAKING ATTENDANCE

for Victam and Grapas Asia 2024!

The Victam Corporation proudly concluded the 16th edition of VICTAM Asia and GRAPAS Asia 2024, in co-location with Health & Nutrition Asia, with a record-breaking attendance of 8,722 trade visitors from 73 countries.

The event, held from March 12 – 14 at BITEC in Bangkok, welcomed 315 international exhibitors from the animal feed, pet food, aqua feed, as well as the rice, grain and flour processing industries. This year's event showcased an array of innovations and facilitated key industry connections, underscoring its role as Asia's most comprehensive exhibition for these sectors.

VICTAM Asia and GRAPAS Asia experienced an unprecedented 42.5% increase in visitors from the last edition in 2022. This growth indicates the growing interest and importance of the event in the sector. This edition's success marks a significant milestone in the industry's recovery from the Corona period, showcasing resilience and renewed post-pandemic growth.

The exhibition was honored to host a diverse array of industry leaders and decision-makers, including top executives from over 40 leading companies such as AMP International, Bogasari, Cargill, and CPF Worldwide. The organization also welcomed ASEAN investors, presidents of relevant associations, ambassadors, and university professors.

During the exhibition, visitors could also attend a high-quality and extensive conference and technical seminar program. A total of 141 speakers from 14 countries delivered compelling presentations on a wide range of topics, ranging from the future of livestock feed to innovations in shrimp farming, feed safety, and milling technology.

The Victam Foundation hosted the 3rd International Feed Technology Congress (IFTC) with Wageningen University. Chairman was professor Leo den Hartog and dr. Mai Anh Khoa (Thai Nguyen University – Vietnam), Dr. Nazri Nayan (Universiti Putra Malaysia), dr. Pairat Srichana (CP Group), and dr. Thomas van der Poel (WUR) spoke about the developments and challenges in the ASEAN feed industry.

Another interesting conference was the "Flour Milling Maximized", where the continuous transformation of the wheat processing industry was discussed by Adi Witono (Bogasari), Peer Hansen (Eye-Grain Aps.), Sirichai Songsermpong (Kasetsart University) among others.

During the Thai Feed Mill Association (TFMA) conference, Mr. Pornsil Patchrintanakul (President TFMA) , Dr. Witthawat Songsujaritkul (Trouw Nutrition Thailand), Mr. Amnat Chidthaisong (King Mongkut's University of Technology Thonburi) spoke about modernizing and exploring the future of livestock feed in 2024 and managing the carbon footprint in feed. After the conference there was a greet and meet between the Thai feed millers and exhibitors, where millers could address their needs and challenges in their feed mills.

The "Networking Night" at VICTAM Asia successfully brought together over 250 industry professionals, including leadership from the Thai Pet Product Industry Association (TPIA) and more than 40 media representatives from Thailand and abroad. This event served as a platform for attendees to connect with leading exhibitors and discuss the latest technological advancements in the livestock industry, demonstrating the significant interest and engagement across the global community.

The next edition of VICTAM Asia and GRAPAS Asia together with Health & Nutrition Asia is scheduled for March 10 – 12, 2026, at BITEC, Bangkok. For more details, please visit

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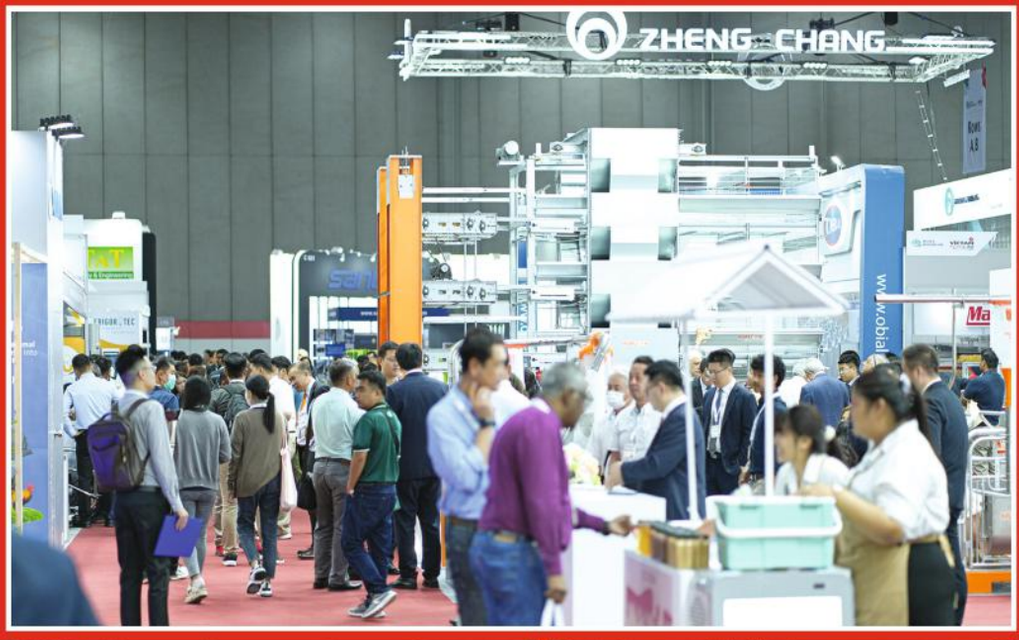
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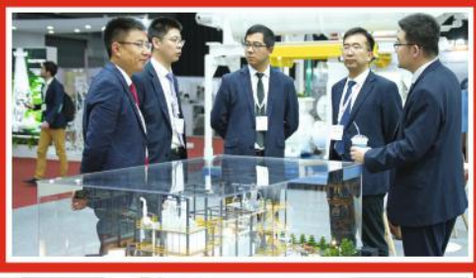

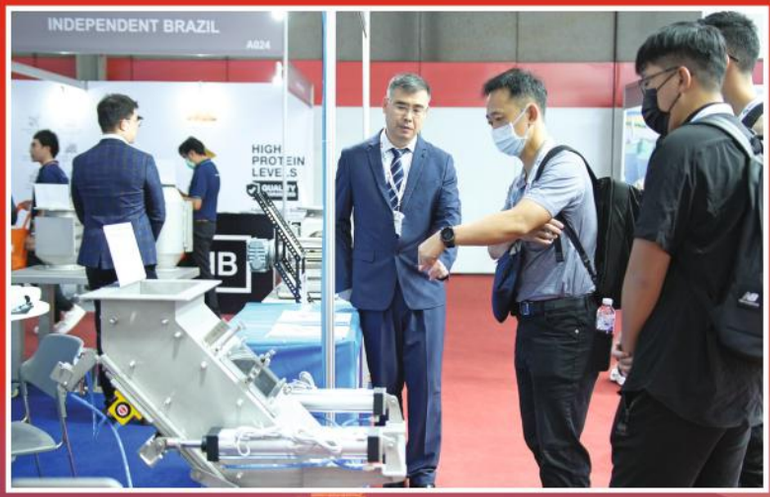
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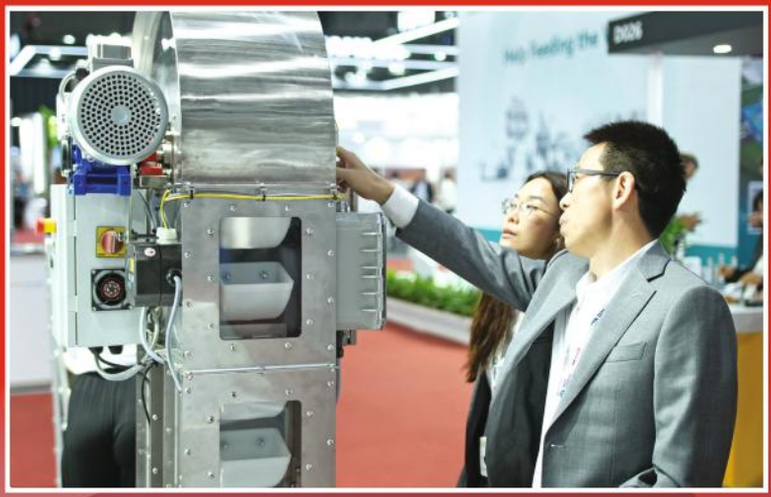

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The Potential of Postbiotics:
A Promising Solution for Sustainable Poultry Production

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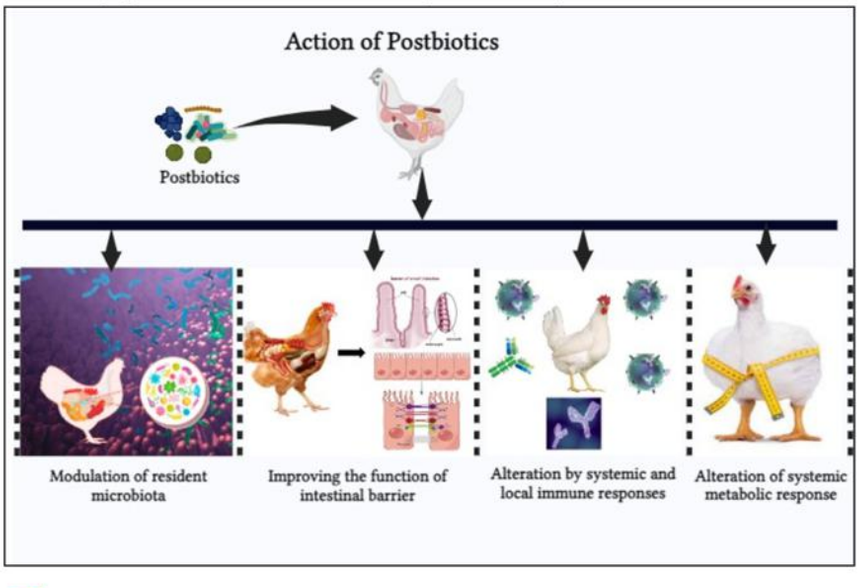
The discovery of antibiotics revolutionized healthcare and agriculture, but their excessive use has resulted in antibiotic resistance, a significant threat to human and animal health. Postbiotics, which are non-viable microbial products with various benefits, present a safer alternative to antibiotics. Unlike probiotics, postbiotics are stable and do not contain live microorganisms, making them well-suited for improving poultry health and performance. By utilizing postbiotics, we can responsibly meet the increasing global protein demands while also addressing regulatory concerns. As research on postbiotics advances, they are emerging as a promising solution for promoting animal well-being in a continuously expanding world.

Concepts of Postbiotics

Postbiotics, derived from the Greek words "post" and "bios," refer to products that emerge after microbial activity. Unlike live probiotics, postbiotics are non-living fragments that may offer health benefits. They are closely linked to bacterial and probiotic metabolism, often appearing as soluble metabolites. The International Scientific Association of Probiotics and Prebiotics (ISAPP) recently defined postbiotics as preparations made from inert microorganisms or their components that provide health benefits to the host. The effective postbiotics include different Lactobacilli species and various soluble factors such as enzymes, peptides, and organic acids. As a cutting-edge field in microbial science, postbiotics offer new avenues to improve host well-being through non-living microbial derivatives.

Beneficial Response of Postbiotics

Postbiotics, similar to probiotics, have immunomodulatory effects that enhance both innate and adaptive immune responses. They strengthen the intestinal barrier, inhibit pathogenic growth, and promote the production of beneficial compounds, ultimately benefiting gut health and immune response. The postbiotics, especially those derived from inactivated probiotics such as Saccharomyces cerevisiae fermentation-based postbiotic, show promising advantages in poultry, including better disease resistance, growth, and intestinal health. Postbiotics offer a comprehensive approach to enhance gut health by inhibiting pathogens, promoting antimicrobial activity through bacteriocins, and acting as growth promoters. Their other benefits include antioxidant, anti-inflammatory, anti-proliferative, hypocholesterolemic, and hepatoprotective effects. Common producers such as L. plantarum, L. casei, L. rhamnosus, L. brevis, and L. acidophilus have demonstrated efficacy in various animal models, showcasing their potential in disease mitigation and health promotion.



Promising Advantages in the Poultry Industry

In poultry farming, postbiotics offer numerous advantages by enhancing performance and health in various poultry species. They are effective in improving growth, egg quality, and feed efficiency in broilers and layers, even under challenging conditions like heat stress. Postbiotics that contain L. plantarum exhibit antioxidative activities, reduce cholesterol levels in layers, and improve intestinal morphology in broiler chickens. Additionally, they boost immune response and reduce inflammation in challenged chickens, resulting in significant weight gain and reduced lesion scores in broilers. They also enhance pre-harvest food safety by reducing pathogens like Salmonella Enteritidis in commercial layers. By combining postbiotics with pro-and pre-biotics, enzyme activity, nitrogen utilization, and overall feed efficiency can be improved while mitigating environmental concerns such as ammonia emissions in poultry production. The adoption of postbiotics in poultry farming facilitates antibiotic-free production, resulting in high-quality and safe chicken products. Also, its supplementation enhances the quality of meat and eggs by reducing plasma cholesterol concentration, improving meat quality attributes, and increasing egg output in layers. As the global demand for meat and eggs continues to rise, ensuring their quality becomes increasingly important, underscoring the significant role of postbiotics in poultry farming to guarantee the production of safe and healthy products.

Conclusions

Postbiotics are a promising tool for poultry producers to fulfil their consumer expectations and ensuring global food security sustainably. Their dual action of promoting gut health and optimizing digestive health can effectively support growth, performance, animal welfare, and food safety aspects in antibiotic free poultry production.

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RVC 1977 3rd Reunion

at Shillong Meghalaya 23rd Feb 2024

We celebrated our RVC 1977 batchmates 3rd get together with our vet brothers, at Shilong (Meghalaya) on 23rd Feb 2024. Special guest basically from Jammu and Kashmir Retd. Dr VS Sharma presently residing at Shilong with his son working in Army accepted our request to chair as special guest. In addition to our primary get together programme, we also performed entertainment event amongst ourselves including our better halves. The celebration was very successful which is energizing us for tomorrow. Here are certain images as images of yesterday, hope for tomorrow! I hope from our rest colleagues to join us in next meet who could not join us under their any personnel unavoidable circumstances. Thanking all for better happy life in future.

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DATE	AGE	PARAMETERS					
	4 WKS (28 Days)	T-0	T-1	T-2	T-3	T-4	T-5
10-Mar-23 To 16-Mar-23	WKLY FEED / BIRD (GM)	794.74	747.52	721.62	776.80	760.96	708.68
	CUM. FEED / BIRD (GM)	1815.55	1875.30	1876.69	1864.81	1827.02	1766.92
	DAY OLD BODY WT. (GM)	796.25	917.13	931.38	880.38	858.38	844.50
	WKLY BODY WT. (GM)	1320.88	1450.13	1436.00	1383.25	1360.00	1328.25
	WKLY BODY WT. GAIN (GM)	524.63	533.00	504.63	502.88	501.63	483.75
	CUM FCR	1.37	1.29	1.31	1.35	1.34	1.33
4	CFCR	1.245	1.165	1.185	1.225	1.215	1.205
	CUM MORTALITY NOS.	22	3	6	9	6	12
	CUM MORTALITY %	2.50	0.34	0.68	1.02	0.68	1.36

DATE	AGE	PARAMETERS					
	5 WKS (35 Days)	T-0	T-1	T-2	T-3	T-4	T-5
17-Mar-23 To 23-Mar-23	WKLY FEED / BIRD (GM)	1157.90	1148.11	1144.51	1158.44	1164.35	1186.51
	CUM. FEED / BIRD (GM)	2973.45	3023.41	3021.20	3023.24	2991.37	2953.43
	DAY OLD BODY WT. (GM)	1320.88	1450.13	1436.00	1383.25	1360.00	1328.25
	WKLY BODY WT. (GM)	1901.00	2057.38	2036.75	1992.75	1977.63	1944.13
	WKLY BODY WT. GAIN (GM)	580.13	607.25	600.75	609.50	617.63	615.88
	CUM FCR	1.56	1.47	1.48	1.52	1.51	1.52
5	CFCR	1.435	1.35	1.355	1.395	1.385	1.395
	CUM MORTALITY NOS.	27	5	7	9	6	15
	CUM MORTALITY %	3.07	0.57	0.8	1.02	0.68	1.7

DATE	AGE	PARAMETERS					
	6 WKS (42 Days)	T-0	T-1	T-2	T-3	T-4	T-5
24-Mar-23 To 30-Mar-23	WKLY FEED / BIRD (GM)	1434.32	1410.75	1500.01	1435.09	1411.18	1433.71
	CUM. FEED / BIRD (GM)	4407.77	4434.16	4521.21	4458.33	4402.55	4387.14
	DAY OLD BODY WT. (GM)	1901.00	2057.38	2036.75	1992.75	1977.63	1944.13
	WKLY BODY WT. (GM)	2600.38	2750.13	2742.5	2709.50	2677.75	2645.75
	WKLY BODY WT. GAIN (GM)	699.38	692.75	705.75	716.75	700.13	701.63
	CUM FCR	1.7	1.61	1.65	1.65	1.64	1.66
6	CFCR	1.58	1.49	1.53	1.53	1.51	1.54
	CUM MORTALITY NOS.	30	5	8	9	9	18
	CUM MORTALITY %	3.41	0.68	0.91	1.02	1.02	2.05

1st Day To 10th Day per 100 Chicks, to remove the stress better development of the brain & Antibodies Nutrigrow 50gm per day + Multimune 5gm was given. Readymune 500gm per ton feed regularly in T-1, T-2, T-5 and Growfast-P 500gm per ton feed regularly in T-3 & T-4 for overall Growth & Immunity.

T-1, T-2, T-3 and T-4 were vaccinated followed by Intermune 1gm per litre water for 4-5 hours x 3 days, Vaccine titer, Bacterial load, Hemoglobin etc. were monitored every week, followed by final dressing percentage, boneless muscles, fat etc. along with stress factor at every week.

T-0 was control flock without any Interface product but vaccinated

T-5 was test flock without any vaccination & T-0 was control flock but vaccinated. Kept on Readymune.

