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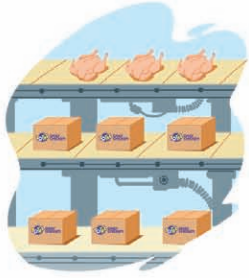

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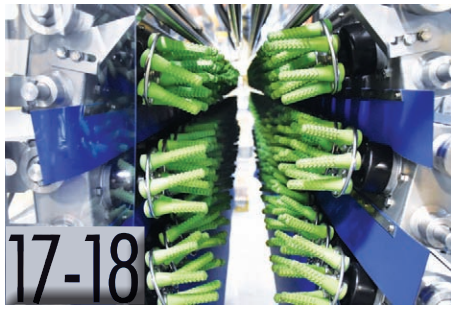

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The Edit

THE ROLE OF INNOVATION

In an ever-evolving world, where population growth, consumer preferences, and sustainability concerns are reshaping industries, the poultry sector stands at a crossroads. Innovation, once considered a luxury, is now a necessity for ensuring the future viability of this vital food supply chain. The poultry industry—comprising production, processing, and distribution has to embrace cutting-edge advancements to address challenges such as efficiency, environmental impact, animal welfare, and changing consumer demands.

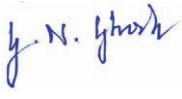
One of the key drivers of innovation in the poultry sector is the need for increased productivity. As the global population rises, so does the demand for affordable and sustainable protein sources like chicken and eggs. The industry can no longer rely on traditional methods alone; there's a pressing need for technological innovations, such as precision farming, automation, and data analytics. From smart feeding systems to automated chicken housing, these innovations can improve resource management, reduce waste, and enhance overall productivity.

Animal welfare is another area where innovation is crucial. Consumers are increasingly conscious of how their food is produced, with a growing emphasis on ethical farming practices. New technologies such as artificial intelligence (AI)-driven monitoring systems can track the health and behavior of poultry in real-time, ensuring that any potential issues are addressed promptly. Such advancements not only improve animal welfare standards but also contribute to better production outcomes, as healthy birds yield better products.

Sustainability is perhaps the most significant challenge facing the poultry industry today. Environmental pressures, including the need to reduce greenhouse gas emissions and water usage, demand innovative solutions. Circular farming practices, where waste from poultry production is recycled back into the system, are gaining ground. Additionally, alternative feed sources such as insect-based proteins or algae can reduce the environmental footprint associated with conventional feeds like soy and corn.

Innovation isn't limited to the farm. In the processing and retailing stages, advancements in packaging, food safety, and logistics are streamlining operations and ensuring higher-quality products reach consumers. Blockchain technology, for instance, is enhancing transparency in the supply chain, giving consumers confidence in the origins and quality of their food.

Ultimately, the future of the poultry sector hinges on its ability to innovate. From production to processing, every step of the poultry supply chain can benefit from the adoption of new technologies and practices. For an industry that feeds millions and fuels economic growth, innovation is not just an opportunity—it is a necessity. Embracing change today will secure the success of tomorrow.



G. N. Ghosh
Managing Editor

Indian Research

Effect of Phytobiotics on Production Performance of Japanese Quail under Cage System

By
K. Sangilimadan[1]*, S. Sumanth, R. R. Churchil[2] and P. S. L. Sesh[3]

[1]Poultry Research Station, MMC. Chennai, [2]Department of Poultry Science, [3]Department of Veterinary Biochemistry. Madras Veterinary College, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Chennai

A study was conducted at experimental shed of Department of Poultry Science, Madras Veterinary College, Chennai-7. For this study 180 day-old straight run Japanese quails were randomly distributed into four treatments consisting of six replicates each. Each replicate had six birds. The birds were reared in cages throughout the biological experiment and Japanese quail brooder mash diet was provided as control diet(T_1). In treatment groups Japanese quail brooder mash diet along with amla fruit powder (AFP) at the rate of 0.5 (T_2) and 1.0% (T_3) and tulsi leaf powder (TLP) at the rate of 0.25 (T_4) and 0.5% (T_5). The results revealed that the supplementation of AFP at the rate of 0.5% resulted in improved ($P<0,05$) body weight during 2nd and 3rd weeks of age: whereas, 1% AFP supplementation significantly ($P<0.05$) improved the body weight of Japanese quails from 1st week and 4th week of age. The quail fed with 0.25% TLP attained significantly ($P<0.05$) higher body weight from 1st to 4th week. At higher inclusion level of 0.5% TLP, recorded significantly ($P<0.05$) higher body weights during 2nd, 3rd and 4th weeks of age. AFP supplementation at both levels (0.5 and 1.0%) showed significant ($P<0.05$) improvement in weight gain during 1st, 2nd and 3rd weeks of age.

In birds fed with TLP at the rate of 0.25% there was significant ($P<0.05$) increase in body weight gain during 1st, 2nd and 3rd weeks of age compared to control. The birds fed with higher levels of TLP (0.5%) there was significant ($P<0.05$) increase in body weight gain only during 2nd and 3rd weeks of age. Supplementation of AFP and TLP significantly ($P<0.05$) influenced the feed intake during 3rd and 5th week of age. However, the supplementation had no significant ($P>0.05$) effect on overall feed intake of birds. The group fed with AFP at the rate of 0.5% recorded significant ($P<0.05$) decrease in feed intake during 3rd and 5th weeks of age. Whereas, the group fed with AFP at the rate of 1.0% showed significant ($P<0.05$) decrease in feed intake than control only during 5th week of age. Quails supplemented with TLP showed no significant ($P>0.05$) difference in feed intake during the entire period. The birds supplemented with AFP. had significant ($P<0.05$) improvement in feed efficiency during 1st, 3rd and 4th week at 1% level of inclusion and at first week alone at 0.5% level compared to control. TLP supplementation at the rate of 0.5% showed significant ($P<0.05$) improvement in feed efficiency during 1st, 3rd and 4th weeks of age.

At inclusion level of 0.25%, there is significant ($P<0.05$) improvement only in 1st and 3rd week feed efficiencies. The overall livability of birds showed no significant ($P>0.05$) difference was observed. AFP supplementation at the rate of 0.5% in Japanese quails diet fetched better profits in terms of net profit per bird. The Japanese quails which were fed with TLP powder at low (0.25%) and higher (0.5%) levels in their diets produced better profits both in terms of net profit per bird. It was concluded that Supplementation of amla fruit powder and tulsi leaf powder had beneficial effects on body weight and weekly weight gain in Japanese quail up to three weeks of age.