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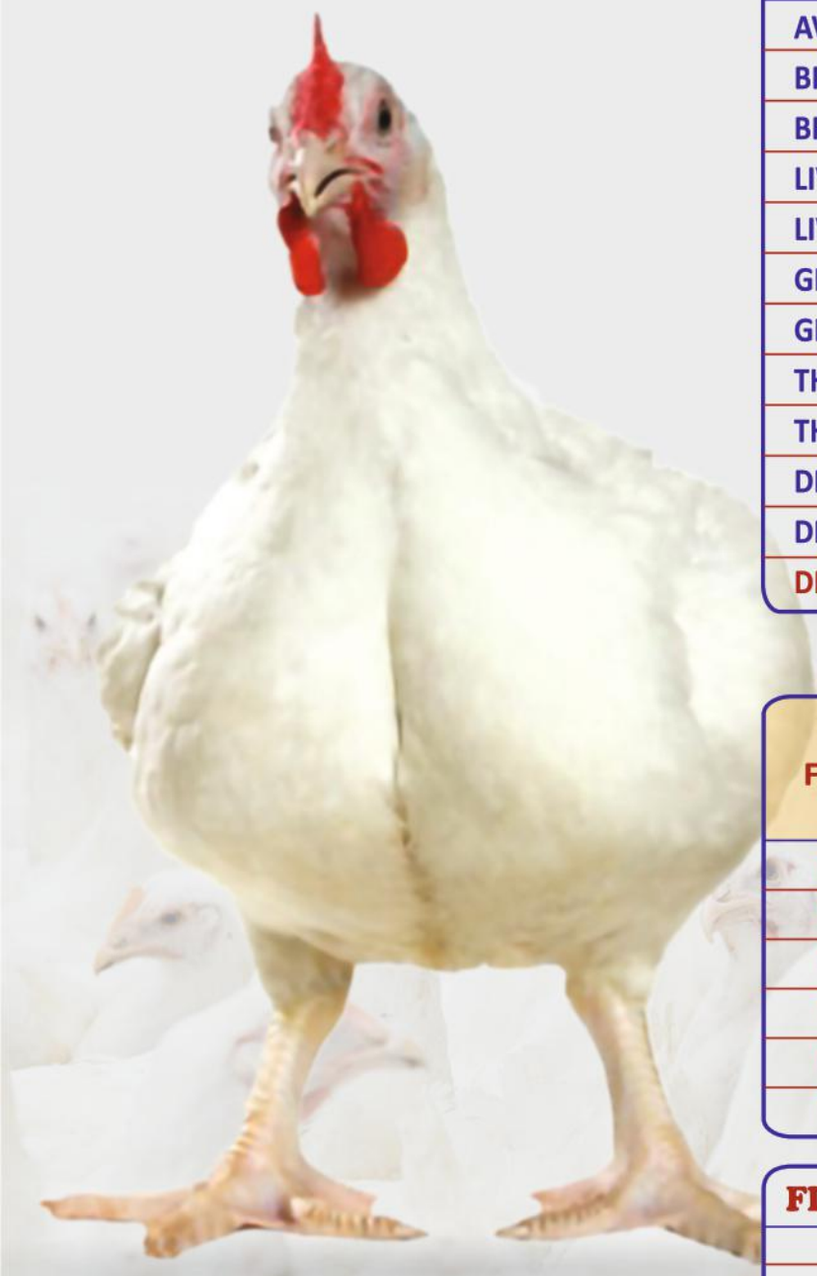

GROUP	T-0
AVG. LIVE WT. (KG)	2.301
BREAST MEAT WT.	0.480
BREAST MEAT %	20.86
LIVER WT. IN GM	0.045
LIVER WT %	1.96
GIZZARD WT. IN GM	0.034
GIZZARD %	1.48
THIGH AVG WT.	0.335
THIGH %	14.56
DRUMSTICK WT.	0.280
DRUMSTICK %	12.17
DRESSING % (WITHOUT SKIN) WITHOUT GIBLETS	69

FINANCIA

Flock	Average Weight Gm.	Dressed Weight Gm.	Meat %	Extra % To Control
T-0	2251	1597	70.95	–
T-1	2694	2031	75.43	4.48
T-2	2755	2090	75.87	4.92
T-3	2704	2038	75.36	4.46
T-4	2639	1995	75.57	4.62
T-5	2606	1991	74.87	3.92

FLOCK GROUP	FLOCK
T-0	Control Flock - Without any Interface products.
T-1	Feed with complete product schedule upto 42nd
T-2	Feed with complete product schedule upto 42nd
T-3	Feed with complete product schedule upto 42nd
T-4	Feed with complete product schedule upto 42nd
T-5	Feed with complete product schedule upto 42nd No vaccine administered to this flock at any stag

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T-1	T-2	T-3	T-4	T-5
2.846	3.025	2.904	2.889	2.838
0.670	0.749	0.698	0.68	0.685
23.54	24.76	24.04	23.54	24.14
0.059	0.065	0.062	0.062	0.059
2.07	2.15	2.13	2.15	2.08
0.044	0.049	0.045	0.044	0.045
1.55	1.62	1.55	1.52	1.59
0.435	0.485	0.470	0.452	0.445
15.28	16.03	16.18	15.65	15.68
0.375	0.405	0.399	0.401	0.390
13.18	13.39	13.74	13.88	13.74
73	74	73	72	74

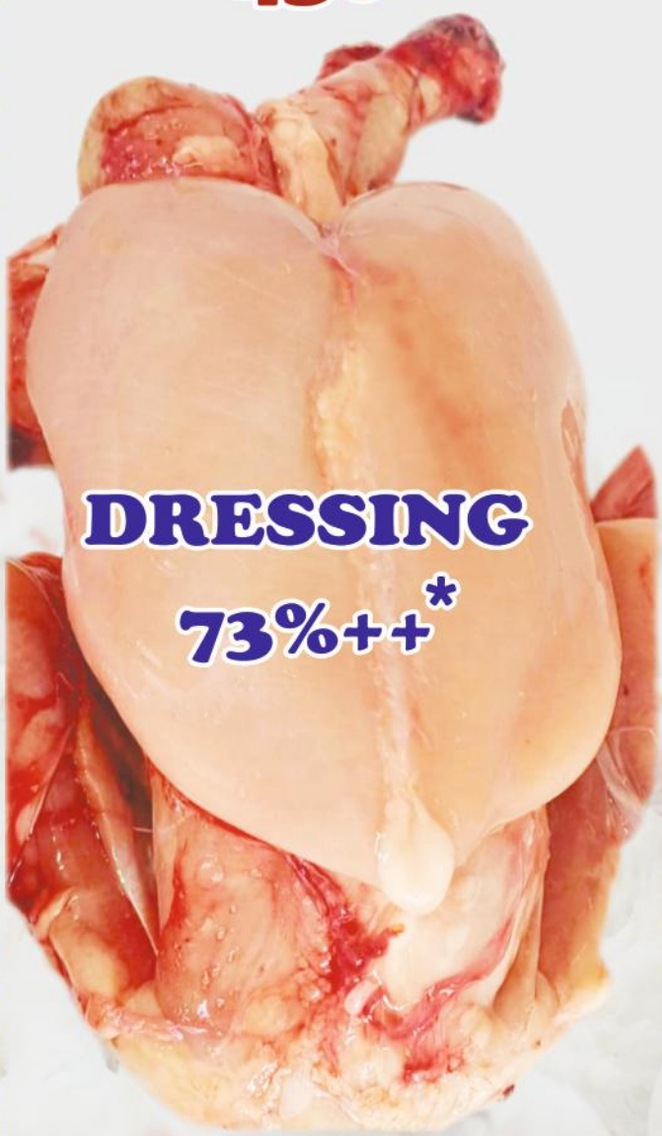
L OUTPUT

Cost of Meat @Rs. 250 Per Kg.	Extra Profit to Control	Extra Profit to (-) Control	Total Avg. Profit including feed saved + meat
399.25	–	–	–
508.00	108.75	22.17	129.98
522.50	123.25	30.87	
509.50	110.25	27.61	114.32
498.75	99.50	24.92	
487.75	88.50	22.17	24.92

K GROUP DETAILS

day Products Used. Readymune, Nutrigrow, Intermune, Multimune
day Products Used. Readymune, Nutrigrow, Intermune, Multimune, Calface
day Products Used. Growfast-P, Nutrigrow, Intermune, Multimune, Calface
day Products Used. Growfast-P, Nutrigrow, Intermune, Multimune, Calface
day Products Used. Readymune, Nutrigrow, Intermune, Multimune, Calface
e, only tried to maintain Maternal Antibodies T-5.

Trial Conducted on VENCOBB 430



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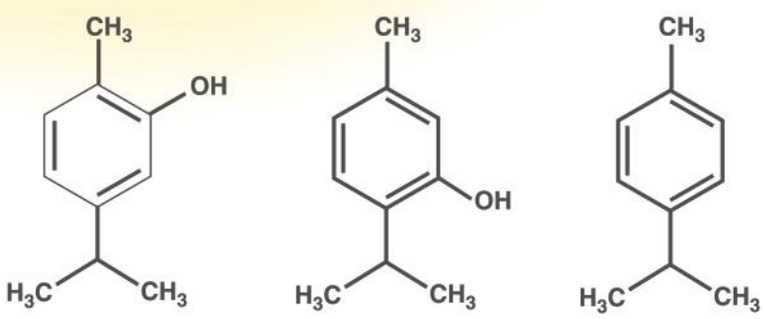

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Technical Seminar:

Toxicity and immunity management for profitable poultry farming

Regen Biocorps AHI Pvt Ltd, hosted a technical seminar at Talegaon (Dabhade), Pune, dated 9th Mar'2023which was attended by poultry Farmers& enthusiasts on current trends in the poultry industry. The topic of discussion, **"Toxicity and immunity management for profitable poultry farming"** was apt in the current context of challenges that the egg and meat industry face the most. Dr. Uttarwar, **Zonal Manager,** welcomed the distinguished guest to this event and set the context of the discussion.

The poultry industry was going through a bad phase due to skyrocketing raw material prices in general, and Maize in particular which has been trading at the higher prices for a pretty long period from the beginning of 2024. The poor quality and availability make the matter even worse as it's hampering the immunity & health of the birds. Due to that Managing known and unknown diseases is becoming more challenging. It is affecting the overall profitability of producers and leading to excess overhead costs. Higher production costs together with lower selling prices are challenging the viability of producers.

This seminar was aimed at highlighting the appropriate solutions, to aid efficiency in production by focusing on "Total Immunity" which is sustainable.

Dr. Sudhir Rukadikar, a renowned poultry consultant who has extensive experience in Poultry management for more than 30 years, highlighted the novel ways to enhance Innate immunity. Dr. Rukadikar emphasised that the first couple of weeks are very important for Primary Lymphoid organ development. Supplementation of soluble specialised nutrients in this critical stage of life is vital. He envisaged that innate immunity can be improved with products based on comprehensive immune nutrition like Immon®, a specialised product for Total Immunity (Innate and adaptive).

Birds do have a strong Immune system comprised of Innate and Adaptive Immunity. Genetically selecting the birds for higher productivity negatively impacts Immunity. Hence, Immune competence of commercial flocks is under challenge due to performance pressure and need extra nutrition not only for challenge situations but also for regular health management too.

Dr. Gopal Potdar discussed how Immon® does stress management by reducing the Corticosteroid activity in the blood resulting in improved egg production and feed efficiency in layers. It can be a major boost to Broiler Integrators wishing to raise antibiotic-free

chicken (AFC)!!Regular preventive usage in healthier birds will ensure better performance and improvedreturn on investment. Along with Immon, Dr. Gopal Potdar also highlighted key important features of Mantox, a broad-spectrum toxin binder. Mantox consists of Activated charcoal, Bentonite, Herbs, PVP, and MOS which offer Comprehensive Mycotoxin Management against Aflatoxin, Ochratoxin, Zearalenone, DON, T2, and Fungal toxins. Mycotoxins significantly damage liver and kidney cells, So the addition of Liver and kidney-stimulating herbs gives more effective protection against toxins.

"We thank our honourable guests graced the occasion by sparing their valuable time for active participation in this event", said Mr. Ganesh (Sr. Sales Executive). "We are committed to serving the local industry and providing solutions for its challenges through collaborative projects. By understanding and anticipating proactively the changing needs of our valuable partners, we bring about solutions with global knowledge and expertise"."We will bring more advanced knowledge and technology which will pave the way for more efficient customer service", Mr. Sachin Kakde (Key Client Manager) added.

Concept of Duck Farming and its Role in Poverty Eradication and Post-flood Rehabilitation

Ram Singh, Sarita Kaushal, Antra Gupta, Gunjan Sharma and GV Punith Kumar
Animal Nutrition Division
ICAR-National Dairy Research Institute
Karnal-132001 (Haryana), India
Email: carisingh@yahoo.co.in

The extent of devastation, destruction and disaster due to flood has been realised in many parts of the country on several occasions. The breach in Kosi (often referred to as Sorrow of Bihar) embankment drowned several towns and numerous villages coming in the way of its newly acquired course in the past. The unprecedented damage and loss to land, crops, homes, human and livestock lives and infrastructure due to flood accounted to be massive. Consequent to the flood misery, the role of government, non-government organisation (NGO), public and private agencies becomes very challenging especially in chalking out the rescue, relief operation and rehabilitation programmes. Among many efforts to rehabilitate the flood grief stricken people, the job of animal husbandry officials is to contribute immensely to mitigate flood misery. Ensuring supplemental income by diversification of agricultural operations is a viable option to improve the economic and nutritional status of rural poor people.

Geographical rearing of ducks:

The term "Poultry" denotes all domesticated species of birds including chickens, ducks, turkeys, quails, pigeons, guinea fowls and ratites such as ostrich and emu. Archaeological evidence indicated that chickens were domesticated as early as 5400 B.C. even though distribution throughout the world originated from the Harappan culture of the Indus Valley during 2500-2100 B.C. The first use of domesticated birds was cultural in religion and superstition, in decorative arts and for entertainment. They were used as a source of food by human only much later of their domestication. Presently, the role of poultry farming in income generation, employment propagation, supply of animal protein for human and poverty eradication has gained a height. Landless, marginal farmers, unemployed youths and distressed women can be engaged through motivation towards poultry rearing. The development however has been confined primarily to chickens and the ducks have been second major alternate birds after chickens for egg and meat production. This is very worthy to note that the ducks and geese love water and belongs to group "Water Fowls". India, the land of diversity, has 5700 km of coastal line and a vast area of low and marshy lands. The Desi type of ducks are reared mainly for eggs and concentrated in several states viz. Andhra Pradesh, Assam, Bihar, Jammu and Kashmir, Kerala, Manipur, Orissa, Tamil Nadu and Tripura. In India, the ducks are mainly kept by the people belonging to lower strata of the society as a source of income. But the current scenario has changed to some extent as big farmers are also adopting the duck farming as business.

Plus points for duck raising over chicken farming:

- Ducks are more ideal for coastal areas, marshy wetlands, waterways and ponds.
- Very suitable for mixed farming with paddy.
- Require less care and management.
- Can sustain on foraging, eating insects, snails, weeds, etc.
- Easy to adapt for moving in group, going to ponds and coming back to homes.
- Prolific layers, even native ducks lay about 160-180 eggs in a year.
- Eggs are 15-20 g heavier than chicken eggs.
- Continue to lay in second year of production and thus reducing cost of inputs.
- Lay most eggs during night and early in the day.
- Hardy and resistant to most of the avian diseases.

How ducks help in improving situation:

- The ducks swim in the water, collect small fish and snails and aquatic weeds from water areas.
- Require little or no additional feed to fetch maximum profit for the owner.
- Unlike chickens, the ducks are economical even in small scale and on scavenging system primarily due to need of less attention and management.
- During post flood period, even the areas with water logged for longer duration can be very suitable for duck production.
- When the excess rainy season causes the water logging and ultimately causing damage to crops, the duck rearing thrives here well for more period.
- Increase soil fertility.
- Rearing 20 ducks in an acre agri-land compensates 16% N, 23% P and 10% K.

Performance of Broiler ducks:

- Day old weight: 60 g
- Body weight at 4 wks: 1.2 to 1.4 kg
- Body weight at 6 wks: 2.0 to 2.2 kg
- Feed consumption upto 6 wks: 4.5 to 4.7 kg
- Mortality upto 6 wks: 2 to 3%

Performance of Layer ducks:

- Age at first egg: 120 days
- Age at 50% production: 140 days
- Annual egg production: 300 eggs
- Egg weight at 40 wks: 60 to 66 g
- Body weight at 40 wks: 1.8 kg
- Daily feed consumption per bird: 120 to 150 g
- Duckling mortality (0-8 wks): 2 to 3%
- Grower mortality (9-20 wks): 0.5 to 1%
- Layer mortality (21-72 wks): 5 to 7%

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Breeds and sexing:

Indian Runner and Khaki Campbell are prolific layer breeds, whereas the table meat variety includes Aylesbury, Muscovy and White Pekin. The young ducks are known as ducklings. The sexing between males (drake) and female (duck) can be distinguished at about 6 wks of age by seeing the drake feathers. The drakes belch and ducks whimper; these are the sounds made by ducks, whereas in chickens, the cocks crow and hens cackle.

Rearing system:

There are three types of rearing system for ducks in India.

1. Backyard/free range/scavenging system:

This system is very popular for dual purposes, i.e. egg and meat in many parts of the country. It needs low inputs of feed, housing and management but a large area of land for grazing. The flock size may be 1 to 20. They are sheltered at night within Katcha house made up of bamboo and/or mud. At morning, they have access to canals, ponds, or rivers where they can consume insects, small fish, snails, tender grasses which fulfill their nutritional requirement. After coming back to home the ducks are given broken rice, rice polish and kitchen garbage waste.

2. Integrated system:

Farmers can integrate ducks in many combinations such as pigs-ducks-chickens-vegetable-fruit-aquaculture, pigs-ducks-goat-rice-vegetable-aquaculture, pigs-ducks-Cattle-vegetable-aquaculture. For example, a system comprise ducks, fish, water plants and fruit trees, where the dark feces become feed for fish and fertilizer for plants and trees, while the ducks can utilise part of the plants and fish as feed. Other system based on duck keeping with paddy cultivation which has been shown to reduce or eliminate insects, pests and weeds and to increase rice yields. In case of using insecticides/pesticides in paddy fields, the ducks may be poisoned and therefore proper care is needed during this operation. The fish-duck raising is very beneficial. Where 200 tilapia fish are raised per 100 m^2, a maximum of 35 ducks per 100 m^2 water surface are kept.

3. Confinement/intensive/semi-intensive system:

In this system, the ducks are kept in total confinement and all facilities are provided in a sheltered area or pen or well ventilated house with litter on floor. A well balanced ration and water pans are required. The ducklings are reared under this system upto 6 to 8 weeks of age i.e. ideal age for marketing. During day time, ducks are allowed to run into shallow water channels to dip their heads and splash water on the bodies. The system is expensive in relation to free range or backyard farming. Intensive system is mostly followed by government farms, large-scale private farms and by some NGOs.

Incubation and Hatching:

- Incubation period in ducks is 28 days i.e. 7 days more than chickens.
- The Muscovy ducks require 35 days for incubation.
- A mating ratio of 6-8 ducks per drake in layer breeding and 4-6 ducks broiler breeding.
- Hatching eggs are collected 15 days after drakes are allowed to mate.
- Temperature should be 37°C to 37.5°C with humidity of 70-75%.
- High humidity by sprinkling eggs with lukewarm water on alternate day during 2 to 4 wks.
- Turning of duck eggs at 180° and not at 90° as in the case of chickens.
- Generally lower hatchability in ducks than chickens.

Brooding:

- Brooding is similar to chicken and ducklings do not require swimming water.
- Ducklings can be allowed on free range after 3 wks of age.
- Upto 3 wks of age, any brooder house meant for chickens can be used for rearing of ducklings.
- A 250 capacity chick brooder is suitable for 150 ducklings.
- Brooding temperature should be 29-35°C for 1st wk and reduction in temperature by 3°C (5°F) every wk, until the ducklings require no heat.

Housing Ducks:

- In free-range, the ducks need no proper house, whereas intensive or semi-intensive involves either floor or cage house.
- The flood house may be a deep litter or wire floored house.
- The welded wire (1.25 cm x 1.25 cm of 8 gauges) can be fixed leaving a gap of 10 cm on the concrete flooring,
- After brooding (4 wks), they are reared on welded wire (2.5 cm x 2.5 cm of 8 gauges).
- Where swimming facility can be provided, pond (usually made of concrete) dimensions can be 1 meter wide, 20 to 30 cm deep and length depending on number of birds.

Floor, Feeder and Drinker space requirements:

Age/System (Intensive system)	Floor space (cm2/bird)		Feeder space (cm/bird)		Drinking space cm/bird	
	Egg type	Meat type	Egg type	Meat type	Egg type	Meat type
0-3 wk	800	900	5	5	2	3
4-8 wk	1600	1800	8	10	3	5
9-20 wk	2400	2700	10	12	5	6
Adult	3200	3600	12	15	6	8

Feeding and Nutrition:

Little attention on feeding is given during free-range system of rearing. Duck feeds comprise of paddy grains, small fish, insects, snails, earthworms, tender grasses/leaves, aquatic weeds etc. During evening the supplementary partial feed includes paddy grains, rice bran/polish, wheat bran, kitchen waste, thrashed fish/snails, wheat bran etc. Damp or wet mash feed at 8:00 AM and 5:00 PM.

- Ducks prefer pellets because they can easily eat them pellet size generally used is 0.3 cm for starter ration and 0.5 cm for other feeds.
- For meat-type ducks, starter, grower and finisher rations are given during first 2 weeks, 3 to 6 weeks and 7th week to market, respectively.
- Layer ration is provided one month prior to the expected onset of lay. Feed restriction is also similar to that in chickens. The feed conversion ratio (FCR) in meat-type ducks is around 3.0.
- Water consumption of ducks depends on age at 1, 4 and 8 weeks of age, they consume water at a rate of 28, 120 and 330 ml/duck/day, respectively.

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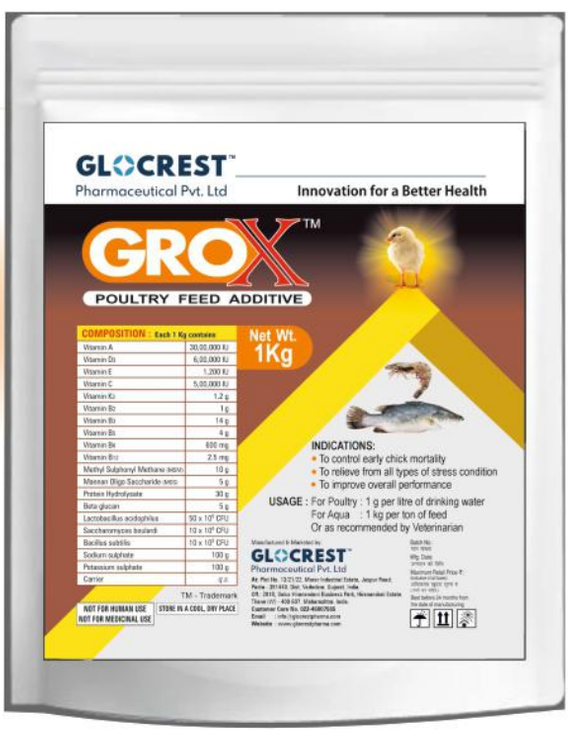

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Requirements of some important Practical Nutrients for Ducks

Nutrients	Starter (0-8 wks)	Grower (9-20 wks)	Layer/Breeder (21wks-Above)
ME, Kcal/kg	2800	2600	2700
CP%	20	16	17
Lysine%	0.90	0.65	0.60
Methionine%	0.40	0.30	0.30
Calcium%	0.70	0.60	3.00
Phosphorus, non-phytin,%	0.40	0.30	0.40
Sodium, %	0.15	–	–
Vit. A, IU/Kg	3000	4000	6000
Vit. D2, ICU/Kg	400	900	1200
Vit. E, mg/kg	15	10	10
Riboflavin, mg/kg	6.0	5.0	5.0

Ducks are waterfowl and scavengers by nature and are relatively resistant to many common diseases of birds. However, following are the important diseases of ducks.

Aspergillosis:

This condition occurs when ducks inhale spores produced by the Aspergillus species. (A. fumigatus is the common species) that grows on damp straw or feed. These inhaled spores cause multiple nodules or plaques in the lungs and air sacs. Common signs include gasping, listlessness and dehydration. This disease is not to be confused with aflatoxin poisoning. The best solution to prevent Aspergillosis is to avoid using mouldy straw and preventing feed from getting wet.

Mycotoxicosis in ducks:

Serious hepatic lesions and significant death rate was reported in ducklings (1 to 7 day old) fed with a concentration of 300 to 600 ppb of AFB1 for 7 to14 days. Ducklings (one day old) fed on a feed contaminated with 305 ppb of AFB1 and 20 ppb of AFG1 reported 43.33 and 10% deaths at 19 and 42 days of age, respectively. The intoxicated birds showed a delay in development hyperkeratosis of the cornea and oral mucosa, malformations and bone fragility, leg paralysis, inflammatory edema of the eyelids, dermatitis, and scarce feathering. The ducklings suffered massive avitaminosis and a deficiency in Ca, P and Mn absorption. Necropsy of ducks indicated an enlarged, fatty and friable liver, pale yellowish in colour, massive necrosis, jaundice, and cirrhosis. The liver and some muscles had petechial hemorrhages and necrotic focus. Deterioration of the hepatic cells, as well as fibrosis and hyperplasia of the bile duct was also reported. The surface of some of the liver's was granulated and there was scattered lymphatic nodules. Atrophy of the Bursa of Fabricius and thymus was observed. Feed contaminated with 2000 ppb OTA fed to khaki Campbell ducks from birth until 18 days of age resulted in delayed development, enlarged livers and kidneys, and regression of the thymus. Microscopic features reported an accumulation of glycogen in the liver, and an infiltration of lymphoid cells in the kidneys. Feed intake and body weight gain decreased significantly in one day old white Pekin ducks fed on 100, 200 or 400 ppm levels of fumonisin B1 for 21 days. Liver, heart, kidney, pancreas and proventriculus absolute weights increased. A moderate hepatocellular hyperplasia in liver and gallbladder was also reported. The relationship between sphinganine/shingosine increased significantly. Feed contaminated with deoxynivalenol (DON) or vomitoxin (5800 ppb) fed to wild ducks kept in captivity for a period of 14 days did not result in feed/wheat refusal, and there was no significant difference in serum protein, calcium, glucose, creatinine kinase, aspartate aminotransferase, or uric acid levels. Feed contaminated with 250, 500 or 1000 ppb of T-2 toxin fed to day old Muscovy ducklings for a period of 7 days resulted in oral lesions produced by all levels of T-2 contamination after 16 hours of consuming the contaminated feed. Similarly, feed contaminated with 2000 ppb T-2 toxin fed to 6-week old ducks for 9 days caused significant development in ulceration and erosion of the esophagus and oral cavity. A decrease in body weight, thymus, spleen and bursa weight was also recorded. Diacetoxyscirpenol (DAS) contaminated feed at 250, 500 or 1000 ppb levels fed to day-old Muscovy ducklings for 7 days induced oral lesions 16 hours after consumption of contaminated feed.

Botulism:

Botulism is a disease caused by the ingestion of a toxin produced by the Clostridium botulinum bacterium. The organism is common in nature and is widely dispersed in soils. Ingestion of the organism is not harmful. It becomes dangerous only when conditions are favourable for its growth and subsequent toxin formation. The organism grows best under high humidity and relatively high temperature and in an environment containing decaying organic material (plant or animal). The organism cannot multiply in the absence of air. Stagnant pools or damp areas with buried decaying matter are danger areas for toxin production. Botulism results after the decaying animal or plant material containing the toxin is consumed. Decaying carcass is a frequent source of toxin, as are many insects feeding in the same tissue. The insects may contain enough toxin to cause the disease in any ingesting bird. Water sources may become contaminated and provide a reservoir for the disease as the toxin is water soluble. Weakness is generally the first sign of the illness and is followed by progressive flaccid paralysis of the legs, wings and neck. When neck muscles are affected the head hangs limp, thus causing a condition referred to as "limberneck". Affected birds may have a peculiar trembling, loose feathers that are pulled out easily and dull partly closed eyes. Because of the paralysis, birds are unable to swallow and mucous accumulates in the mouth. Affected birds may lie in a profound coma appearing lifeless for several hours before death. Prevention should be aimed at eliminating sources of toxin production and preventing access of birds to such materials. These practices include prompt removal of all dead animals, debeaking the birds, controlling fly and insect population and avoiding access to decaying organic material. Mild laxative may be used for birds that have been exposed but do not show disease symptoms. Epsom salts (500 gm / 100 birds) may be mixed in feed. Adding 5gm of Epsom salt in 30 ml of water and placing in the crops of sick birds has proved beneficial. The disadvantage is that antitoxin is difficult to obtain and is very expensive.

Pasteurella infections:

Infection with Pasteurella multocida (Fowl cholera) is very common across the world. Signs of acute outbreaks can be sudden death in large numbers of birds. In chronic infection, signs of depression, conjunctivitis and dyspnoea may occur. Rats are known to be a reservoir for P.multocida and transfer between birds can occur through infected water and around feed troughs. Chronic cases may respond to tetracyclines. Vaccination using multi-strain inactivated vaccines can be effective in preventing infection, although autogenous vaccines are usually more successful. The depopulation of the affected site, thorough cleansing and disinfection of the buildings and equipment and rodent elimination are the best long term controls of this disease.

Riemerella anatipestifer causes disease in ducks throughout the world. Formely known as Pasteurella anatipestifer this organism usually causes disease in young ducklings aged between 2 and 6 weeks. The organism is transmitted through the egg and lateral transmission occurs via the respiratory route stress factors such as moving birds and environmental variations have also additive effects.

Signs include head shaking, lethargy and an abnormal gait. Post mortem signs in acute cases include enlargement of the liver and spleen; and lung congestion. In chronic cases, pericarditis and air sacculitis with a caseous deposit was found. Treatment with a range of antibiotics has been found to be successful. Prevention is best achieved with good hygiene and by avoiding stress in the flock.

Duck virus hepatitis (DVH):

DVH affects young ducklings between 2 and 21 days of age. It usually presents as an acute disease, affected birds dying within a few hours of showing clinical signs. Birds usually die in good condition, with their heads stretched upwards in opisthotonus. Post mortem signs include an enlarged liver with petechial and ecchymotic haemorrhages. These clinical findings are diagnostic. The disease can be controlled by using a live vaccine in the foot in one-day-old ducks.

Duck virus enteritis (DVE, Duck plague):

The clinical signs of infection include conjunctivitis, nasal discharge, inappetence, soiled vents and watery diarrhoea. The disease spread more rapidly when birds have access to swimming water. Vascular damage characterises this condition with haemorrhages on the heart, liver, pancreas, intestines, lungs and kidneys. Haemorrhages are also very common on the mucosal surface of the alimentary tract. Yellow diphtheritic plaques develop in the oesophagus and cloaca, which are fairly diagnostic of the disease. A live vaccine inoculated into susceptible stock gives reasonable protection.

Sticky Eye/Eye Infection:

Debris, a scratch, or rough mating can cause eye infections in ducks. Their sinuses run down the back of their head, so often eye and respiratory issues go hand in hand with ducks. Symptoms of an eye infection include a closed eye, bubbling eye, redness and tearing. Cleansing the eye with saline and then providing duck an access to the nice, deep water bowl to submerge her entire head can serve the purpose. A more serious infection might require Vet-Treatment, a natural camphor-based solution that can be added to the water or applied to the nostril.

Constraints:

- Lack of scientific knowledge
- Non availability of quality ducklings
- Non availability of feed
- Absence of proper bio security measures
- Lack of financial resources
- Lack of an organized marketing system
- Inadequate development programme by government
- Susceptibility to mycotoxicosis

Conclusions:

The duck farming bears many plus points over rearing of chickens. The profit comes more when the ducks are raised under backyard or free-range or scavenging system. There are many constraints to the development of small holder duck production that need to be addressed. One can get technical support and day old ducklings from Directorate of Poultry Research, Regional Centre, Bhubaneswar (Orissa) and Central Duck Breeding Farm, Hessarghatta Bangalore (Karnataka). There is a need to introduce some more development programmes by the Government and NGO to promote the duck farming in order to eradicate the poverty and rehabilitate the affected people as a post-flood scenario.

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ENZYMES

Mr. Sumit Sipany
Assistant Manager - Marketing

Mr. O. P. Singh
Managing Director

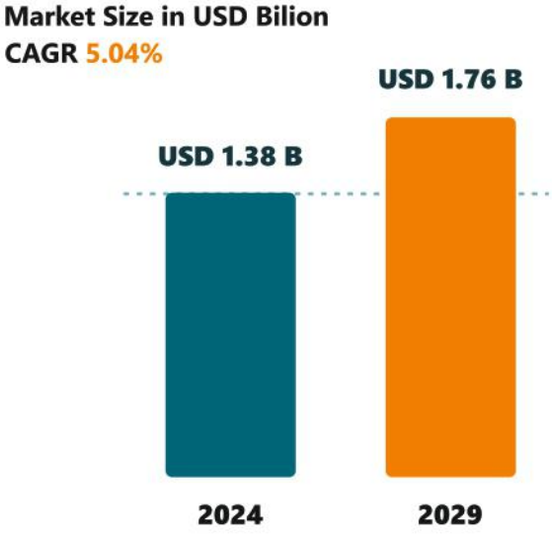
Enzymes – Growth Trends & Forecasts

Presently livestock keepers require more competent exploitation of low-quality feedstuffs due to rising economic pressures. The animal's digestive system is not fully efficient. Poultry cannot digest approximately one fourth of the diet they are fed because the feed ingredients contain undegradable harmful factors that hinder the digestive process and/or the animal is devoid of the necessary enzymes needed to degrade certain complexes in the feed. Supplementation of feed with enzymes enhances its nutritive value, thereby increasing the effectiveness of digestion. Animal feed enzymes help break down indiscriminating factors (e.g., fibre, phytate) that are naturally occurring in various feed ingredients. Indiscriminating factors may result in decreased meat or egg production and inferior feed efficiency, and can cause digestive disturbances as well. Exogenous enzymes are mainly added to enhance the accessibility of nutrients from feed ingredients. The animal feed industry uses enzymes that degrade crude fibre, starch, proteins, and phytates, and being proteins, they are eventually digested or excreted by the animal, having no residual effect on products like meat or egg. Feed enzymes enhance the competence of meat and egg production by improving the nutrient utilization and reducing animal excreta/waste.

Enzymes are proteins that help speed up metabolism, or the chemical reactions in our bodies. The molecules upon which enzymes may act are called substrates, and the enzyme converts the substrates into different molecules known as products. A "substrate" is the portion of the feed that the enzyme will break down to release the nutrients bound to it. It is similar to a "lock and key" concept, where the substrate is the lock, and the enzyme is the key. If there is no lock, then it becomes absolutely pointless to buy a key! Therefore, it is important to consider what substrates (i.e. ingredients) are prevalent in your diets to best determine which enzyme(s) you should include for optimal results. In the field of nutrition and applied feeding programs, one area in which producers have adopted improved technology is the use of feed enzymes. The advantages of using commercial enzymes in poultry feeds include improved productive performance and feed utilization, minimized environmental pollution due to reduced nutrient of manure.

Feed Enzymes Market Analysis

The Feed Enzymes Market size is estimated at 1.38 billion USD in 2024, and is expected to reach 1.76 billion USD by 2029, growing at a CAGR of 5.04% during the forecast period (2024-2029).



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The global feed enzymes market is experiencing rapid growth due to the crucial role that enzymes play in increasing energy and nutrient intake from animal feed. Cereals, in particular, benefit from using enzymes, as they can increase starch intake in animals, which is especially useful when cereal prices are high. Despite their importance, the feed enzymes market accounted for only 3.8% of the global feed additives market in 2022.

LARGEST MARKET BY REGION

31.57%

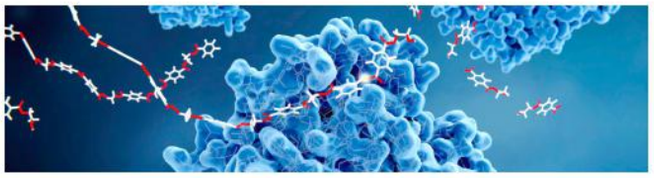
Value Share, **Asia-Pacific,** 2023

The Asia-Pacific region is the largest because of increased feed production, per capita meat consumption, and high feed additives adoption rates.

- Asia-Pacific is the largest market for feed enzymes, accounting for 31.6% of the global market share in 2022. North America and Europe followed closely, accounting for 25.8% and 23.1% of the market share, respectively. The high market share in Asia-Pacific is attributed to higher penetration rates of feed additives and a higher animal population.

- Carbohydrases are the most widely consumed feed enzyme, with a market value of USD 576.5 million, due to their ability to increase the energy and starch intake from cereal feed. Carbohydrases are expected to be the fastest-growing feed enzyme, with a CAGR of 5.1% during the forecast period. Phytases are also expected to record a CAGR of 4.9% during the forecast period.

- Proteases and lipases are other enzymes that are significantly used to increase protein digestibility and utilization by animals. The demand for meat products is expected to increase the market for these enzymes, with a CAGR of 5.0% during the forecast period.



LARGEST MARKET BY SUB-ADDITIVE

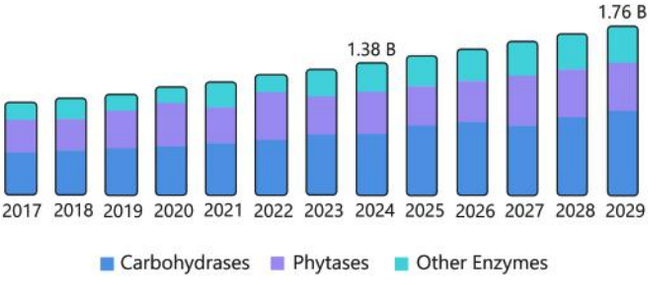
46%

Value Share, **Carbohydrases,** 2023

It has the largest market share due to its ability to increase the energy or starch intake from cereal feed and increase the intake of protein and minerals from animal feed.

- Feed enzymes are critical in increasing the intake of energy, starch, and phosphorus from animal feed. In the case of cereals, feed enzymes increase the starch intake of animals, which is beneficial when cereal prices are high. Despite their importance, the feed enzymes market accounted for only 3.8% of the global feed additives market in 2022.