Effect of Short Periods of Incubation During Egg Storage (SPIDES) on Hatchability of Broiler Breeder Eggs

By
B.A. Dhotre, A.S. Kadam*, V.D. Lonkar, V.R. Patodkar, U.M. Tumlam, C.S. Mote, A.K.Barate, V.D. Nimbalkar, S.R. Kharde and A.K Shinde

Krantisinh Nana Patil College of Veterinary Science. Shirwal Dist. Satara Maharashtra Animal & Fishery Sciences University, Nagpur

In the commercial hatchery, eggs are stored for a period of three to seven days as hatchability gets reduced in the long-term storage of eggs. Hence, the experiment was conducted to determine the effect of Short Periods of Incubation During Egg Storage (SPIDES) on the hatchability of broiler breeder eggs.

A total of 500 broiler hatching eggs were divided into 5 treatment groups of A, B, C, D and E each containing 100 eggs. Each treatment was further divided intofive replicates of 20 eggs. The groups were viz., A (control) eggs were stored for 7 days without SPIDES treatment, Group B and C eggs were stored for 10 days and exposed to 1 hr and 2 hr SPIDES on 5th day, respectively. Group D and E eggs were stored for 15 days and exposed to lhr and 2 hr SPIDES on the 5th and 10 days, respectively.

The eggs were stored at 16-18°C and 65-70% relative humidity and eggs from groups B, C, D and E were exposed to SPIDES treatment at temperatures 37.5°C and 55-60% relative humidity. The parameters studied were egg weight loss during storage, fertility, hatchability, embryonic mortality, hatch window, chick quality and healthy chick production.

The results of the study indicated that the percent egg weight loss during storage, fertility, day-old chick weight, early and mid-embryonic mortality is not significantly influenced by storage period and SPIDES. However, exposing hatching eggs to 2 hr SPIDES on the 5th and 10th day during the 15-day storage period helps to restore hatchability, embryonic survivability, healthy chick production and chick length. Late embryonic mortality was significantly reducedin group E. Exposing the hatching eggs to incubation temperature of 37.5°C and 55 to 60% relative humidity for 2 hrs on the 5th and 10th day of storage helps to restore the hatchability, embryonic survivability, healthy chick production and chick quality in hatching eggs stored for 15 days.

Source: XXXVII Indian Poultry Science Association Conference, November 2022

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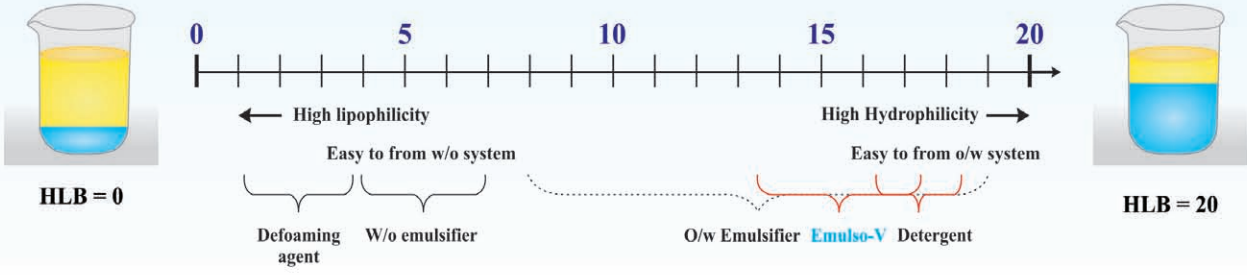

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Article

Maintaining Water Quality for Healthy Gut of Poultry

Dr. Ashok Rajguru
Program Manager
Trouw Nutrition South Asia

Introduction

Water is the most important nutrient for poultry which plays a critical role in bird performance. The main functions of water are thermoregulation, digestion, and absorption of nutrients. It also acts as a carrier for administering additives, such as medication, supplements, etc. Chickens consume twice as much water as feed. Water quality takes on an increasingly valuable role as public concern over antibiotic use in the poultry industry rises. Water quality is one of the most critical and least appreciated factors for bird performance. Therefore, providing a clean and safe water supply is crucial for optimal broiler performance (Fig.1).

Fig.1: Supply of clean water to birds

To ensure water quality, we must check the following parameters

- Physical Examination- Colour, taste, odour and turbidity
- Chemical Test – pH, hardness, TDS, alkalinity, mineral level
- Microbial Analysis–Total bacterial count, Coliform, Enterobacteriaceae, E. coli, Salmonella, Mould count

Physical Examination

Drinking water should be clear, tasteless, odourless, and colourless. As a general observation, a reddish-brown colour may indicate the presence of iron, while a blue colour indicates the presence of copper. Hydrogen sulphide is indicated by a rotten egg odour. Hydrogen sulphide may also combine with iron to form black water (iron sulphide), indicating the presence of sulphate-reducing bacteria. Taste can be affected by the presence of salts, and a bitter taste is usually associated with the presence of ferrous and manganese sulphates. Turbidity results from suspending materials such as silt, clay, algae or organic materials in water.

Chemical Analysis

1. Water pH

The acidity or alkalinity of water is measured by pH. A pH of 7 indicates that the water is neutral, a pH less than 7 indicates acidity and a pH greater than 7 indicates alkalinity. High-pH water is also unacceptable since it reflects high levels of calcium and magnesium, which can clog watering systems. Poultry accepts water on the acidic side better than they accept water on the alkaline side. The ideal water pH should be 5.5-6.

2. Total Dissolved Solids (TDS)

Measurement of total dissolved solids (TDS), or salinity, indicates levels of inorganic ions dissolved in water. Calcium, magnesium, and sodium salts are the primary components that contribute to TDS. High levels of TDS are the most found contaminants responsible for causing harmful effects in poultry production.

3. Hardness

Hardness refers to the presence of dissolved minerals such as calcium and magnesium in either bicarbonate or sulphate form and is expressed as an equivalent of calcium carbonate. Hard water is commonly associated with the buildup of deposits and the formation of scale in the components of the watering system. High levels of magnesium sulphate ($MgSO_4$) may cause an increase in water consumption, wet droppings, and a drop in production. Extreme hardness may diminish the effectiveness of water-administered medications, disinfectants, and cleaning agents.

4. Alkalinity

Alkalinity is a measure of the capacity of water to neutralise acids. The alkalinity is predominantly due to carbonates, bicarbonates and hydroxides. The bicarbonate ion is usually prevalent. Alkalinity is generally associated with high pH, hardness & TDS. High alkalinity water may have distinctly flat, unpleasant taste; so alkalinity should not exceed 200 mg/ L for potable water. Alkalinity is important because it majorly decides the water acidifier required quantity for desired pH reduction.