Value of Feed Enzymes by sub additive Categories,USD, Global,2017-2029



- Asia-Pacific is the largest regional segment in the global feed enzymes market, accounting for USD 395.9 million in 2022 due to the higher penetration rates of additives and animal cultivation in the region. However, the United States is the largest country-wise segment for the global feed enzymes market, accounting for USD 225.8 million in 2022, or about 18.0% of the market share, due to highly developed production practices and commercial animal cultivation.

With the growing concerns over rising productivity, the growing global population, and increasing urbanization, an increase in the consumption of meat and dairy products is expected to drive the global feed enzymes market with a CAGR of 5% during the forecast period (2023-2029). This growth will be driven by the need to improve animal health, increase the nutritional value of animal feed, and enhance animal productivity.

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Global Feed Enzymes Market Trends

High demand for animal protein and poultry products such as eggs with increasing investment in poultry sector is increasing poultry population

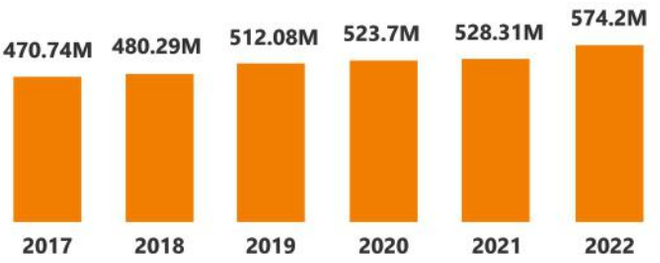
- The poultry population has significantly increased in recent years due to the growing demand for chicken meat and eggs in daily diets. The shift toward poultry products has been driven by the increasing prices of other meat, such as pig meat, in the United States. The consumption of eggs in Europe increased by 4.6% between 2017 and 2021, accounting for 6,135 metric tons in 2021.

- Asia-Pacific is the largest producer of poultry birds, with production increasing by 6.6% in 2022 compared to 2017. The rise in poultry production is due to the growing demand for animal protein following the outbreak of African Swine Fever, which has reduced the supply of pork meat. China accounts for 40% of global production, the country has more than 900 million stock-laying hens, and the largest layer poultry farming center can hatch 60 million chicks annually.

- The Middle Eastern region is also expected to witness growth in poultry production during the forecast period (2023-2029).

- The increasing demand for poultry products, coupled with rising investments in the poultry sector, is expected to strengthen the growth of feed production. This, in turn, is expected to drive the demand for feed additives in the global market during the forecast period. Overall, the poultry industry is poised for significant growth in the coming years, driven by the shift toward poultry products and increasing investments in the sector.

Production Volume of Poultry Feed, Metric Ton, Global, 2017-2022



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Poultry industry faces a lot of challenges and problems due to rising temperatures during summers. Heat stress has emerged as a critical issue, impacting the health and productivity of birds worldwide. In this article, Narsipur chemicals delve into the complexities of heat stress in the poultry industry and suggest a super cool and novel solution to overcome and flourish the producers

- **Understanding Heat Stress:**

Animals are divided into two groups: cold-blooded and warm-blooded animals. Birds are warm-blooded, as they have the ability to maintain their body temperature throughout the year. However, the thermoregulatory mechanisms are efficient only in thermoneutral zones, i.e., 18°C to 24°C. In chicken, the thermoneutral zone depends on body weight; amount of plumage; shape and distribution of feathers on the body; acclimatization and dehydration status. When heat production by birds is greater than heat lost, the core body temperature rises and it is the onset of HEAT STRESS.

The normal body temperature of a chicken is approximately 40 °C; if the body temperature rises more than 4 - 5 °C, the bird will die. Poultry are most susceptible to heat stress because they can't dissipate heat due to their feathers and lack of sweat glands. Summers and high environmental temperatures are among the factors responsible for heat stress in poultry flocks. Birds are 'Heat Stressed' if they have difficulty in achieving a balance between body heat production and body heat loss.

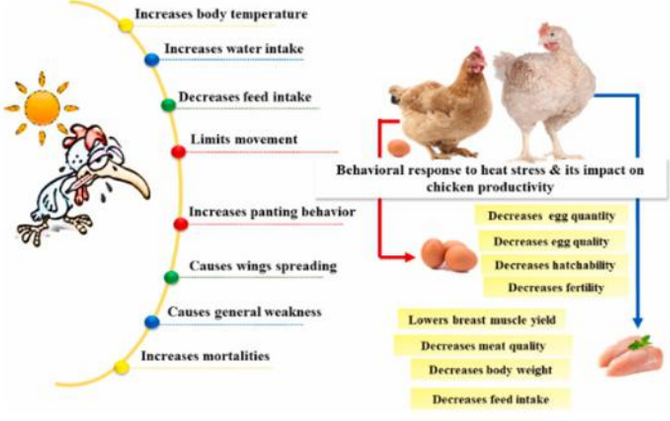
- **Factors Contributing to Heat Stress:**

Several factors contribute to heat stress in poultry:

1. **Ambient Temperature:** High temperatures, especially in combination with high humidity, pose a significant risk. Between 18°C to 24°C birds can adjust their body temperatures. As temperature rises above 25°C, it is the sign of development of heat stress conditions. Above 37°C it turns chronic if temperature is not controlled in time.
2. **Housing Conditions:** Poor ventilation, overcrowding, and inadequate shade exacerbate heat stress.
3. **Genetics:** Certain breeds may be more susceptible to heat stress than others.
4. **Management Practices:** Inefficient feeding and watering systems, as well as improper handling during transportation, can intensify heat stress.

- **Impact on Production: Heat stress exert a toll on poultry production in various ways:**

1. **Reduced Growth Rates:** Feed intake as well as feed conversion ratio (FCRs) drops, while water intake increases. Heat-stressed birds growslowly, resulting in decreased profitability.
2. **Decreased Egg Production:** Hens may lay fewer eggs or experience a decline in hatchability.
3. **Poor Meat Quality:** Heat stress can compromise meat quality, leading to increased carcass condemnation rates.
4. **Elevated Mortality:** Severe heat stress can cause heat stroke and death in poultry, resulting in economic losses for producers.



Narsipur Chemicals Pvt. Ltd. has introduced ENCIKOOL-HS, a powdered supplement designed to address heat stress issues in poultry farms. This complementary product contains a blend of electrolytes, energy, vitamins, antioxidants, and specialized ingredients aimed at mitigating the negative impacts of elevated ambient temperatures on the performance of broilers, layers, and birds under transportation. Dehydration-induced stress symptoms can manifest swiftly, leading to an abrupt increase in mortality rates. ENCIKOOL-HS is effective in mitigating the effect of high temperature not only during summer season but also on any farm located in environment with elevated temperatures.

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BENEFITS :

- Prevents Dehydration
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- Enhances Intestinal Microflora
- Improves Eggshell Hardness
- Prevents Mortality Due To Heat Stress

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1. 1 gm per litre of drinking water continuously.
2. Feed Premixes: 0.5 - 1 kg per ton of feed.
3. Double the quantity in extreme conditions.

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The Active ingredient in ENCIKOOL-HS is **Special Electrolytes** which are crucial for managing heat stress in poultry farms by keeping birds hydrated, maintaining electrolyte balance, and supporting overall health during hot weather. When temperatures rise, poultry lose water through panting and decrease FCR. Adding electrolytes to their diet helps restore hydration and balance, which in turn helps regulate body temperature and reduces the harmful effects of heat stress on performance and welfare. **Vital Vitamins** acts as an antioxidant, relieve heat stress, protecting tissues from damage, as well as vitamin also support immune function and defends against heat-related infections. **Glucose** supplement quickly replenish energy and support metabolism, helping birds stay hydrated and better cope with heat stress. Using these supplements in poultry feed ensures healthier, more resilient birds and improved production outcomes, even in challenging weather conditions.

Sodium Bicarbonate helps to maintain the blood acid level and mineral balance, that are the important parameters for a healthy bird. It can also make the bedding in the poultry house better by lowering the amount of ammonia. This also helps in balancing the pH level of stomach and blood. Having the right pH level is important for better digestion and sound health, especially when birds are dealing with heat stress. **KCl & NaCl** Salts are a vital nutrient that sustain water balance and prevents dehydration. Potassium plays key role in transport of water from peripheral area into the cell through osmotic gradient. These salts also help keep the body acid balanced. At high environmental temperature, birds breathe fast to cool off, and this can make them lose too much carbon dioxide, leading to a problem called respiratory alkalosis. Adding salts is the solution for respiratory alkalosis. Food enriched with Sodium and Potassium salts taste better, hence the food consumption increases. **Sodium Citrate** acts as an antioxidant, plus, it balances their electrolytes, keeping them well-hydrated and stable. It helps birds absorb important nutrients like calcium and phosphorus efficiently, which is crucial when they are suffering from heat stress.

Advantages

- **Improved Performance:** ENCIKOOL-HS helps to maintain poultry performance by mitigating the negative effects of high temperatures on feed intake, growth rate, egg production, and overall productivity.
- **Reduced Mortality:** Heat stress can increase mortality rate in poultry due to dehydration, heat stroke, and metabolic imbalances. ENCIKOOL-HS mitigate these risks by helping birds cope with elevated temperature, thus reduce the mortality rate and improve flock health and welfare.
- **Optimized Health:** ENCIKOOL-HS contains vitamins, electrolytes, and other nutrients that support immune function and reduce the susceptibility of poultry to heat-related illness and infections, thus promoting overall health.
- **Cost-Efficiency:** With the small initial investment, ENCIKOOL-HS can ultimately lead to cost savings by minimizing losses in production and reducing the need for interventions such as veterinary treatments due to heat-related health issues.
- **Environmental Sustainability:** Maintaining optimal poultry performance with the help of ENCIKOOL-HS can contribute to a more sustainable poultry farming operation by reducing resource wastage and minimizing the environmental impact associated with fluctuations in production.

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Management and Nutritional Measure to Enhance Performance of Hot Weather Flock

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Department of Animal Nutrition,
College of Veterinary Science and Animal Husbandry,
Acharya Narendra Deva University of Agriculture and Technology
Kumarganj, Ayodhya-224229

The summer season brings with it several days with high ambient temperatures, frequently coupled with high relative humidity. Extreme heat can have a significant impact on a flock's productivity. In less extreme temperatures, heat stress is frequently disregarded as a cause of poor growth or modest reductions in egg production and shell quality. However, at environmental temperatures exceeding 33°C, substantial mortality and significant output losses are clearly visible.

The combined effects of temperature and air relative humidity on a bird are known as heat stress. The term "effective temperature" refers to this. In any temperature, higher air humidity will result in more pain and heat stress for birds. Producers need to keep a close eye on the local humidity and temperature. In general, the temperature rises, and the relative humidity falls during the day. When there is less humidity, evaporative cooling—which includes cool pads, misters, and foggers—is the most effective way to stay cool.

Foggers add humidity, which can exacerbate heat stress during the evening when temperatures drop, and humidity usually rises. In open housing, more airflow with fans alone will lessen heat discomfort when humidity levels are high. The wind chill effect is caused by air movement and is the body's perception of a drop in atmospheric temperature.

Thermoregulation of the Hen

Excess body heat is removed by four different mechanisms.

Convection

Body heat is lost to the cooler surrounding air. Birds will droop and stretch their wings to maximize exposed surface area. Convection helps with air flow by producing a wind chill effect.

Vasodilation - swollen wattles and combs transport internal body heat to the surface, where it is lost to the cooler surrounding air.

Radiation

Electromagnetic waves carry heat through the air to a distant object. Body heat is transmitted to cooler things in the home (walls, ceiling, and equipment).

Evaporative cooling.

Rapid, shallow, open-mouth breathing leads to increased heat loss by evaporation of water from the mouth and respiratory tract. Lower atmospheric humidity promotes evaporative cooling. Conduction

Birds lose body heat when they come into direct touch with chilly items like litter, slats, or cage wire. Birds will seek cooler spots within the house. Birds seek cooler spots by lying on the floor or digging in rubbish.

- Sensible heat loss includes radiation, convection, and conduction.
- The thermoneutral zone of the chicken is typically between 18 and 25°C. Within this temperature range, sensible heat loss is sufficient to keep the bird's usual body temperature at 41°C.
- Above the thermoneutral zone, the effectiveness of sensible heat loss mechanisms decreases.
- At this point, evaporation of water from the respiratory tract becomes the bird's primary heat loss method.
- The evaporation of one gram of water removes 540 calories of body heat.At temperatures exceeding the thermoneutral zone, the bird must burn energy to maintain normal body temperature and metabolic functions. This diverts energy away from growth and egg production, resulting in reduced performance.
- Heat stress production losses are based on the
  1. maximum temperature the flock was exposed to.
  2. The duration of the high temperatures.
  3. Temperature Change Rate
  4. Relative air humidity

Nutritional Measure

- During hot weather, closely monitor the flock's feed consumption. The diet must be rebalanced for other vital elements, including amino acids, calcium, sodium, and phosphorus, based on the birds' productivity need (i.e. stage of production) and observed feed intake.
- Insufficient amino acid intake is the leading cause of productivity loss in hot weather.

Various measures can be used to regulate excessive temperatures and maintain adequate feed intake.

- To maximize consumption, avoid feeding during hot seasons and opt for early morning or nighttime hours. Normally, a maximum of one hour is advised for feeder clean-out time, however this can be increased to three hours if the temperature exceeds 36°C.
- Consider adding a one- or two-hour overnight feeding. Adjust the feed particle size, either by increasing it or by providing a crumble diet. With crumble diets in laying flocks, an additional source or presentation of large particle limestone is advised.

Several Factors Need to be Considered When Preparing a Diet for Hot Weather:

- Create diets with easily digested ingredients, especially protein sources. Excess protein metabolism causes the bird to overheat and exacerbate the electrostatic imbalance. Don't use a high crude protein minimum in the ingredients; instead, formulate to targets for digestible amino acids.
- Without lowering the quantities of amino acids in the diet, synthetic amino acids can lower the amount of crude protein. Lowering the amount of heat produced by digestion in the body can be achieved by increasing the percentage of energy coming from highly digestible fat instead of carbs or proteins.

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- When dietary fat is digested, this phenomenon, known as heat increment, is at its lowest.

Because of the increased excretion of urine under heat stress, the requirement for phosphorus increases. Under circumstances of heat stress, increases of up to 5% ought to be suitable.

- In hot weather, the goal dietary electrolyte balance (molar equivalency of Na+ + K+ – Cl-) should be approximately 250 meq/kg.
- The ratio of chloride to sodium in the diet should be between 1:1 and 1.1:1. Higher salt levels (0.02-0.03% more than in non-heat stress settings) may be necessary in hot weather due to increased electrolyte loss. Additionally, care must be taken to ensure that the birds are not receiving an excessive amount of chloride from the water.
- Vitamin and trace mineral consumption is also decreased as a result of the decreased feed intake. Several of these micronutrients, especially antioxidants and B vitamins, may help the bird while it is under heat stress.
- To enhance performance, supplement the diet with 200–300 mg of vitamin C per kg of body weight.
- Since organic zinc is a crucial mineral component of the enzyme carbonic anhydrase, it may enhance shell quality by supporting the enzyme's activity. By lessening the antagonistic unfavorable interactions that occur during digestion between zinc sources and inorganic copper, organic copper may also be beneficial.
- Nicarbazin, an anticoccidial medication, should not be taken in hot weather as it can raise the risk of heat stress-related death.

Housing Consideration during Hot Weather

- Before the summer heat arrives, the ventilation system should be inspected to ensure proper functioning.
- Make sure the fan shutters are clean and working. During times of high temperature, fan belts should be replaced or adjusted to prevent sliding. To provide the necessary airflow for ventilating the house in warm weather, there must be sufficient air inlets.
- The fans will be turned down and the airflow will be reduced by insufficient inlet space.

Everything that could obstruct the passage of incoming air should be kept out of inlets and kept clean.

- Turn incoming air onto the birds by using baffle boards. The accuracy of thermostats has to be verified. To providing backup power during hot weather, an auxiliary power system needs to be installed.
- To guarantee sufficient and consistent airflow, check the static pressure settings in the home's positive and negative pressure ventilation systems (12.5–30 Pa or 0.05–0.12 in. water).
- When clogged, evaporative cooling pad replacement or cleaning is necessary in homes with such systems. There should be no dry spots and a consistent water flow across the pads. Because there is less resistance in dry places, air will flow through them preferentially.

Inspect and replace the water filters as needed. Fresh drinking water cannot enter the house through a clogged water filter. To increase interior ventilation, frequently remove dust and

- If practical get rid of the manure from the house before the hot season. Manure decomposition generates heat that adds to the home's thermal load. The airflow in shallow pit houses and under cage batteries is impeded when there is an abundance of manure present.
- In regions where the temperature is high, environmentally controlled homes and curtain-sided homes with tunnel ventilation are excellent. Fogging systems and stir fans should be used at open houses.
- Insulated roofs lessen the amount of solar heat that enters the building through the roof and radiates inside.
- Make sure the water system can handle the extra water needs for birds as well as for foggers and evaporative cooling systems.
- It is never appropriate to jeopardize a flock of stressed birds' access to drinking water. Clear the area surrounding dwellings of any unnecessary metal objects, such as equipment, cars, nest boxes, and trash that could radiate heat into open spaces.
- Preparing for times when the weather will be hot and taking the necessary management and dietary precautions before the temperature rises will help to minimize the impacts of heat stress.

Drinking Management During Summer

- The flock has a high demand for drinking water during hot weather conditions. At 21°C, the water-to-feed consumption ratio is typically 2:1; however, at 38°C, it rises to 8:1
- Flocks under stress from the heat must have access to the necessary quantity of drinking water.

Make sure those who are drinking have access to enough water (> 70 ml/minute/nipple drinker). Verify that there is enough room for drinkers and that they are operating as intended.

- More drinkers can be provided to floor-reared flocks to deal with the increased water consumption,
- Water that is cooler will aid in lowering the birds' body temperature and lessening the effects of heat stress.
- It has been demonstrated that cooling drinking water by flushing water lines in the afternoon increases feed consumption and maintains egg production in heat-stressed layers.

Water below 25°C will help maintain higher water intakes and consequently encourage higher feed intake.

- Plastic water lines quickly acclimate to the surrounding temperature, making it challenging to cool water temperature below the air temperature, especially at the end of long water lines.
- Water intake will be significantly impacted by temperatures exceeding 30°C and will have additional detrimental effect on feed consumption.
- Utilize vitamin and electrolyte supplements in drinking water to make up for salt, bicarbonate, chloride, and potassium lost through urine loss. It is preferable to take electrolyte supplements before a sudden increase in outside temperature.
- If exposed to direct sunshine, drinking water from rooftop water tanks may become heated.

These water tanks must be covered, insulated, and painted a bright color to prevent direct sunlight.

Conclusion

The key to reducing the impacts of heat stress is to anticipate periods of high environmental temperatures and put in place suitable management and dietary measures before they occur.

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Poultry Federation of India and USA Poultry and Eggs Export Council

Sign MOU to Address Protein Deficiency

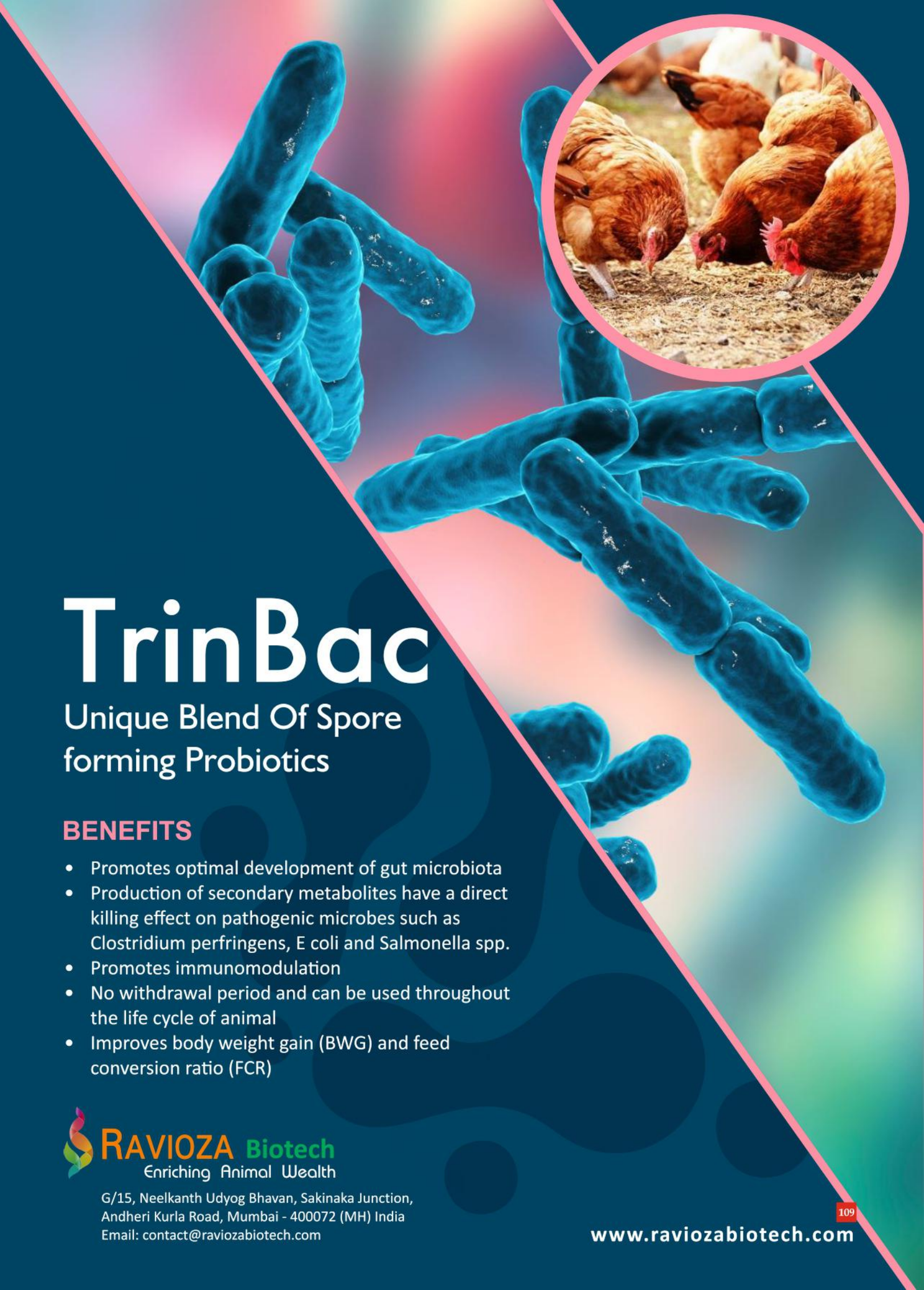
In a historic moment, the Poultry Federation of India (PFI) and the USA Poultry and Eggs Export Council (USAPEEC) signed a Memorandum of Understanding (MOU) to collectively combat protein deficiency and promote the consumption of poultry and poultry products in India. The signing ceremony at Hotel The Oberoi, New Delhi on March 20, 2024, brought together esteemed representatives from both organizations, including Mr. Greg Tyler, President & CEO USA Poultry & Egg Export Council, Mr. Clay M. Hamilton, Agricultural Minister Counsellor for Agricultural Affairs, USDA, and Mr. Ramesh Khatri, Chairman, Mr. Sanjeev Gupta, Vice President (HQ), Mr. Ricky Thaper, Treasurer, Mr. Parveen Kumar, Vice-President-North Zone and Mr. Jagdish from Poultry Federation of India. **This partnership symbolizes a shared dedication to enhancing the nutritional landscape and fostering a healthier, protein-rich future.**

Mr. Ricky Thaper, Treasurer, Poultry Federation of India highlighted the significance of this partnership in addressing critical nutritional needs and fostering international cooperation in the poultry industry. **Mr. Thaper said that this occasion marked the beginning of what promises to be a fruitful collaboration aimed at enhancing nutritional standards and promoting economic growth in the poultry sector.**

While addressing the gathering, Mr. Greg Tyler, President & CEO USA Poultry & Egg Export Council added that this collaborative approach encompasses a range of initiatives, including educational, research and development, expansion of market opportunities and campaigns to raise nutritional awareness. **By combining their expertise, both organizations aspire to raise awareness about the nutritional advantages of poultry products.**

Poultry Federation of India Team presented mementoes to Mr. Greg Tyler, Mr. Clay M. Hamilton and Ms. Devna Khanna.

Later Ms. Devna Khanna, India Representative of USA Poultry & Egg Export Council, expressed gratitude to all attendees for their support and participation in this milestone event. This was followed by Trade Reception which provided an opportunity for networking among the invitees including USA Soybean and Corn Grower Farmers, Star Chefs from elite Hotels, Commodity Members, PFI Team and USAPEEC Team.



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Successful Conclusion of Poultry India's Inaugural Technical Seminar in Nashik

Poultry India's inaugural Technical Seminar, held in Nashik city, recently concluded with resounding success, uniting industry leaders, experts, and stakeholders for insightful discussions and knowledge sharing.

Hosted on April 13th at Hotel Express Inn Nashik, the event showcased a diverse array of presentations, panel discussions, and felicitation ceremonies, shedding light on key issues and opportunities within the poultry sector.

The event commenced with Ganesh Vandana and the Lighting of the Lamp by distinguished guests Mr. OP Singh, MD of ABTL, Mr. Krishna Gangurde, Mr. Udhav Aher, and Dr. B.R. Narwade (Regional Joint Commissioner Nashik.) Additionally, the offcial YouTube channel for Poultry India was inaugurated by Mr. OP Singh, and the Monthly Newsletter was launched by past president Mr. Chakradhar Rao, alongside other esteemed delegates.

"We are thrilled by the overwhelming response to the event and the valuable contributions made by all participants," stated Anil Dhumal, who delivered the welcome address. "It was a true collaborative effort aimed at fostering positive change and progress within the poultry industry."

A highlight of the event was the keynote address delivered by Mr. O P Singh, a renowned figure in the poultry industry. Mr. Singh provided invaluable insights into the evolving landscape of poultry farming, addressing challenges and o□ering strategic perspectives for future growth.

Distinguished speakers such as Dr. Mahendra Choudhary and Dr. Ajit Ranade shared their expertise on various aspects of poultry farming, welfare, and disease prevention. Their presentations ignited engaging discussions and equipped attendees with actionable insights to enhance their practices.

The event also featured felicitation ceremonies, honoring individuals and farmers who have made significant contributions to the poultry sector, adding a touch of appreciation and recognition.

Panel discussions provided a platform for interactive exchanges of ideas and experiences, fostering collaboration and innovation within the industry.

Dr. Mahendra Choudhary addressed the topic of maintaining EC poultry houses and provided tips for managing heat stress.

Akshay Dhumal discussed poultry housing and the performance of equipment related to it. Ms. Shruti Aher Naik explored new trends in poultry consumption.

Dr. Milind Chavak focused on preventive diseases and their prevention strategies. Dr. Ajit Ranade highlighted the welfare of poultry as a major concern for farmers.

Mr. Sanjay Deore outlined incentive subsidy schemes introduced by the Maharashtra Government.

On this occasion Sri Dr. B.R. Narwade (Regional Joint Commissioner - Nashik) Also explain his views of the Poultry Sector and He was also joined by Dr. Prashant Dhramadhikari (Deputy Director), Dr. Sanjay Shinde District (Animal Husbandry Office – Nashik).

Honoring Shri Samadbhai, felicitating the speakers, and acknowledging farmers were carried out by

Chakradhar Rao, Sanjay Nalgirkar, and Op Singh.

President of Poultry India Mr Uday Singh Bayas, had made a Video presentation of Poultry India Glimpse's 2007 - 2023 and the journey covered with all the support of the Poultry industry faternity. Further expressing gratitude and also giving invitation to the Poultry industry to visit the 16th edition of Poultry India to be held from 26-29 November at Hitex, Hyderabad and to make the event grand success and accordingly concluded the event by extending thanks to all attendees, speakers, sponsors, and organizers for their unwavering support and participation.

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EMU: A Million Dollar Bird

Ram Singh Bibyan, Balaga Sravani, Harneet Kaur, Sarita Kaushal, Pramod Kumar,
Jannat Saini, Priyanka Patir, Prajakta Kailas Sangale, Lovely Anant, Somesh Rameshrao Gaikwad and Ashwani Kumar Saini*
Animal Nutrition Division - ICAR National Dairy Research Institute, Karnal- 132001 (Haryana)
*STO, CIRB, Sub Campus, Nabha
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Emu *(Droamius novaehollandiae)* is the second largest flightless bird having poorly developed wings (Ratite) after ostrich (Struthio camelus); other members of the group include rhea (Rhea Americana); cassowary *(Casuarius casuarius)* and kiwi *(Apteryx australis)*. Emu is very attractive and is the national bird of Australian continent. Emu is reared throughout the world with significant population in USA, Australia, China and Asian countries. In India, emu farming started in 1996 on a small scale in Andhra Pradesh. For commercial farming, the breeding flocks spread over entire India and is being practised in large scale in Andhra Pradesh, Tamil nadu, Maharashtra, Goa, Orissa, Madhya Pradesh, Karnataka and Kerala. Emu is becoming popular owing to low fat red meat and other byproducts utilities viz. oil, skin, feather, ornamental eggs and toes which are of high economic value. At hatching emu chick have squirrel like stripes on the body & after three months, the stripes turn into brownish black feathers. Emu chicks weigh about 370-450g (about 70% of egg weight).

Emu: The Majestic Bird

Characteristic features of emu:

- **Breeding:** mating in pairs
- **Height at birth:** 8-10 inches
- **Adult height:** 5-6 feet
- **Adult weight:** 45 to 60 kg
- **Colour:** Black and brown
- **Temperament:** Docile and friendly
- **Eggs per year:** 10 to 20 eggs in the first breeding season; increases upto 20-40 in subsequent breeding seasons
- Sexual maturity at 18-24 months
- First egg is laid around two years of age and male keep watch for incubating the eggs.
- Eggs are laid during cooler days (October to February)
- **Age at slaughter:** 16-18 months
- Long neck and legs having scaly skin and small naked head
- Emu is tri-ductile (three toes in the leg)

Emu is generally easy to work with and has calm disposition. Emu is shy and can be quite curious and interested in shiny objects. Emu egg is around one pound in weight and has the most delightful and unusual green colour. Crafters like emu egg due to size and colour with tough, durable shell for decoration. A female emu takes 3-5 days to produce an egg and the incubation period is 49 to 53 days. On an average, an adult emu can supply between 20 and 30 pounds of good quality and flavouring meat. Emu meat is very low in fat and cholesterol content as compared to beef. Also, emu meat is a good source of vitamin C and E; protein ; and iron which contributes to the dark red colour of the meat. Emu oil, a side product is produced from the emu's fat stores having several beneficial fatty acids like omega 9,6 and 3; and used as a natural skin moisturiser. Emu oil is anti-inflammatory that provides relief from muscle soreness, insect bites and sunburns. Emu oil is also used in several products (soaps, shampoos, lotions) Emu produces a distinct leather having a unique pattern of feather follicles. The leather is used in several personal items like shoes, wattles, handbags. Emu require a tall fence (6 feet) to prevent jumping over. For good health over-crowding must be avoided.

Sex differentiation: Sexing is done on day old chicks; based on feather and vent sexing by identifying male organ, and sound differentiation on maturity. Male makes grunting and female makes drumming sound.

Watering and Feeding: Sufficient drinkable water should be provided to meet the physiological requirement. Emu should not be deprived of water for more than 24 h in any case. Multiple water points should be provided in the area. Feed accounts for 60-70% of the production cost. Therefore, balanced feed for proper growth and reproduction should be prepared using locally available feed resources.

Starter phase: Starter mash is fed during first 14 weeks or till standard body weight of 10 kg is achieved. Brooding space is cleaned and disinfected. Chicks are very active and have long legs. Floor should be covered with gunny bags to prevent slipping which may otherwise cause hip dislocation. For first 24 to 72h chicks are kept in hatcher for drying and egg yolk absorption. Sufficient run space is to be provided to chicks for healthy life. The nutrient requirements for starter feed are crude protein 20, calcium 1.5, total phosphorus 0.80, methionine 0.45, lysine 1.0, tryptophan 0.17, threonine 0.50, common salt 0.4%; vitamin A 15000, vitamin D3 4500, vitamin E 100 IU/kg; vitamin B12 45ppb.; choline 2200, copper 30, zinc 110, manganese 150 and iodine 1.1 ppm. The starter feed containing maize 50, soybean meal 30, DORB 10, sunflower 6, dicalcium phosphate 1.65, calcite powder 1.5, common salt 0.3, trace minerals 0.1, vitamins 0.1, coccidiostat 0.05, methionine 0.25 and choline chloride 0.05% is to be provided. The crude fibre content should not be more than 9%.

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Grower phase: Grower feed is given from 15 to 34 weeks of age or 10-25 kg body weight. The nutrient requirements are: crude protein 18, calcium 1.5, total phosphorus 0.7, common salt 0.3, lysine 0.8, methionine 0.4, tryptophan 0.15, threonine 0.48%; vitamin A 8800, vitamin D3 3300, vitamin E 44 IU/kg; vitamin B12 22 ppb; choline 2200, copper 33, zinc 110, manganese 154 and iodine 1.1 ppm. Grower feed containing maize 45, soybean meal 25, DORB 16, sunflower 10, dicalcium phosphate 1.65, calcite powder 1.60, common salt 0.3, trace minerals 0.1, vitamins 0.1, coccidiostat 0.05, methionine 0.15 and choline chloride 0.05% is to be provided. Crude fibre should not be more than 10%. Emu also eats fruits, flowers, insects, seeds and green vegetation. Emu loves to eat caterpillars.

Finisher phase: Finisher feed is given from 35 weeks of age to slaughter or upto 12-18 months age. Feed containing maize 60, soybean meal 20, DORB 16, dicalcium phosphate 1.65, calcite powder 1.5, common salt 0.3, trace minerals 0.1, vitamins 0.1, coccidiostat 0.05, methionine 0.02 and choline chloride 0.05% is to be provided. Feeding is done twice daily.

Breeders feeding: Emus are seasonal layers and monogamous. Since feed intake is significantly reduced during breeding, protein and micro-nutrients rich feed is required. The nutrient requirements of breeder are: crude protein 20, calcium 2.5, total phosphorus 0.6, common salt 0.4, lysine 0.9, methionine 0.4, tryptophan 0.18, threonine 0.6%; vitamin A 15000, vitamin D3 4500, vitamin E 100 IU/kg; vitamin B12 45 ppb; choline 2200, copper 30, zinc 110, manganese 150 and iodine 1.1 ppm. Crude fibre should not be more than 10%. Feed containing maize 50, soybean meal 25, DORB 15.5, dicalcium phosphate 1.7, calcite powder 1.5, shell grit 6, common salt 0.3, trace minerals 0.1, vitamins 0.1, methionine 0.25 and choline chloride 0.05% can meet the breeder requirements. After breeding maintenance ration having low protein and energy is sufficient. Studies at CARI, Izatnagar revealed that feed intake per breeding pair per annum ranged from 400-630 kg with an average of 530 kg.

Incubation and hatching: Set the eggs in horizontal or in slant row-wise in a tray. Make the incubator ready for cleaning and disinfection. Set the optimum incubator temperature i.e. dry bulb temperature of 96-97◦F and wet bulb temperature of 78-80◦F (30-40% RH). Once the incubator is ready with set temperature and RH, place the egg tray in a setter. Fumigate the incubator with 20g KMnO4 + 40ml of formaline for every 100 cft of space. Turn the eggs every one hour till the 48th day in incubation. 48th day onwards, watch for pipping. On 52nd day, the incubation period ends. Keep the chicks for 24 to 72 hours in the hatcher for drying and to become healthy.

For small scale farming, shelter requirements are meagre. Simple shed having three- sided shelter is enough to meet the basic need. Emu provide red meat low in cholesterol and high in protein that is good for heart and the demand will increase in future. If the idea of emu farming sounds appealing, bring home first pair of emus and by adopting scientific farming, emu can definitely be a million dollar bird.

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BOOM – OX UNVEILED:
REVOLUTIONARY PATENTED WATER TREATMENT SOLUTION PROMISES TRANSFORMATION

Brightwell Aquatech LLP, owned by Mr Balasaheb Jadhav a Pune based startup promoted by Dr. Santosh Ire, has recently introduced a patented groundbreaking solution for water treatment challenges. This marks a significant milestone in the quest for sustainable and accessible clean water solutions.

Boom-Ox was the only Indian start-up to be selected for a presentation at Health & Nutrition Start Up Pitching 2024 organized at VICTAM Asia, on 14th March at Bangkok. This was indeed a proud moment for us!

While water is the most essential nutrition, it is least focused upon. However, 80% of all diseases globally, for both humans and livestock, are a result of consumption of unsafe water, inadequate sanitation and poor hygiene.