Table 1: Water Quality (Chemical) Standard for Poultry

Water Quality Parameter	Maximum Value
Total Hardness	300 mg/L
TDS	1000 mg/L
Alkalinity	300 mg/L
pH	5.5-6
Calcium	100 mg/L
Chloride	250 mg/L
Copper	0.6 mg/L
Cadmium	0.01 mg/ml
Iron	0.3 mg/L
Lead	0.02 mg/L
Magnesium	125 mg/L
Nitrite	4 mg/L
Nitrate	20 mg/L
Sodium	50 mg/L
Sulfate	250 mg/ml
Zinc	1.5 mg/L

Watkins, S. 2008. Water: Identifying and correcting challenges. Avian Advice 10(3): 10-15

Microbial Analysis

Water is the most important nutrient for bird performance, but water is also a major source of contamination which disturbs poultry gut health and overall performance. Water is a carrier of microbial challenges and can easily contaminate the drinking

system of broiler houses with biofilms (Fig. 2) which would affect the quality and quantity of water intake. When bacteria attach to the interior wall of a water pipe, they begin to exude a sticky substance called biofilm (Fig.2). This substrate becomes an ideal home for bacteria to reproduce and colonise. Biofilm can build up rapidly and become a breeding ground for waterborne pathogens, such as E. coli. Biofilms will affect bird performance consequent to the reduced effectiveness of medication and vaccination, reduced nipple flow rate, blocked drinking system/nipple or nipple leakage and increased bacterial disease mortality. There should be bacterial count within permissible limits. (Table no.2). E. coli is introduced into the water system, and they can survive/ multiply in the biofilm.

Table 2 : Maximum Recommended Microbiology Values in Water

	cfu/mL
Total bacteria	< 100
Total Coliform	< 50
Faecal Coliform	0
Enterobacteria	< 100
E. coli	< 100
Yeast	< 5000
Mould	< 100

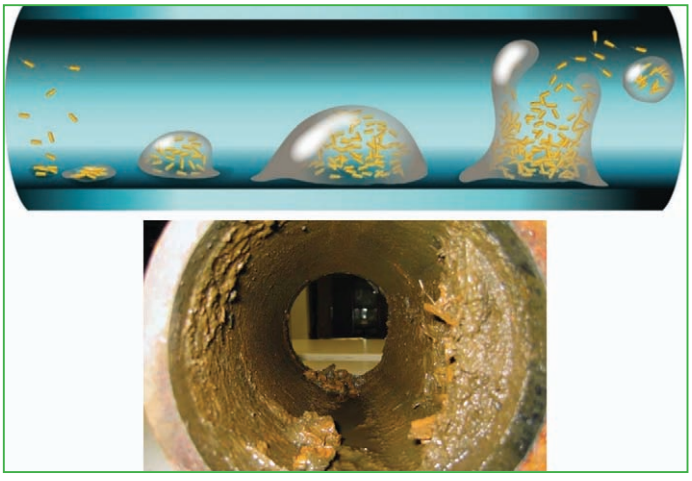

Fig. 2: Pipeline water biofilm

Strategies for Optimising Water Quality

There are four commonly used methods to manage biofilm threats in poultry drinking. The first addresses pathogens that enter the bird through contaminated water, while others focus on preventing pathogen intake.

1. Acidification Supports Digestion

Providing a level of protection against pathogens that enter the bird via the biofilm, acidification helps control water and stomach microbes while reducing pathogenic bacteria in birds' intestines. Water acidifiers reduce the pH of water to less than 4.5 a level at which many pathogenic bacteria struggle to survive. Low pKa (strength of an acid) and undissociated organic acids reaching the stomach may also help control gram-negative bacteria ingested through contaminated feed or faeces. These organic acids may deliver antimicrobial efficacy in the acidic stomach region as they pass through the walls of bacteria and fungi, altering their metabolism.

As a low pH is required for the digestion of most plant- and animal-derived proteins, organic acids can help assure less undigested protein reaches the hindgut, potentially reducing the threat of dysbacteriosis. Selko pH, a blend of organic acids may be worth considering when the objective is to combat biofilm and improve animal digestion, gastrointestinal microbial balance or animal performance. Selko-pH improved the zootechnical performance of broilers and could be a suitable alternative to in-feed AGPs to maintain growth performance. (Table 3 & Fig.3)

Table 3: Treatment

	Application Rate
Negative Control*1	-
Positive Control*2	50 ppm
Selko pH**	1L/1000L water

**Water pH:7.80 **Water pH:3.42*
- - Daily stepwise approach: day 1, Day 2, Day 3 :0.8 /1000 L water, >4 days:1 L/1000 L water - BMD (bacitracin methylene di salicylate) in feed

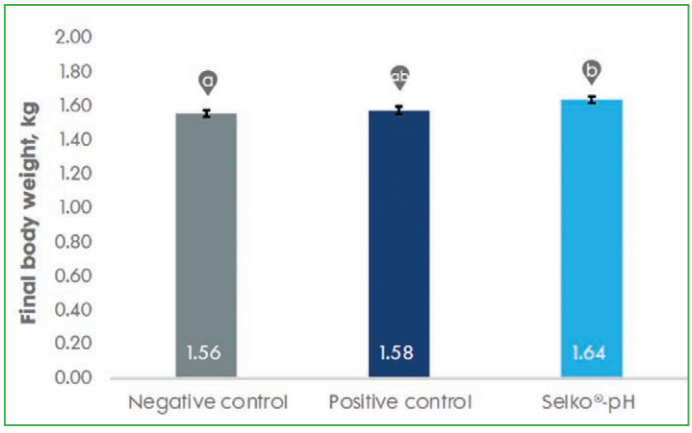

Fig. 3 Final body weight (83% confidence interval as error bars) of broilers receiving an antibiotic growth promoter (AGP) in feed (positive control) or Selko®-pH in water on day 35. Columns with different superscripts (a,b) are significantly different (p < 0.05).

2. Flushing Pipeline

Clean drinking water begins with flushing. The system should be flushed with clean water between bird cycles and after any treatment, such as vaccines, antibiotics or vitamins delivered through water. As disease risk is highest during a bird's first week, it is advisable to flush systems at least twice during the first week of production. Flushing with clean water loosens substances that can contribute to biofilm and washes away buildups that can clog equipment. High-pressure flush (2 to 3 bars/units) should be applied during the flushing process.

3. Disinfection with Hydrogen Peroxide

A simple and effective disinfectant usage between cycles like hydrogen peroxide will work very well in killing many bacteria and removing biofilm buildup. It also helps to prevent biofilm formation to some extent. Applying the proper concentration of hydrogen peroxide (35 % conc.) with 1-3 % water solution and allowing adequate treatment time is important to achieve desired disinfection results. Hydrogen peroxide works best for disinfection purposes and not for regular practice or as a substitute for water acidification.