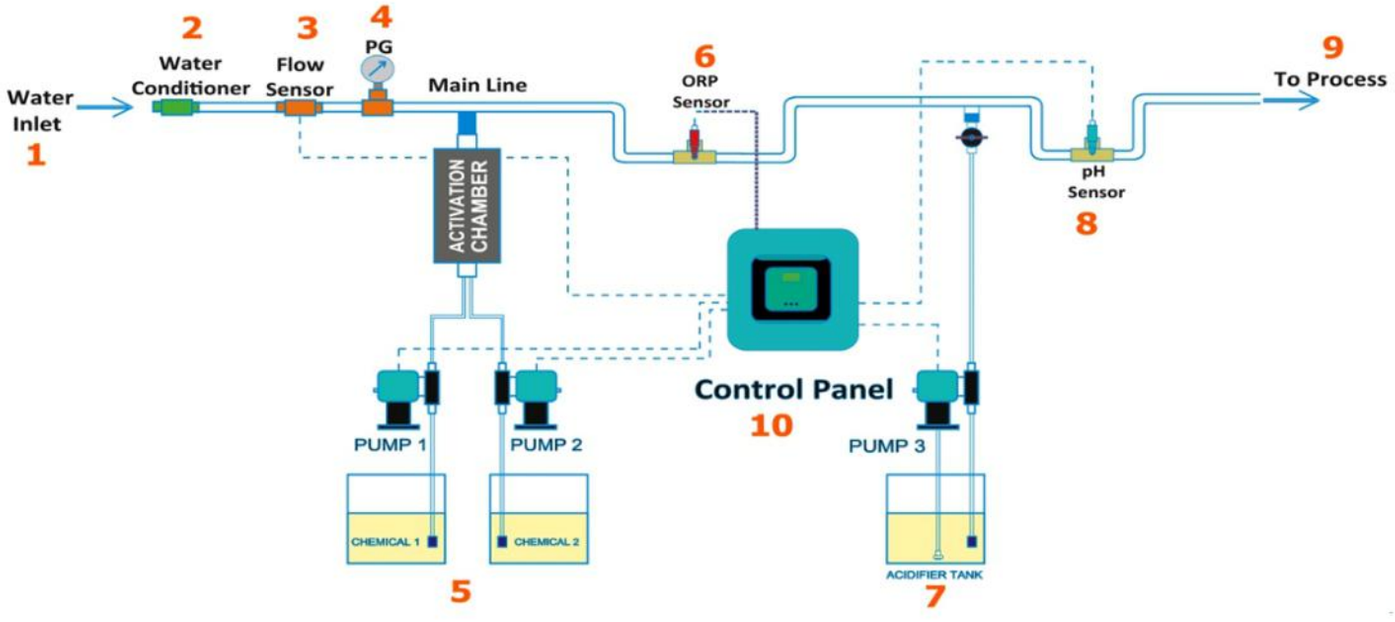
This is where Boom-Ox, a patented engineering solution for providing safe, potable water for poultry, dairy, swine and cattle comes into play.

Salient features of Boom-Ox are:

- ORP based Automated Dosing of Stabilized Chlorine Dioxide with IoT facilities.
- ISRAELI Technology based water improver.
- A potent combination of Water Disinfectant and Acidifier to achieve desired goals
- Automated & sensor base technology to maintain ORP & pH continuously:24x7.
- All in one patented solution, we call it "Water Doctor".
- Robust & maintenance free device

The mode of working of Boom-Ox is as follows:

- **Water Inlet:** Machine Installed at this point. Common inlet pipe from tank / source to the whole farm
- **Water Conditioner:** This helps to neutralise the majority of ions, metals and hardness causing agents
- **Flow Sensor:** Helps to check flow of water and accurate dosing of medicines
- **Pressure Gauge:** To maintain water pressure
- **Chlorine Dioxide Solutions:** The two solutions need to be filled and refilled once a signal is received from the device. This solution can't be changed by other source as it is calibrated with the control panel of the machine
- **ORP Sensor:** Helps maintain desired ORP (650+ mV) as set in the device
- **pH Solutions:** The acidifier solutions need to be filled and refilled once a signal is received from the device. This solution can't be changed by other source as it is calibrated with the control panel of the machine
- **pH Sensor:** Helps maintain desired pH (5.8-6.0) as set in the device or needed
- **IoT Device:** This device is an indicator of all parameters which are set and it sends notification messages. It needs to be implemented at the last shed and last row and last point so that water treatment can be done as per set limits of ORP and pH from last point to start point
- **Control Panel:** This is the brain of the machine. It receives all signals and gives solutions as per given commands. Most important and patented instrument
- Entire machine is well assembled, dust proof, water resistance, rodents resistance and durable etc. Size of machine is approx one office table and can mount on wall easily
- Maintenance free machine except minor calibration of sensors once in quarter which user can do at its own
- Best ROI : Cost of medicines is almost equal to existing price but it gives much better ROI than traditional ways of water treatment. 13- User can replaces all of his available solutions for water treatment including pipeline flushing and cleaning
- During vaccination and medication, user can stop sensors and use normal non medicated water from same machine
- For 1st installation and till smooth operations, company engineer will help
- Other much more benefits which keep livestock healthy and owner happy ...



For more information and queries call **Dr. Santosh Ire, +91 9850979652** or email: dr.ire007@gmail.com

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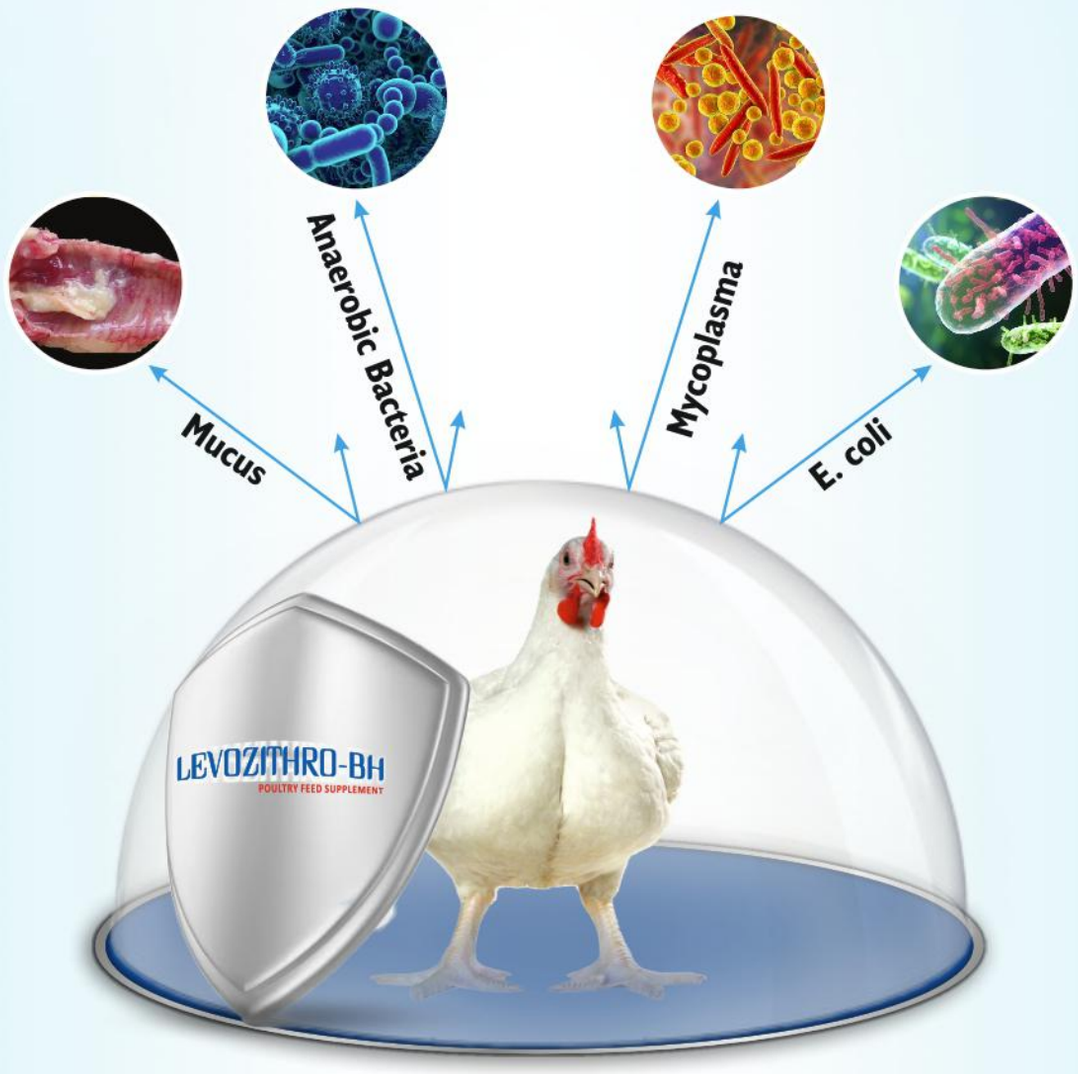

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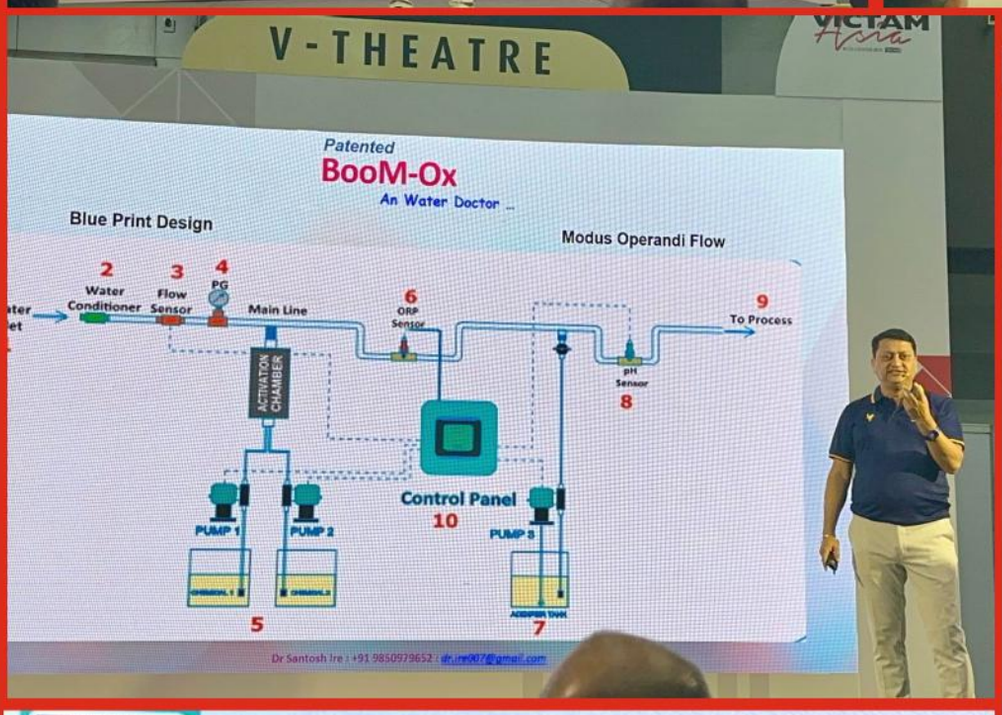
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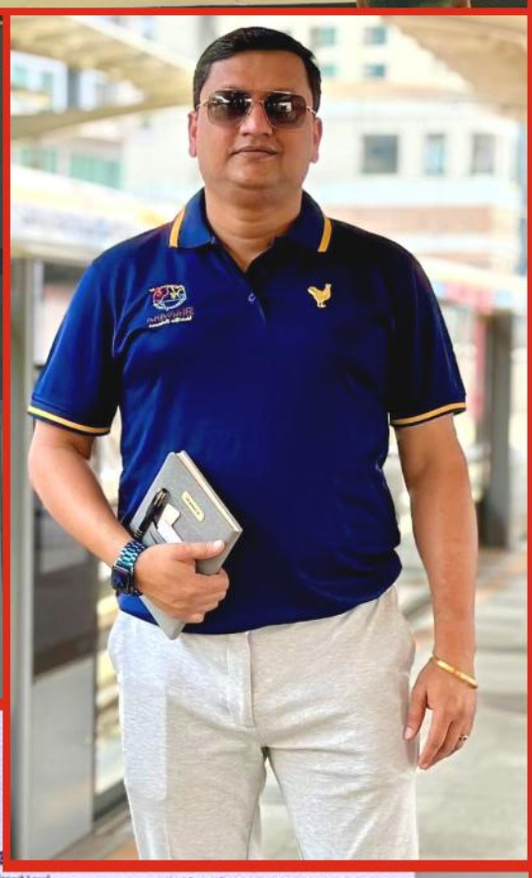


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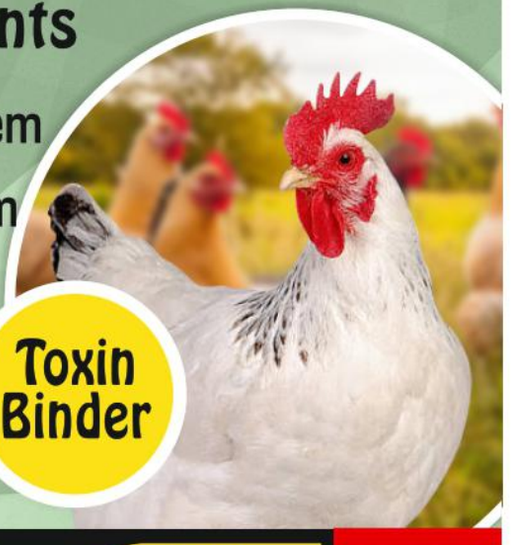

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2024 Alltech Agri-Food Outlook

Shares Global Feed Production Survey Data and Influential Trends in Agriculture

Data collected from 13th annual global feed survey estimates world feed production remains steady, with a slight decrease of 0.2% to 1.29 billion metric tons
Lower demand attributed in part to more efficient use of feed; poultry feed shows most significant growth
The 2024 Alltech Agri-Food Outlook revealed global feed production survey data and trends.

Global animal feed production remained steady in 2023 at 1.29 billion metric tons (BMT), a slight decrease of 2.6 million metric tons (MMT) — or 0.2% — from 2022's estimates, according to the 2024 Agri-Food Outlook, released today by Alltech. The annual survey, now in its 13th year, includes data from 142 countries and more than 27,000 feed mills.

The overall lower demand for feed was due, in part, to the more efficient use of feed made possible by intensive production systems that focus on using animal nutrition, farm management and other technologies to lower feed intake while producing the same amount of protein, or more. A slowdown in the overall production of animal protein, in response to tight margins experienced by many feed and animal protein companies, also contributed to lower feed demand. Changing consumption patterns caused by inflation and dietary trends, higher production costs and geopolitical tensions also influenced feed production in 2023.

Top 10 countries:

The top 10 feed-producing countries are China (262.71 MMT, +0.76%), the U.S. (238.09 MMT, 1.13%), Brazil (83.32 MMT, +1.84%), India (52.83 MMT, +13.43%), Mexico (40.42 MMT, +0.02%), Russia (35.46 MMT, +3.83%), Spain (27.53 MMT, -11.88%), Vietnam (24.15 MMT, -9.63%), Japan (23.94 MMT, -1.15%) and Türkiye (23.37 MMT, -11.48%). Together, the top 10 countries produced 63.1% of the world's feed production (same as in 2022), and almost half of the world's global feed production is concentrated in four countries: China, the U.S., Brazil and India.

Notable species results and outlook:

- **Poultry** experienced an increase in broiler feed production (385.04 MMT, +13.10 MMT, +3.5%) and remained steady with a slight increase for layers (170.88 MMT, +0.01 MMT, 0%).
  - Broiler feed now accounts for 29.9% of the total feed tonnage in the world thanks to a 3.5% increase in overall tonnage in 2023. While this growth was not uniform across all regions, the poultry sector is poised to keep holding strong in 2024 thanks to a combination of regional successes and global market dynamics. Some of the biggest factors that will contribute to the resilience of the broiler sector include reduced costs for inputs, such as feed and energy, and increases in margins and profitability.
  - For layers,there are industry-wide efforts to optimize feed efficiency and to keep pace with changing dietary trends and new purchasing power. Some markets around the globe were significantly impacted by macroeconomic challenges and disease outbreaks, which can disrupt production cycles. Still, the general outlook for the layer industry remains positive thanks to its resilience in the face of difficult circumstances, when other protein sectors often struggle to adapt.
  - The poultry sector is poised for continued strength, driven by a blend of regional successes and global market dynamics. The broiler forecast remains optimistic thanks to lower input costs, increased industrial margins and shifting consumer behaviors. For layers, challenges persist, but there are pockets of resilience and growth.
- The global pig feed production sector faced many challenges in 2023, which led to an overall decrease in pig feed production of 1.23% (320.80 MMT, -4.01 MMT).
- Latin America stood out as the only region that achieved an increase in pig feed production in 2023, while Europe, Asia-Pacific and North America — which have traditionally been the top pig feed-producing regions in the world — all faced challenges. African swine fever (ASF) continues to wreak havoc on pig production in China and Southeast Asia, where repopulation efforts are slowly proceeding.

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- The trends highlight the complex relationship between economic factors, supply dynamics and disease management in the global pig feed industry. Addressing these challenges will be crucial for sustaining animal agriculture and ensuring food security.
- **Dairy** feed tonnage decreased by 2.3% (126.23 MMT, -2.28%), primarily due to the high cost of feed combined with low milk prices, which led farmers to make strategic adjustments that included reducing their cow numbers and/or relying more on non-commercial feed sources.
  - In Europe, dairy producers will continue to grapple with stricter environmental policies in the years ahead, and they will need to find new ways to continue growing.
  - Asia-Pacific managed to buck the downward trend and emerged as the only region that increased its dairy feed tonnage in 2023. This growth was fueled by a continued increase in the consumption of milk products there, as well as an expansion of feed production in co-operatives.
  - This shift reflects the delicate balance between economic factors and the need to sustain dairy production. Lower feed costs and higher milk prices would help right the ship.
- **Beef** feed production decreased by 4.36% (117.49 MMT, -5.35 MMT) globally — the most pronounced downward change among all species sectors last year. Changes in cattle cycles in the United States and stricter sustainability policies in Europe had major impacts, with the Asia-Pacific beef sector notably surpassing Europe's in 2023.
  - The substantial decline in North America was the result of lingering droughts and high production costs, among other issues.
  - While the European and North American beef industries are expected to continue declining in 2024, growth is expected in China, Brazil and Australia — highlighting the complex dynamics and landscape of beef feed production around the world.
- The **aquaculture** sector experienced a decline of 4.4% (52.09 MMT, -2.42 MMT).
  - This decline was driven in part by a significant drop in China's supply of aqua feed due to lower fish prices, which had a far-reaching impact.
  - Latin America grew by 0.27 MMT (3.87%). Despite adverse weather conditions in that region, the demand for aqua products is still strong in Latin America, which helped aqua producers there remain resilient.
- The global **pet** feed industry continues to grow, albeit at a slower pace of 0.74% (34.96 MMT, +0.26 MMT) in 2023. Demand for high-quality pet products and services remains high from pet owners who want only the best for their animal companions.
  - The Latin American and North American markets were the primary drivers of this growth, with the pet food sector in North America surpassing Europe's this year.
  - Europe was the only market experiencing a decline in pet food production in 2023. Supply-chain disruptions and inflationary pressures were the key factors contributing to this decrease.
- The **equine** feed industry experienced a decrease of 3.9% (7.98 MMT, -0.32 MMT) in 2023.
  - The top challenges in the equine sector include high labor and material prices.
  - The top technologies impacting the sector are biosecurity, microchipping, genetics and nutritional solutions.
  - Survey respondents said the biggest opportunities for nutritional solutions are gut health management and feed efficiency.
  - Equine feed is expected to decrease both in price and in volume during the coming year.

Notable regional results:

- North America saw a decrease of 2.8 MMT (259.26 MMT, -1.1%), with beef feed tonnage down significantly. The pig and dairy sectors also slipped slightly, but the broiler, layer and pet sectors more than made up the difference. Feed tonnage in the broiler sector was up nearly 2.9%.
- Latin Americaexperienced growth in 2023 by 2.46 MMT (200.67 MMT, +1.24%). Despite high production costs, geopolitical tensions and changing consumer behavior due to economic reasons, the region continues to lead global growth, mainly because of its export-driven aquaculture, poultry and pork markets.
- Europecontinued its downward trend in feed production, with a decrease of 10.07 MMT (253.19 MMT, -3.82%) due to issues that included the invasion in Ukraine and the spread of animal diseases such as African swine fever (ASF) and avian influenza (AI).
- Asia-Pacific led feed production growth in 2023, with an increase of 6.54 MMT (475.33 MMT, +1.4%). Feed production growth in the region's ruminant sectors offset a setback in the aqua sector. The region is home to several of the top 10 feed-producing countries, including China, India, Vietnam and Japan.
- Africa experienced continued but slower growth with an increase of 1.95%, nearly 1 MMT to total 51.42 MMT.
- The Middle East saw a slight decrease of 0.12 MMT (35.93 MMT, -0.32%).
- Oceania had the third-highest growth, 3.71% or 0.39 MMT to total 10.78 MMT.

Alltech works together with feed mills and industry and government entities around the world to compile data and insights to provide an assessment of feed production each year. Compound feed production and prices were collected by Alltech's global sales team and in partnership with local feed associations in the first quarter of 2024. These figures are estimates and are intended to serve as an information resource for industry stakeholders.

To access more data and insights from the 2024 Alltech Agri-Food Outlook, including an interactive global map,

visit: alltech.com/agri-food-outlook.

Canafa & CBS Bio Platforms Triumphs with Innovative Agri-Biotech Solutions in India

In a groundbreaking series of events that promise to transform the poultry nutrition landscape, Canafa, in collaboration with CBS Bio Platforms, a leader in enzymes and other bio-based feed platforms, conducted a series of educational and networking programs across the Indian subcontinent in Karnal, Chandigarh, and Hyderabad last week, showcasing groundbreaking product technologies in the field of agricultural biotechnology. This initiative marks a significant milestone since Canafa, a key channel partner for CBS since 2020, enhanced its outreach with a dedicated sales team.

CBS presented its latest advancements in Multi-Carbohydrase Enzyme Technology and Enhanced Yeast Technology, designed to optimize animal nutrition, and improve gastrointestinal health across various species. These technologies are emblematic of CBS's commitment to sustainability and efficiency in agriculture, crucial in a country where agriculture plays a pivotal role in the economy.

"At CBS Bio Platforms, our technical capabilities are at the forefront of transforming agricultural production, " said Rob Patterson, Vice President Innovation, CBS Bio Platforms. "By leveraging our advanced enzyme and yeast technologies, we aim to revolutionize the way nutrients are utilized in animal feed, enhancing both efficiency and productivity."

The Multi-Carbohydrase Enzymes, including the flagship product Superzyme®, exemplify CBS's innovative approach. This technology allows for enhanced digestion of high-fibre ingredients, promoting better nutrient absorption and overall animal health. Superzyme® has shown significant improvements in feed efficiency and growth performance, which are key to the cost-effective production of poultry and livestock.

In addition, CBS highlighted its Enhanced Yeast Technology through products like CarboMax and Maxi-Nutrio® Liquid. These products are designed to improve gut health and immunity, contributing to the robustness and productivity of farm animals. Notably, Maxi-Nutrio® Liquid, the first fully-soluble beta-glucan & mannan product launched in the market, for use in drinking water systems, has demonstrated its efficacy in promoting beneficial bacterial growth and enhancing the immune response.

They also featured ProSparity, an advanced multi-component protease technology, designed to increase the digestibility of diverse protein sources in poultry diets. ProSparity targets

undigested proteins, transforming them into absorbable nutrients, which leads to better growth performance and reduced feed costs. By enabling more efficient protein utilization, ProSparity supports eco-efficient protein production and enhances the economic viability of poultry farming.

"We are excited about the possibilities that our latest technologies bring to the Indian market and beyond," said Krisjan Jones, President, CBS Bio Platforms. "Our commitment to enhancing agricultural productivity through biotechnological innovation has never been stronger. These meetings not only strengthened CBS's commitment to the Indian market but also laid the groundwork for further collaborations in India."

The marathon of knowledge began on the evening of April 8, 2024, at the prestigious Hotel Noor Mahal in Karnal, drawing an impressive crowd comprising local feed manufacturers, integrators, nutritionists, and veterinarians. This engagement was not only a platform for learning but also an avenue for forging and strengthening industry connections.

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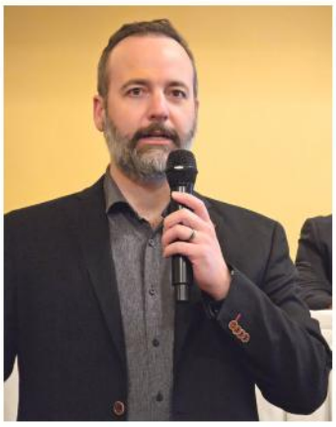

The journey of enlightenment continued, with the next stop at Chandigarh's Hotel Best Western Maryland. This session was specially designed for technical veterinarians and nutritionists, focusing primarily on the needs of layer birds, signifying Canafa and CBS's commitment to addressing the diverse segments within the poultry industry.

The bustling city of Hyderabad witnessed the third ensemble on 11th April,2024 at Hotel Amravati, attracting veterinary doctors, nutritionists, and poultry entrepreneurs.

Each program concluded on a high note with a gala cocktail and dinner, symbolizing the blend of scientific innovation and social interaction that is crucial for the growth and development of the poultry sector. These meetings not only served as an educational platform but also as an instrumental forum for stakeholders to discuss, deliberate, and strategize the future of poultry nutrition in India.

These programs underpinned by the visionary leadership of Mr. Kanwaljit Singh Ahluwalia, MD, Canafa, and the welcoming presence of local managers from the respective areas and Dr. Sandeep Deshmukh, National Head for Canafa, underscored the pivotal role of innovative nutrition solutions in poultry health and productivity.

CBS Bio Platforms's regional office in Manila, Philippines that includes a dedicated team of sales managers and nutritionists who focus on providing tailored support to meet the specific needs of the Asian region. Dr. Geraldbeau Licarte, Nutritionist extends support to India on all the nutrition & technical aspects whereas Dr. Eduardo Tuason, Sales Manager, CBS is helping on all the technical & commercial activities to Canafa team in India.

The series of meetings in India, and the partnership between Canafa and CBS, are a testament to CBS's global impact and its crucial role in fostering sustainable agricultural practices worldwide. As CBS continues to expand its presence and influence, the future of agriculture looks brighter, more sustainable, and technologically driven.

For more information, please visit:

CBS Bio Platforms' official website:
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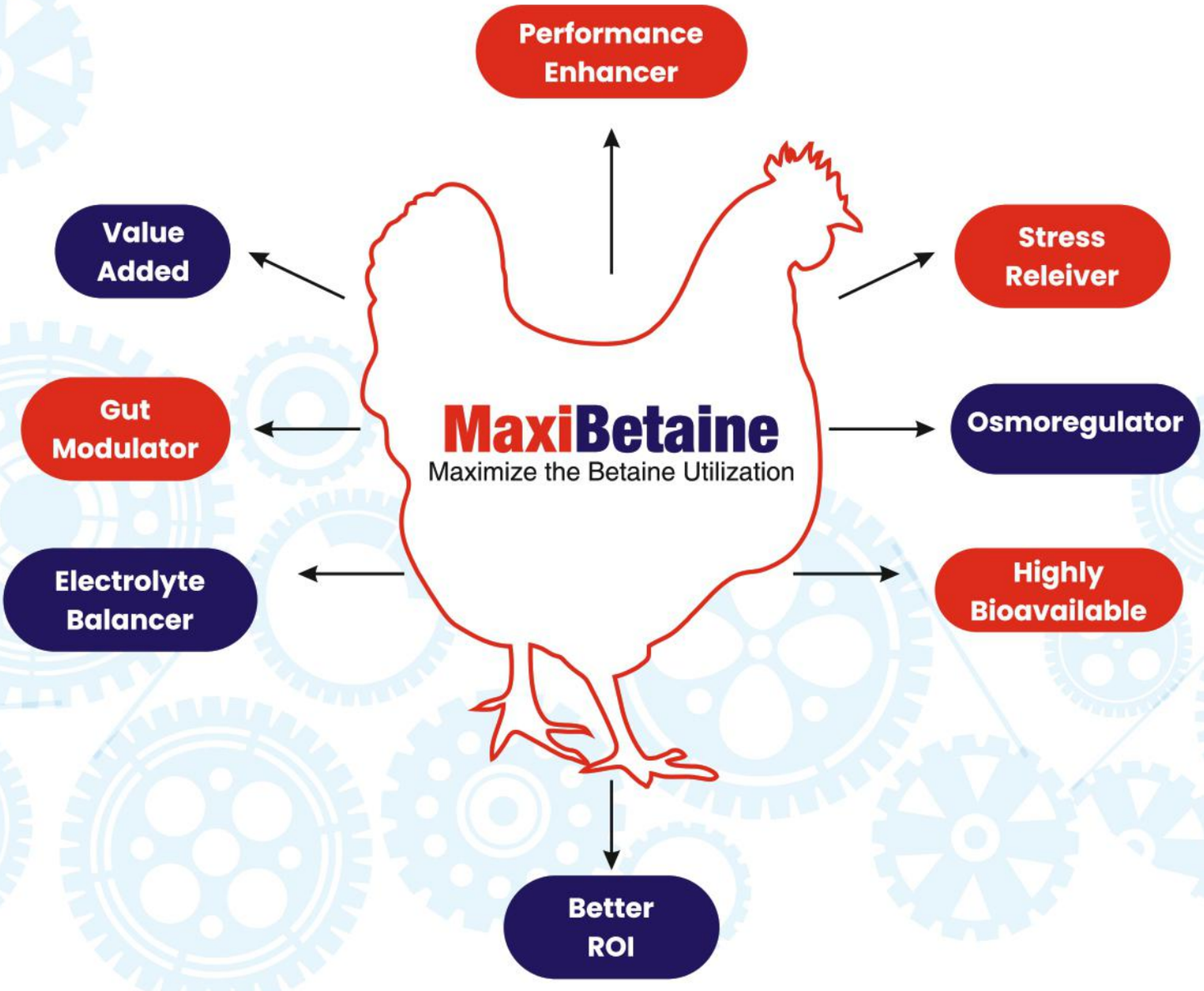

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Poultry Federation of India Meets US Soybean Export Council Delegation:

Exploring Feed and Farming Practices in India & USA, Plus a Tour of Khushboo Feed Mills Pvt Ltd Feed Unit and Farms

On April 21st, 2024, Poultry Federation of India Team and a high level delegation from the United States had a good interactive meeting. The USA delegation comprised of Mr. Lance Rezac, Chairman of USSEC; Mr. Jim Sutter, CEO of USSEC; Mr. Brad Doyle, Board of Director of the American Soybean Association; Mr. Kevin Roepke, Regional Head of USSEC, SAASSA Region; Ms. Rebecca Joniskan, representing the Indiana State Poultry Association; Ms. Gretta Irwin, from the Iowa Turkey Federation and Mr. Jaison John, Country Lead India, USSEC. Later the delegation visited the Khushboo Feed Plant and Commercial Broiler Farm near Gurgaon, where they were warmly welcomed by Mr. Sanjeev Gupta, Mr. Rajeev Gupta and Mr. Ashish Gupta at their office.

During the visit, the US delegation expressed their appreciation for the significant expansion and modernization efforts witnessed within the Indian Poultry Industry.

Mr. Ricky Thaper, Treasurer, Poultry Federation of India provided updates on the activities of the Poultry Federation of India and about Indian Poultry Industry and Agricultural Dynamics. Mr. Thaper appreciated the global initiatives of USSEC in collaboration with various stakeholders of the poultry, aqua and livestock industry. In a gesture of gratitude, the US delegation extended their thanks to the Poultry Federation of India Team and Khushboo Feed Mills Pvt. Ltd., for the enriching exposure to the Indian Poultry Industry.

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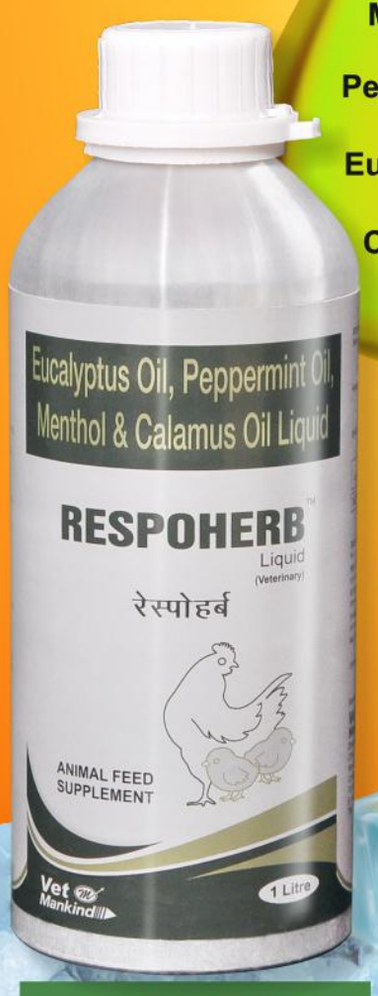

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Aflatoxicosis-A Silent Nuisance to Poultry Industry

Gourab Basak , Kartik Bhatt, Pankaj Patel and N. K. Mahajan
Department of Veterinary Public Health and Epidemiology
IIVER, Lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana

Aflatoxicosis is one of the most distressing disease among both livestock and poultry caused by ingestion of contaminated feed with aflatoxins from toxigenic fungus, mainly *Aspergillus* spp. Aflatoxicosis is a medical condition characterized by fatty and enlarged liver, jaundice, bile duct proliferation, oedema, sudden liver failure and ultimately death (death within 24 hours of consumption of aflatoxin contaminated maize/feed is possible). Aflatoxins are commonly produced by toxigenic strains of *Aspergillus flavus, Aspergillus parasiticus* and *Aspergillus nominus* on maize, peanuts, soybeans, cottonseed, sorghum and other foods (even in figs, tree nuts, spices) either in the field or during storage when moisture content and temperature are sufficiently high for the mould growth. Although many other species and strains of *Aspergillus* possess aflatoxigenic abilities, usually *A. flavus* contamination in food items is more frequently associated with aflatoxins. The name of the toxin was designated aflatoxin from its production by *A. flavus* (*Aspergillus flavus* toxinA-fla-toxin). Earlier recognized "mouldy corn toxicosis", "poultry haemorrhagic syndrome" and "*Aspergillus* toxicosis", may have been caused by aflatoxins. The discovery of acute dietary aflatoxin toxicity came with unknown disease named Turkey 'X' in England in 1960 with large number of deaths of turkey poults linked to peanut meal contaminated with aflatoxins.

Aflatoxicosis occurs in many parts of the world and affects growing poultry ,ducklings and turkey poults whereas among animals, mostly young pigs, pregnant sows, calves and dogs are the sufferers. Adult cattle, sheep and goats are relatively resistant to the acute form of the disease but are susceptible if toxic diets are fed over long periods. Contrary to long-term exposure to aflatoxins (AFs) where adverse health outcomes occur over time, dietary exposure to AFs exceeding 200 µg/kg in the short term can also be fatal for aflatoxicosis. Experimentally, all species of animals tested have shown some degree of susceptibility towards it. Dietary levels of aflatoxin (in ppb) generally tolerated are ≤30 in poultry.

Aflatoxins are cancer-causing and immunosuppressive that are associated with reduced weight gain and feed efficiency with occasional sudden deaths. Aflatoxins B_1, B_2, G_1 and G_2 are the major toxins among 16 structurally related toxins, named according to their blue or green fluorescence under UV. *A. flavus* produces AFB_1 and AFB_2 and *A. parasiticus* produces all the four major aflatoxins. AFB_1 is produced by all the aflatoxin-positive strains and is the most hazardous, mutagenic and potent hepatocarcinogenic agent. In fact, is the most prevalent worldwide. Other known aflatoxin producers include *A. nominus, A. bombycis, A. pseudotamartii* and *A. ochraceoroseus* among the aspergilli and *Emericella venezuelensis*. These compounds are highly substituted coumarins and at least 18 closely related toxins are known. AFM_1 is a hydroxylated product of AFB_1 and it appears in milk, urine and faeces as a metabolic product in cattle and buffaloes fed on aflatoxin contaminated feed. Thus, is also of human food safety concern. AFL, $AFLH_1$, AFQ_1 and AFP_1 are all derived from AFB_1. AFB_2 is the 2,3-dihydro form of AFB_1. AFG_2 is the 2,3-dihydro form of AFG_1. The toxicity of the six most potent aflatoxins decreases in this given order: $B_1 > M_1 > G_1 > B_2 > M_2 > G_2$.

Structurally being the derivatives of di-furocoumarin, AFs are mainly produced as secondary metabolites of heterologous group called mycotoxins in the temperature range of 24 35°C. Temperature around 30°C and water activity (a_w) of 0.99 are the major conditions required for AFB_1 synthesis with other environmental factors including substrate, time, CO_2 levels etc. The toxic response and disease in mammals and poultry vary in relation to species, age, sex, nutritional status, level of aflatoxins in the ration and duration of intake. Avian species especially goslings, ducklings and turkey poults are highly susceptible to AFB_1 toxicity. Domestic turkeys and ducks are highly sensitive to both the acute and chronic toxicity of AFB_1. Chickens whereas are comparatively resistant to acute aflatoxicosis (except during the embryonic development) as compared to other poultry species. Practically, poultry are very sensitive even in a very low dose of AFB_1. The order of sensitivity exists as ducks > turkey > Japanese quail > chicken.

The toxic effects of AFB_1 are mainly localized in liver as manifested by hepatic necrosis, bile duct proliferation, icterus and haemorrhage. Chronic toxicity in those birds is characterized by loss of weight, diarrhoea,decline in feed efficiency, drop in egg production and increased susceptibility to infections. The incidence of hepatocellular tumours, particularly in ducklings is considered to be one of the serious consequences of aflatoxicosis. AFB_1 is detrimental to cellular processes too. Synthesis of DNA, RNA and proteins are strongly inhibited in the primary hepatocytes of chicken. Mutations of G-T transversion in hepatic DNA has also been described. Risk of hepatocellular carcinoma increases many folds in humans with hepatitis B infections on chronic exposure to AFB_1. Whereas, adenoma and hepatocellular carcinoma are reported in ducks. Thus, AFB_1 is classified as a group I carcinogen by the International Agency for Research on Cancer.

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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.