4. Chlorination as Water Sanitisation Approach

Chlorine can be used as a maintenance disinfectant during the production cycle. Flushing is the first step in the disinfecting process, followed by chlorination. Generally, a concentration of sodium hypochlorite at 15% (100 to 150 mL/1000 L water) or chlorine dioxide applied at 0.2 to 0.4 mg/L water is recommended. The target level of residual free chlorine is important and should

be between 2-3 ppm or oxidative reduction potential (ORP) in the range of 650 to 700 millivolts. Chlorination becomes even more effective when combined with a proper approach to acidification for effective killing of bacteria.

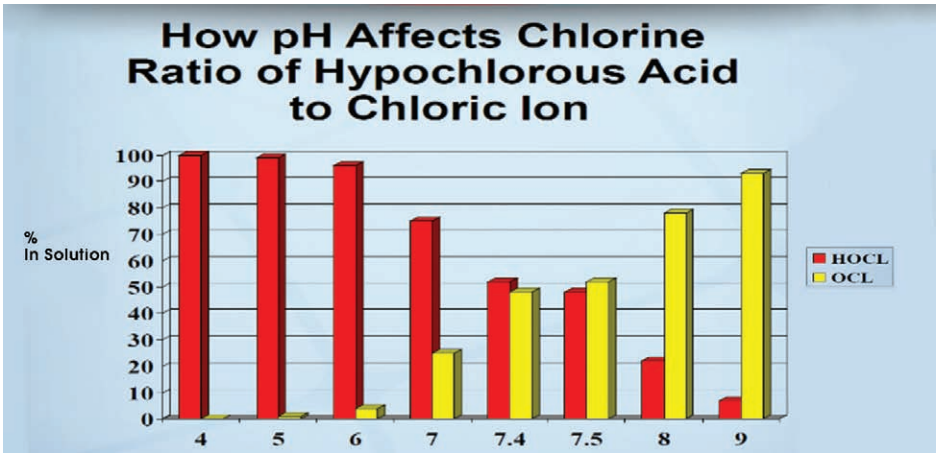

Fig. 4: pH dependent effectiveness of free chlorine

Conclusion

Poor water quality can lead to increased water microbial growth which impacts bird gut health and builds up biofilm inside the drinker pipeline. A regular sanitation program on farms will help to improve water quality. The microbial, chemical, and physical quality of water should be monitored regularly or periodically.

A good pipeline cleaning program should be in place to increase the shelf life of pipelines and to prevent the formation of biofilms. A water sanitation cum acidification protocol should be in place for improving the quality of water that has been provided to birds and for optimizing their gut health conditions. Selko pH when applied in the right dose in the drinking water of poultry, improves the overall bird performance and can serve as an effective product in antibiotic-free rearing practices as well.

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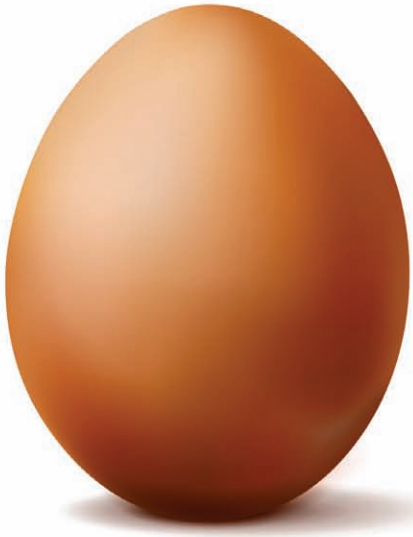

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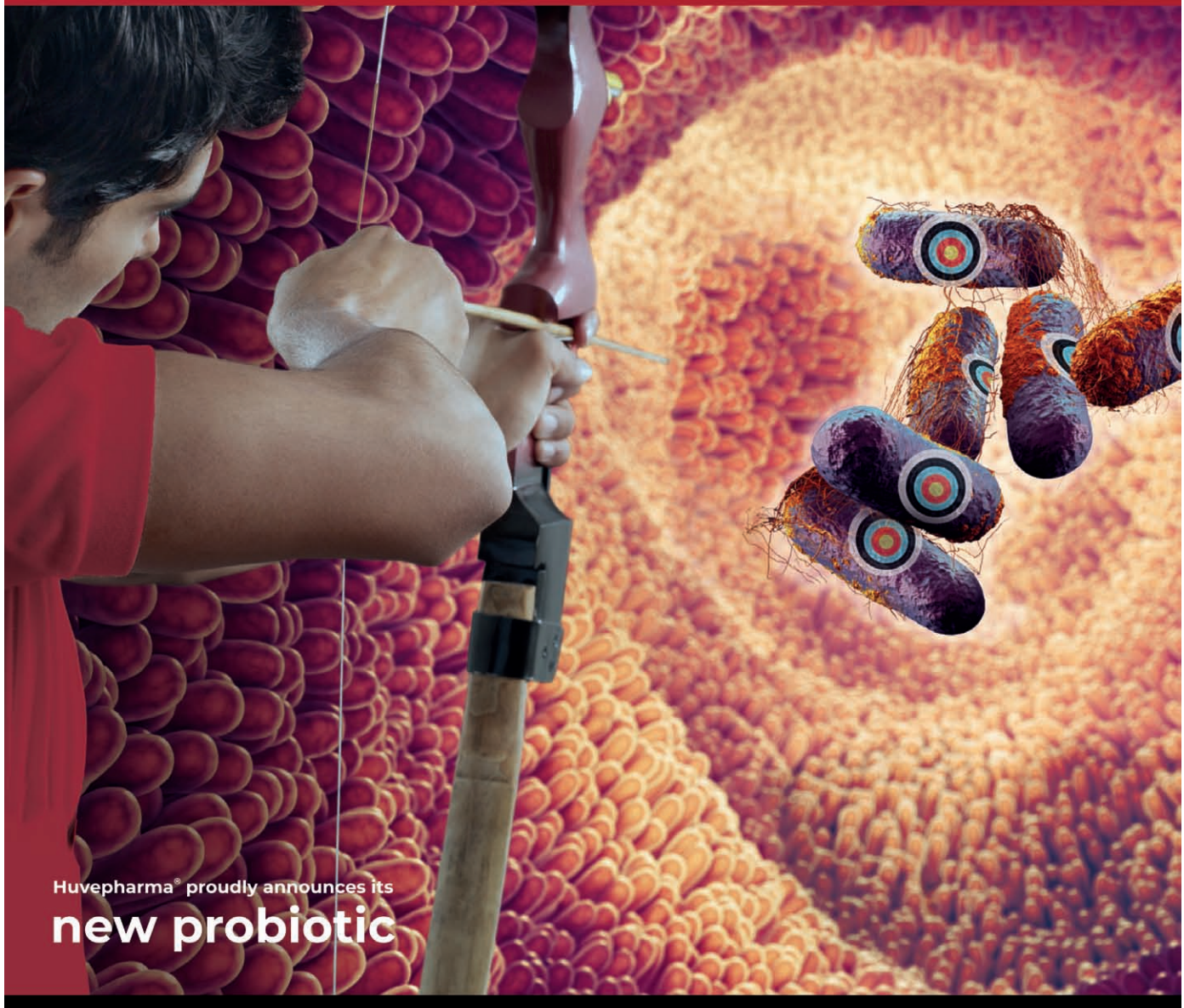

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Article

Managing Gut Health, A Multi-factorial Approach

Ben Dehaeck
DVM Global Product Manager - Anticoccidials
Wouter van Der Veken
Global Product Manager - Probiotics
Huvepharma

With the understanding of gut health growing every day, managing it properly has become more and more of a priority. One key point has been clear since the beginning: gut health is a complex multi-factorial concept, and as such improving and maintaining it requires a holistic approach. Luckily the tools to do so have evolved as well, and new methods emerge frequently.