AFB_1 affects production values adversely. Dietary exposure to AFB_1 and other aflatoxins lowers weight gain and hence the absolute body weights in both chickens and turkeys; as reduced feed intake and nutrient usage efficiency impair growth. AFB_1 lowers the feed conversion ratio leading to more requirement of feed for muscle production in broilers and turkeys and egg production in layer birds.

In contrast, inspite of decreased feed consumption, body weight and feed conversion efficiency of quails are not altered but in ducks former two characters are reduced but not the feed efficiency. This in turn lowers the reproductive performance in poultry. The age of maturity in broilers increases and the egg quality parameters viz., total weight, shape, albumin and/or yolk percentage and shell thickness in chickens and quails adversely get affected because of AFB_1 toxicity.

Moreover, AFB_1 can damage the immune tissues (bursa of Fabricius, thymus and spleen) which produce mature or active leukocytes and suppress innate and adaptive immune responses. Also, immune tissue atrophy, relative bursal, spleen and thymus weight losses can be seen if AFB_1 is consumed during growth period. It has been also indicated that aflatoxin can depress the phagocytic effects of heterophiles and Kupffer cells and lowers the haematological values, total basophilic and thrombocytic counts, enabling lower-resistance of the body to infection. Specific laboratory changes viz., increased AST, ALT and alkaline phosphatase, hypothrombinaemia, prolonged prothrombin and activated partial thromboplastin times, hyperbilirubinemia, hypocholesterolaemia, hypoalbuminemia and variable thrombocytopenia are prominent and frequently encountered.

Besides, nutrition also plays an important role in this context. Deficiencies of some dietary vitamins raise the aflatoxicosis in susceptible chickens. Furthermore, dietary supplementation of tryptophan helps increasing hepatoxicity of AFB_1. The small intestine of the sick birds often gets targeted by lowering the length and weight of duodenum and jejunum which consequently affects the tissue morphology. Above all, transfer of aflatoxins through embryonated eggs is yet another major concern for the poultry sector. AFB_1 can transmit from affected laying hen to albumin and yolk of her eggs . As a result, contaminated unfertilized eggs can be a food safety risk for human consumption. Major effects of aflatoxicosis are depicted in the given figure 1 below :

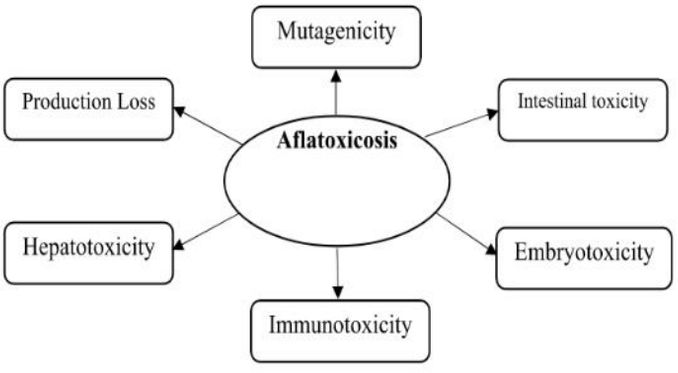

Fig 1. Prominent Effects of Aflatoxicosis

A number of aflatoxicosis outbreaks taking several human and animal lives had been encountered in Asia and Africa in the past. These incidences signify and strengthen the severity of the aflatoxin-contaminated food hazards. Even though prevention is the best medicine to control aflatoxicosis but occasionally natural contamination of crops with *A. flavus* becomes unavoidable. Additionally, enforcement of aflatoxin regulatory limits leads to declined markets and incomes. Methods involving physical removal or chemical inactivation of toxins in the aflatoxin contaminated feeds can be a way out for the decontamination. Some significant strategies to combat aflatoxicosis are depicted in the figure 2 below.

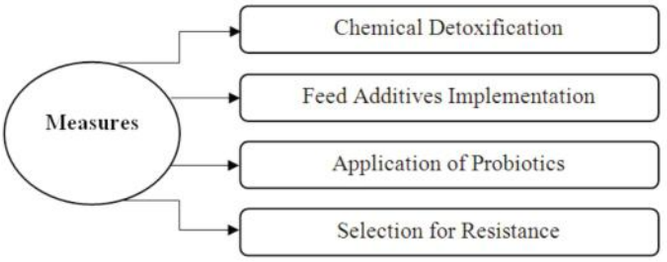

Fig 2. Control Measures to Resist Aflatoxicosis in Poultry

For detoxifying crops like grain, rice, maize and cottonseed, chemicals viz., ammonium hydroxide, calcium hydroxide, hydrogen peroxide, sodium hydroxide and sodium hypochlorite are useful. These chemicals play a key role in reducing aflatoxins specially AFB_1 concentrations by hydrolysis which leads to production of degraded form having reduced or no toxicity. Likewise, some feed additives are employed for detoxification and strengthen the metabolic and/or immune functions of the body in order to safeguard the poultry from the effects of aflatoxicosis. Selenium supplementation is the most prominent one and highly preferred against AFB_1. Also, super-activated charcoal, phenobarbital, cysteine, glutathione, beta carotene, zeolites like hydrated sodium calcium aluminosilicate, clinoptilolite and sodium bentonite and antioxidants like butylated hydroxytoluene (BHT) and turmeric have proved to reduce the effects of aflatoxicosis. On the other hand, probiotics can also aid in this process of protection. Bacteria viz., *Streptococcus*, *Enterococcus*, *Lactococcus* and *Berevibacillus* efficiently can help in vitro binding against AFB_1. Works are in progress for the effective use of probiotic strains of *Lactobacillus*, *Bifidobacterium* and *Propionibacterium*. Above all, an effective managemental system be established till the selection of resistant lines of poultry against the same can be undertaken for farming. If in case the selection strategy has been adopted then the adverse effects can be easily controlled without any negative impacts or losses and poultry can be protected even from their day-old lives, proving it to be a gold-standard approach.

Thus, not only morbidity or mortality occurs on exposure but also aflatoxicosis in turn causes losses directly and indirectly to the poultry industry. Therefore, to save the industry and protect public health as well as poultry health, a holistic approach has to be adopted in order to mitigate all the iniquities judiciously.

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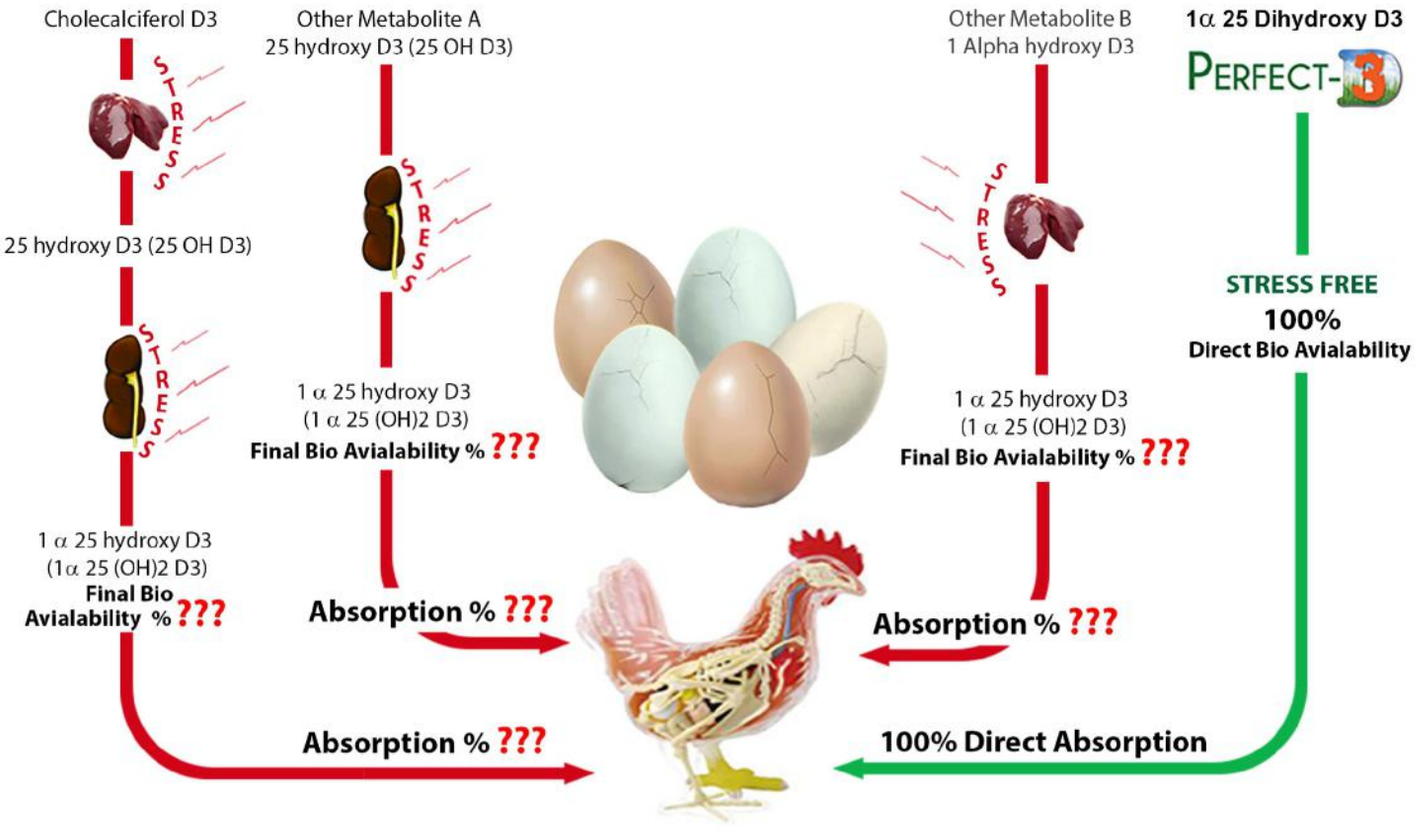

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Sustainability Assurance Protocol Annual Report Released

The U.S. Soy Sustainability Assurance Protocol (SSAP) has released The Positive Momentum of Sustainable U.S. Soy, a comprehensive sustainability report on the 10-year history and growth of international U.S. Soy shipments verified by the SSAP.

The SSAP is a tool that aggregates sustainability and conservation principles to verify sustainable soy production on U.S. soybean farms. It was created in 2014 to provide credible information and assurance to U.S. Soy customers that the soy they purchase is sustainably produced.

"The U.S. Soy supply chain and its customers share a desire to understand one another and work togetherfor sustainable solutions," said Jim Sutter, USSEC CEO. "This communication and partnership isdriving the ever-increasing demand and momentum for sustainable U.S. Soy."

In 2023, a record 44,480,427 metric tons - 70%of all U.S. Soy exports - were shipped with an SSAP certificate, a 56.44% increase in SSAP shipments over 2021. U.S. Soy's carbon footprint is the lowest in the world when factoring in cultivation impact and land-use change versus other soy, plant proteins and vegetable oils.

Consumer-facing packaging labels verifying that products are made with "Sustainable U.S. Soy" (SUSS) or "Fed with Sustainable U.S. Soy" are also seeing an increase in use worldwide. More than 1,000 products in countries across the globe currently feature licensed SUSS labels.

"Sustainability is not just a trend but something that creates long-termvalue for companies," said Chulhoon Lee, Purchasing Manager for Sajo Daerim Corporation in

Seoul, Korea. "We know that using the "Sustainable U.S. Soy" logois a great opportunity to demonstrate our commitment to sustainability."

The 2023 SSAP report also highlights sustainability milestones achieved by U.S. soybean farmers, successful industry collaborations, and progresstoward U.S. Soy's 2025 sustainability goals*, which include:

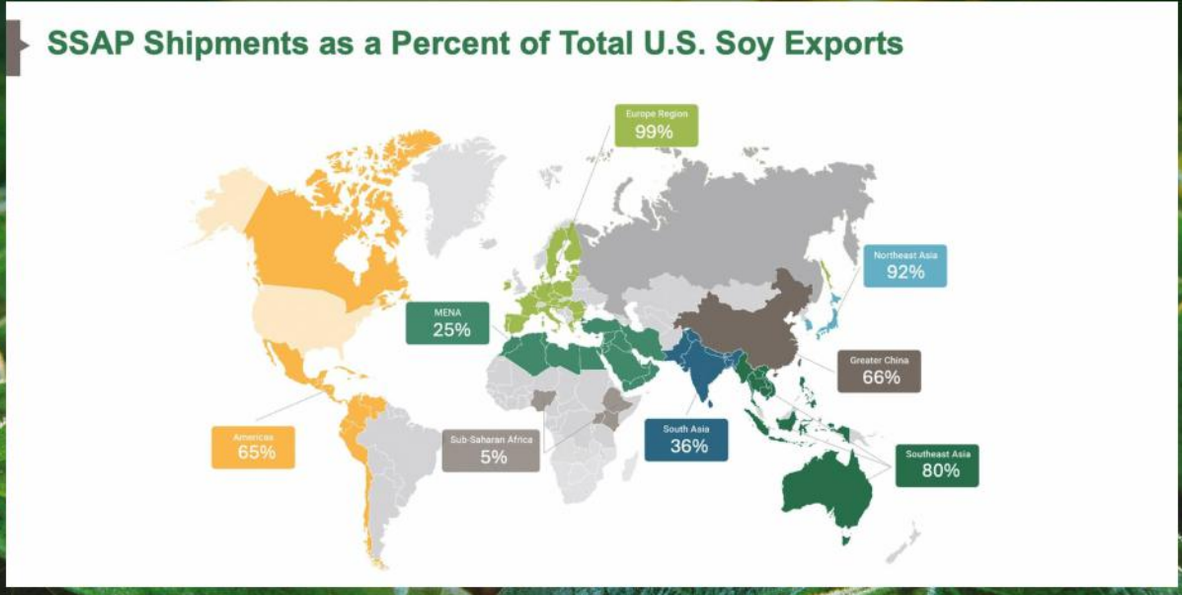
- Reduction in land use impact by 10%
- Reduction in soil erosion by 25%
- Increased energy efficiency by 10%
- Reduction in total greenhouse gasemissions by 10%

*2025 sustainability goals use the year 2000 as a starting benchmark.

This press release was funded in part by the soy checkoff.

Editor's note: INTERVIEW OPPORTUNITY

For more insight to the 2023 SSAP Report and positive impact of sustainable U.S. soybean farming practices, USSEC Director of Sustainability, Abby Rinne, USSEC CEO Jim Sutter, and U.S. soybean farmers are available for interviews. To schedule an interview, please contact:



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- Conference of The Future of Green Farming
- Conference of Animal Precision Preventive Medicine

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In celebration the 400th anniversary of Tainan City, night tour sightseeing buses for Tainan cultural attractions or night markets for international exhibitors and buyers during the show periods

Organizer reserves all the explanatory rights for the "Free Accommodation" plan.

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The 2024 Asia Agri-Tech Expo & Forum Demonstrates Taiwan's

Prowess on Smart Farming & Biotechnology, brings in Future and Revolution to Agriculture, Livestock and Aquaculture Industries

Taiwan is renowned for its engineering prowess, manufacturing most of the components used in smart farming, including IoT sensors, solar panels, drones, robotics, and agriculture technology system integrators bringing revolutionary advancements to the field.The 8thAsia Agri-Tech Expo & Forum (AAT) in Taiwan is not just the leading exhibition buta content-rich event in agriculture industry.The event will take place from June 19th to 21st, 2024, at Tainan, Taiwan, running concurrently with Livestock Taiwan and Aquaculture Taiwan.

The expo is supported by central and local governments, as well as associations from related agriculture, aquaculture and livestock industries highlighting the expo's significance in the industry.

With its extensive exhibitor's lineup featuring leading companies, the expo offers a comprehensive showcase. The exhibition isdifferentiated by country and theme pavilions. Main pavilions have:

- Agriculture Facility Pavilion exhibits premier sustainablegreenhousefacilities, environmental control systems, smart agricultural systems, seeds and seedlings, etc.;
- Smart Aquaculture Pavilion revealsthe world's first oral gender regulation technology, AI-based underwater monitoring and management system, drone application on smart farming for shrimps and fishes, etc.
- Feed Technology Pavilion has the latestadvanced feeds, feed additives, vaccines that provide animal nutrition and immunityenhancement.
- Livestock FarmingPavilion, the largest pavilion among all, displays all kinds of advanced facilities and houses for livestock farming. Notable brands includeMoba, WEDA, Skiold, SKOV, VDL Jansen, Cloudfarms, Fancom, Kyowa, Frontmatec,Agrisys, AGI, etc.
- Agri-Machine Pavilion: will showcase the latest research on EV agri-machiney, drones, robotics,just to name a few.

The exhibition offers a comprehensive showcase, products and services.

As part of the expo, a series of professional conferences will be held, addressing key issues and emerging trends in agriculture, livestock, and aquaculture, which include:

- Innovative Aquaculture Management Seminar
- Forum of Taiwan Swine- Precision Farming and Management
- Forum of Advanced Poultry House
- The 2nd edition of Precision Prevention Medication for Animals Forum
- EVAgri-Machineryand Technology Seminar

Industry leaders, experts, and stakeholders come from around the world together. Photo taken from the opening ceremony of 2023.

Attendees can expect valuable and practical insights, and networking opportunities from industry experts and thought leaders.

The 3-in-1 event not only provides a one stop sourcing platform but also cooperation opportunities for international players. "The world is now in the middle of its biggest agricultural revolution.Been an agricultural research and development leader since the 1960's, Taiwanis an early adopter and innovator in agricultural technologies. With the prowess on IT manufacturing, bio-research achievements, and the know-how on working with the humidity of the tropical climate", said Ms. Sabine Liu, General Manager of the organizer, "Taiwanis set to take a significant rolefor many of agriculture changes. In addition, located within two hours from China's main cities and 4 hours from Southeast Asia countries, Taiwan is the perfect base for companies looking for partners to enter China or other parts of SoutheastAsia markets."

For any interest or inquiries of ASIA AGRI-TECH EXPO & FORUM, please visit the official website at:

https://www.agritechtaiwan.com OR

contact Ms. Sophia Lu by phone at +886-2-2738-3839 or

via email to: aat.sales@informa.com

A series of professional conferences will be held, addressing key issues and emerging trends in the exhibition.

The 8th edition of Asia Agri-tech Expo & Forum, Livestock Taiwan and Aquaculture takes place from June 19-21, 2024 in Tainan, Taiwan.

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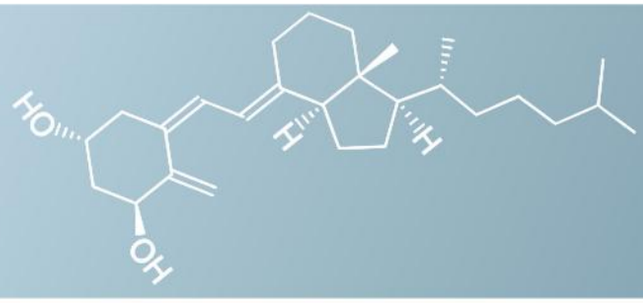

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