Two major gut health issues are coccidiosis and necrotic enteritis (NE). Although caused by different pathogens, there definitely is an interaction between the two challenges: the presence of coccidiosis is often an important predisposing factor for the development of NE. Because of this link, it is very likely that the current rise of NE problems in the field is linked to suboptimal coccidiosis control. The practical implication is that both challenges should be dealt with at the same time. However, monitoring the actual coccidiosis pressure is difficult and a challenge in itself. It is, therefore, crucial to have a good and validated coccidiosis control programme in place, including the use of anticoccidials and product rotation in order to maintain their efficacy.

The mentioned coccidiosis program above ties in with having a good NE control program, of which supporting gut integrity and its microbiota is a crucial part. With this goal in mind, probiotics form an interesting tool to achieve this, especially as the pressure on the use of classic antimicrobials is increasing. Depending on the strain selected, these viable beneficial bacteria are able to influence the gut and its microbiota in multiple ways.

An example of this is minimising the risk of pathogens, such as Clostridium perfringens. A well-known probiotic to do so is B-Act, which has proven its efficacy under many different conditions. The probiotic recently obtained an extension to its current European approval for use in broilers and pre-laying birds, by adding turkeys and minor avian species to the list of registered species. The specific Bacillus licheniformis strain in B-Act has a unique mode of action, based on the concept of competitive exclusion. This goes a lot wider than just competition for space and nutrients - even though Bacillus spp. are often only given credit for this. For example, its capacity to produce antimicrobial compounds should not be neglected. This unique mode of action allows the probiotic to mitigate Clostridium perfringens challenges efficiently, which would have otherwise led to severe NE and dysbacteriosis. Keeping this and the possibility to combine the probiotic with chemical anticoccidials as Coyden (Clopidol), Coxiril (Diclazuril) in mind gives B-Act a competitive advantage, especially in those situations where producers might worry about not applying ionophores.

Approaching gut health and its management as a multi-factorial challenge and dealing with it in a similar fashion is the way forward. This includes using multiple products to work on the same challenge from different perspectives, ensuring various aspects of general gut health effectively.

The well-known probiotic B-Act recently obtained an extension to its current European approval for use in broilers and pre-laying birds, by adding turkeys and minor avian species to the list of registered species.

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Article

Minimise Downgrades During Slaughter and Defeathering

Kate Jørgensen
Head of Marketing, Poultry
BAADER

Ensuring product quality throughout the slaughter and defeathering process is essential for preserving profits and maintaining a strong brand position. Any damage to the carcass can result in costly downgrades and yield losses.

Effective Stunning to Achieve Immediate Unconsciousness

To achieve high carcass quality, it is crucial to handle live birds correctly, taking animal welfare into consideration. Utilising highly efficient stunning equipment is essential to render birds unconscious and insensitive to pain before slaughter. Whether employing electrical water-bath stunning or Controlled Atmosphere Stunning (CAS), the goal is to provide a fast and humane stunning process. The BAADER Water Stunner 032 is designed to ensure high stunning efficiency and animal welfare. The birds' heads will drop into the electrified water bath where they are immediately stunned. By achieving an optimal relationship between current, voltage and resistance, the system induces immediate unconsciousness.

Effective electrical water-bath stunning *Picture Courtesy: Baader*

As an alternative to electrical water-bath stunning, the use of CAS is gaining popularity worldwide to enhance animal welfare and meat quality. With CAS, birds are stunned while still in their transport equipment and exposed to gas mixtures that induce an anaesthetic state. This process ensures the animals are unconscious and do not experience pain during shackling and slaughtering.

From a commercial standpoint, the main driving force behind CAS adoption is its quality benefits. By eliminating live shackling and thus reducing pre-slaughter stress, CAS helps minimise the risk of value loss. Stress-induced wing flapping can lead to wing haemorrhages and dislocations, resulting in downgrades and yield loss. Many damages associated with electrical water-bath stunning, such as internal bleeding in breast fillets, tenders and inner thighs are mitigated or eliminated through CAS processing.

To meet the increasing demand, BAADER offers two CAS systems: above and below ground. Both systems effectively stun the birds and control the induction phase to minimise animal discomfort.

In the CAS Pit System, full drawers are gradually lowered into a pit. With each descent, the CO_2 concentration progressively increases, facilitating a gentle and controlled stunning process.

The Above Ground CAS features a dual-lane tunnel internally segmented into five chambers. Birds remain in their drawers throughout the system, with each chamber gradually exposing them to elevated CO_2 levels. During the induction phase, the system introduces oxygen (O_2) and clean dry air into the atmosphere, ensuring birds perceive the air as non-threatening and reducing the feeling of breathlessness, thus maintaining their calmness until rendered unconscious.

Unconscious birds are easier to shackle and experience no stress or discomfort *Picture Courtesy: Baader*

Highly Adjustable Equipment Protects Quality

To guarantee the highest quality, all slaughter and defeathering equipment should be easily adjustable. This flexibility allows

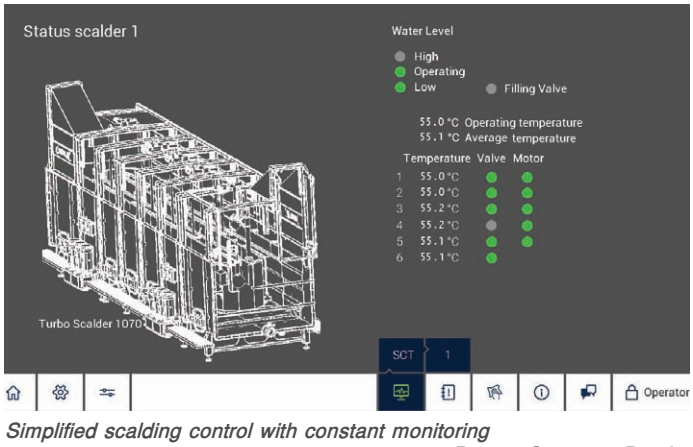
for precise control over processing times, machine setup, and product positioning, leading to accurate processing and increased profit margins.

Recently, BAADER introduced the Killing Machine 2320, which offers multiple adjustment possibilities. This feature enables processors to fine-tune neck positioning and cutting, thereby reducing the risk of costly miss-cuts. The machine design is optimised to maximise bleed-out and ensure quick brain death, regardless of flock size or line speed.

The BAADER Killing Machine 2320 offers a variety of adjustment options *Picture Courtesy: Baader*

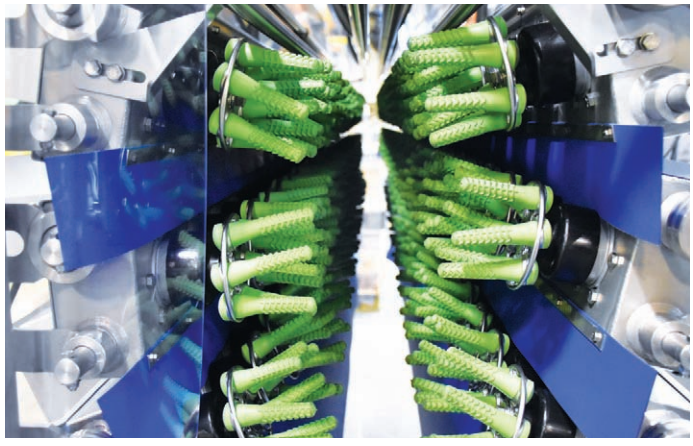
Maintaining an easily adjustable temperature control is vital for an effective scalding process. When preparing poultry for defeathering, achieving the optimal water temperature is crucial to remove feathers without causing damage to the skin or compromising the final product's quality.

Adjustable temperature control allows for precise regulation of the scalding water, considering factors such as stunning method, feather characteristics, local market requirements, and processing conditions. The flexibility and easy access to scalding setup enable processors to adapt to different products, ensuring an optimal scalding environment at all times. BAADER Turbo Scalder 1070 and Air Jet Scalder 1050 are both equipped with touch panels to maintain control of the scalding process, including water level and temperature control. Additionally, a timer function allows for programming daily production.



Simplified scalding control with constant monitoring *Picture Courtesy: Baader*

Adjustability also plays a crucial role in effective picking. The BAADER Tunnel Picker 284 offers multiple adjustment features to ensure optimal picking performance while preserving product quality. Each picking row can be individually angled, and picking banks can be adjusted in terms of height and separation, allowing the picking fingers to follow the bird's shape. Configuring various picking machines on the line enables different targeting approaches as picking progresses. This high degree of targeted picking also allows for dry picking.



The Tunnel Picker 284 is equipped with multiple adjustment features to best target the picking process *Picture Courtesy: Baader*

The Importance of Picking Fingers

The condition of picking fingers is vital for efficient feather removal. Regular inspection and replacement of rubber fingers are necessary to maintain effectiveness. It is recommended to conduct daily checks and replacements to avoid compromising the picking process. Striking a balance between old and new fingers is important to achieve the desired results. Worn-out or broken rubber fingers not only reduce picking efficiency but also create a favourable environment for bacterial growth. Promptly replacing damaged fingers is essential to prevent bacterial contamination and uphold high hygiene standards.

Poultry processing facilities can ensure an efficient and hygienic picking process by prioritising the use of quality rubber fingers. Specially designed rubber fingers with wavy ridges, such as the Rubber Finger WAVE, facilitate multi-directional feather contact during picking, resulting in effective feather removal. Furthermore, the rubber's special formula ensures long-lasting durability, providing optimal performance over an extended period.

Wavy ridges on the rubber fingers optimize the picking process *Picture Courtesy: Baader*

Partner Up with BAADER

Considering the complexities of the slaughter and defeathering process, investing in equipment and solutions that prioritise animal welfare, product quality, and overall efficiency is crucial.

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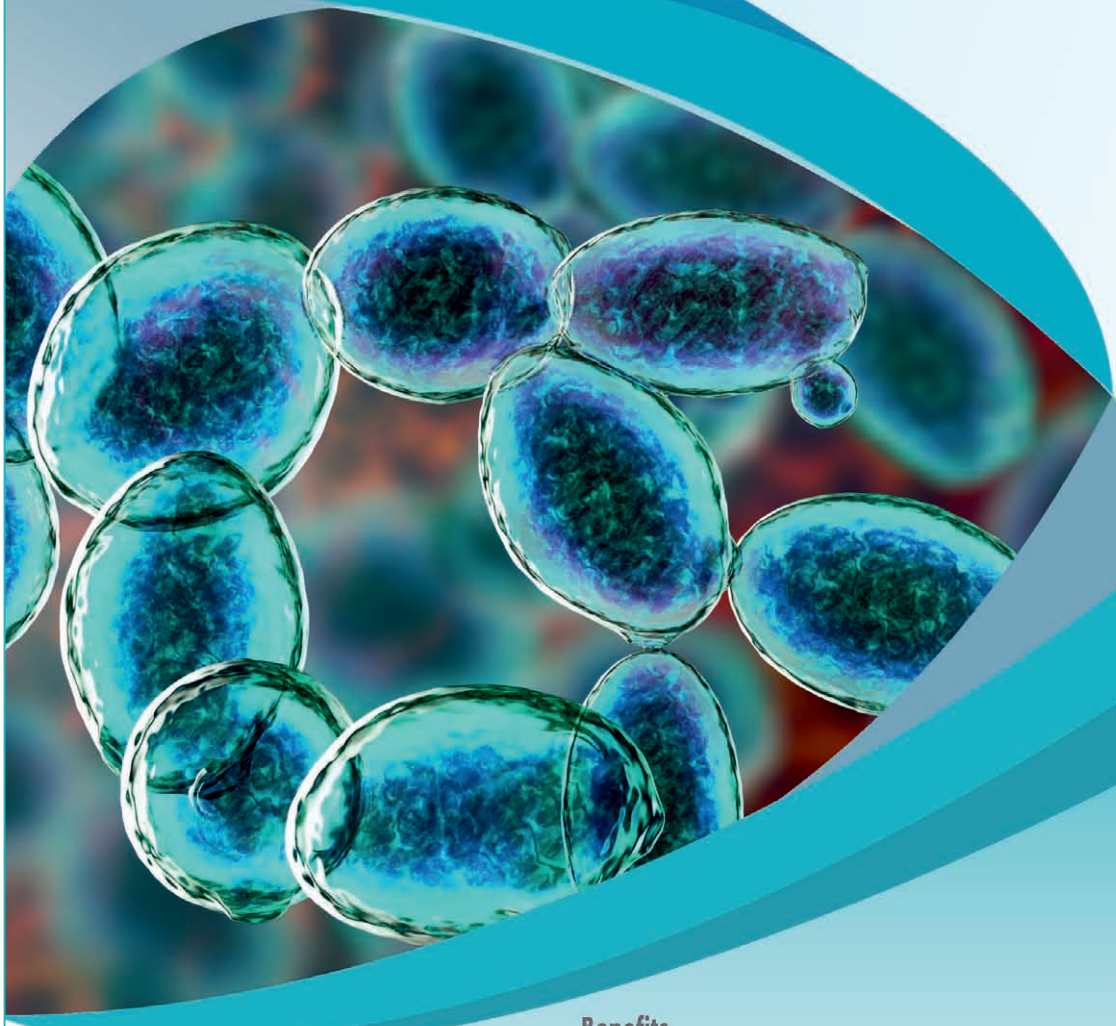

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COVER

FUTURE APPLICATIONS OF 'OMICS' TECHNOLOGY

Omics technologies has innovated analytical workflows to provide quantitative proteomics and metabolomics analyses with supreme throughput accuracy. Expert researchers from Belgium and **Prof. (Dr.) R.N. Sreenivas Gowda** lead us through a promising journey to show how this technology can be successfully used in poultry health and productivity

The increasing global demand for poultry products, together with the growing consumer concerns related to bird health and welfare, pose a significant challenge to the poultry industry. The poultry industry is increasingly implementing novel technologies to optimise and enhance bird welfare and productivity. This review on omics technologies in poultry health and productivity highlights the implementation of specific diagnostic biomarkers based on omics-research in the poultry industry, as well as the potential integration of multi-omics in future poultry production.

A general discussion of the use of multiple omics technologies in poultry research, approaches focusing on one or more omics type are widely used in poultry research, but the implementation of these omics techniques in poultry production is not expected in the near future. However, great potential lies in the development of diagnostic tests based on disease – or gut health – specific biomarkers, which are identified through omics research. As the cost of omics technologies is rapidly decreasing, implementation of multi-omics measurements in routine poultry monitoring systems might be feasible in the more distant future. Therefore, the opportunities, challenges and requirements to enable the integration of multi-omics-based monitoring of bird health and productivity in future poultry production are under discussion.

Introduction

Omics aims at the collective characterisation and quantification of pools of biological molecules that translate into the structure, function, and dynamics of an organism or organisms. 'Omics technology' is the analysis of molecules including genes, transcripts, and proteins. Omics technologies has innovated analytical workflows to provide quantitative proteomics and metabolomics analyses with supreme throughput accuracy. Thanks to this technology, it is now possible to detect not only qualitative but also quantitative levels of multiple genes, transcripts, and proteins simultaneously. Furthermore, owing to the improved sensitivity, specificity, and accuracy of the technology, key biomarkers for disease prediction can be identified much faster.

The present and future applications of omics technologies are not only for the identification of specific diagnostic biomarkers, but also for potential future integration in the daily monitoring of poultry production.

Definition

The term "omics" refers to a pool of technologies that are used to measure and functionally characterise different biomolecules in cells or tissues. The primary aim of "omics" technologies is to study genes (genomics), RNAs (transcriptomics), proteins (proteomics), and metabolites (metabolomics).

Approaches based on omics technologies are particularly used in poultry research in the hunt for genetic markers of economically important phenotypical traits in the host, and in the identification of key bacterial species or functions in the intestinal microbiome.

The omics approach is particularly helpful since it identifies biomarkers of disease progression and treatment progress by collective characterisation and quantification of pools of biological molecules within and among the various types of cells.

Overall, the objective of omics sciences is to identify, characterise, and quantify all biological molecules that are involved in the structure, function, and dynamics of a cell, tissue, or organism.

Who invented omics?

It is indeed interesting to discern that there is little history of how genomics and proteomics came into being, which started the era of omics. The word genomics was first coined by Dr. Thomas H. Roderick, a geneticist at the Jackson Laboratory, Bar Harbor, ME, in 1986.

What are the other branches of omics?

The branches of science known informally as omics are various disciplines in biology whose names ending in the suffix– omics such as genomics, proteomics metagenomics, phenomics and transcriptomics and many more.

What are the four major omics used in poultry disease diagnosis?
There are four omics technologies; genomics, proteomics, transcriptomics, metabolomics.

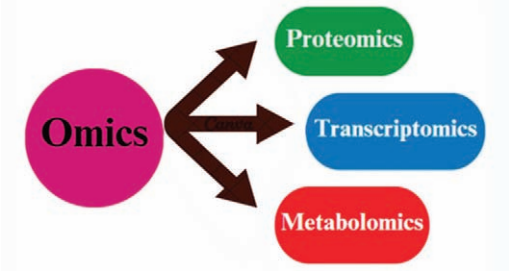


Fig1. A schematic illusion diagram of the omics techniques (proteomics, transcriptomics, and metabolomics) that are commonly applied in biological samples.

1. Genomics, the study of genes, is making it possible to predict, diagnose, and treat diseases more precisely than ever. Early diagnosis of a disease can significantly increase the chances of successful treatment, and genomics can detect a disease long before symptoms present themselves.

Further, whole-genome selection is the newest tool being proposed to the poultry breeding industry for improvement of animal agricultural species. The principle is that the multiple genetic components that affect traits of interest are scattered across the genome. Genomic selection is the future of livestock breeding companies; it improves the genetic gain by decreasing genetic interval and improving reliability. Further research is required to improve the accuracy of genomic estimated value and manage long-term genetic gain. Knowledge of genes conferring disease resistance can be used in selective breeding programmes or to develop vaccines which help to control the effects of these pathogens.

2. Proteomics is the analysis of the entire set of proteins in cells, tissues, fluids or an organism at a certain time and under defined conditions that involves the large-scale study of proteins, their physiological roles, or functions. Proteomics technology is a promising method for disease-related biomarker identification in biological fluids, including urine, plasma, and serum. Body fluid samplings are less invasive and have low-cost advantages for proteomics research. Proteomics is to investigate protein biomarkers related to chicken meat quality and safety traits. Proteomics can identify disease biomarkers and vaccine candidates for economically important diseases of livestock and fish in aquaculture, as well as play a major role in species authentication to reassure consumers of food products on supermarket shelves

3. Transcriptomics- because the state of the transcriptome in a given diseased tissue may contain a highly accurate representation of key biological phenomena, patterns of gene expression have potential to provide insights into disease mechanisms and also to identify markers useful for diagnostic, prognostic, and therapeutic purposes. By sequencing RNA molecules present in a tissue (e.g., blood), transcriptomics enables the analysis of splicing variants, fostering a new era of insights. Thus, we can achieve more precise diagnoses leading to personalised treatments, tailored to each patient's unique molecular profile.

4. Metabolomics is defined as the study of the entire set of metabolites within a cell/tissue/organelle following a specific cellular process. Metabolomics can pave the way for a deeper understanding of existing and novel biochemical indicators responsible for determining the quality of poultry meat and eggs. This approach holds the potential to enhance the overall quality of poultry meat and egg products while also preventing food fraud. Metabolomics approaches and their utilisation in evaluating metabolic changes in biological fluids that occur in response to viral infections. Useful in differential diagnosis of various viral respiratory diseases of poultry.

All the above techniques are made use of in accurate disease diagnosis.

Application areas of multi-omics analysis

The omics-based technologies (e.g., genomics, transcriptomics, proteomics and metagenomics) have revolutionised the diagnostics of microbial contamination of food, feed, and beverages.

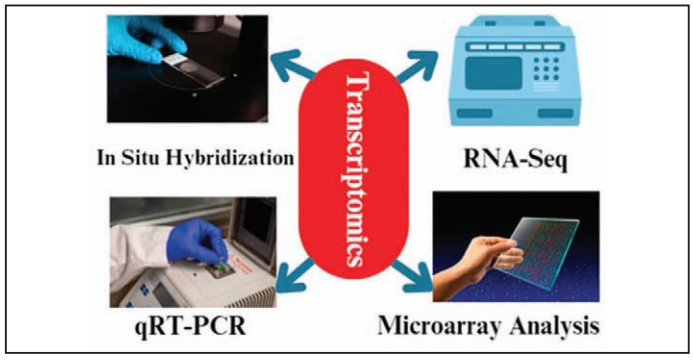


Fig. 2. The different methodologies used during transcriptomics analysis. The most comm on techniques are qRT-PCR and RNA-Seq. In addition, microarray analysis and in situ hybridisation techniques are used for transcriptomics analysis.

Approaches based on omics technologies are particularly used in poultry research in the hunt for genetic markers of economically important phenotypical traits in the host, and in the identification of key bacterial species or functions in the intestinal microbiome. Integrative multi-omics analyses, however, are still scarce. Host physiology is investigated via genomics together with transcriptomics, proteomics and metabolomics techniques, to understand more accurately complex production traits such as disease resistance and fertility. The gut microbiota, as a key player in chicken productivity and health, is also a main subject of such studies, investigating the association between its composition (16S rRNA gene sequencing) or function (metagenomics, metatranscriptomics, metaproteomics, metabolomics) and host phenotypes. Applications of these technologies in the study of other host-associated microbiota and other host characteristics are still in their infancy.

Conclusion

In biology, molecular terms with the suffix "-omics" refer to disciplines aiming at the collective characterisation of pools of molecules derived from different layers (DNA, RNA, proteins, metabolites) of living organisms using high-throughput technologies. Such omics analyses have been widely implemented in poultry research in recent years. Poultry industry is increasingly implementing novel technologies to optimise and enhance bird welfare and productivity. The potential integration of multi-omics is the future of poultry production. It is widely used in identification of a causative agent and disease diagnosis accurately. The future contribution to the advancement of poultry health and productivity lies not only in the new insights in poultry physiology and pathology, which are directly derived from the implementation of these tools, but also in the discovery of new biomarkers for specific clinically and economically important physiological and pathological conditions in the birds.

Prof. R. N. Sreenivas Gowda
Former & Founder Vice Chancellor, Karnataka Veterinary, Animal And Fisheries Sciences University, (KVAFSU) Bidar, Bangalore. Former Director, Institute of Animal Health & Veterinary Biologicals, Bangalore. Former Professor and University Head, Dept. of Pathology, Veterinary College, UAS, Bangalore.

Future Applications in the Poultry Industry

Introduction

Poultry meat and egg production are characterised by a continuous increase in the size of the operations at all levels of the production chain, from the feed mills over the layer and broiler farms, to the abattoirs and the processing plants. In the production units, larger numbers of highly productive birds allow for an increase the efficacy of the operations. At the same time, however, the evolution of ever-increasing performance holds a higher risk of failures due to metabolic disorders in the highly productive birds and due to the fact that endemic and epidemic infectious diseases may cause more damage. Therefore, the poultry industry is embracing and implementing new technologies. Now, chicken houses can be equipped with cameras registering the movements of the birds, and numerous sensors are available for monitoring the environment, feed and drinking water. Such systems can provide indirect information on the health status of the birds. Direct information, however, still comes from regular inspection of the birds and laboratory analyses of samples taken from the birds by the farm veterinarian. It has become a standard practice to sacrifice some birds for necropsy and scoring of lesions in the intestinal tract, air sacs, breast muscles and skeleton at regular timepoints during the production cycle. Unfortunately, such lesion scoring can detect a disease state only when it is already advanced. Therefore, the industry is looking for methods that allow early detection of disease, even before macroscopic signs of disease are present. The development of these methods is in large part based on systems to monitor chicken-related parameters such as bird behaviour, body temperature or sound, as well as on omics-derived research. The hope is that early detection will allow timely interventions, steering towards better performance. Therefore, this two-part review focusses on the current use and future applications of omics technologies in poultry health and productivity.

Implementation of omics-based biomarkers in poultry production

Improving bird performance and disease resistance are key issues in the poultry industry. To date, approaches focusing on one or more omics types are widely used in poultry research, but the implementation of these omics techniques in poultry production is not expected in the near future for a number of reasons. Indeed, today, omics approaches are still too complex, expensive and time-consuming to be implemented directly in commercial poultry production. However, with exponentially advancing technological improvements, the cost of omics technologies is rapidly decreasing and current fourth-generation sequencing approaches already allow real-time, on-site sequencing at relatively low cost (Feng et al., 2015; Theuns et al., 2018). Additionally, the complexity of the data analysis and interpretation is for major concern. Omics technologies typically yield "big data", containing information on all molecules (e.g. host and bacterial genes, proteins and metabolites) present in the sample, which complicates data interpretation. For example, the identification of all microorganisms in a clinical sample results in an enumeration of all microbial taxa present in that sample, which has little to no diagnostic value. Furthermore, this approach might lead to incidental findings of potentially pathogenic microorganisms which pose no clinically significant risk. Without other clinical data and expertise in interpreting those datasets, there is a high risk of over-interpretation and unnecessary treatment of flocks. To overcome the issue of data complexity, many research groups are currently using omics research to identify biomarkers for different pathological facets linked to reduced gut heath (e.g. inflammation, gut leakage, bacterial or parasite infection) (Chen et al., 2015; Ducatelle et al., 2018; Goossens et al., 2018; De Meyer et al., 2019; Dal Pont et al., 2021). These biomarkers can be measured in either the faeces or the blood, and easy and fast diagnostic tests, such as lateral flow assays or ELISAs, have the potential to be readily implemented in the routine health monitoring practices in poultry production. For the majority of these biomarkers, it will, however, not be possible to set a universal threshold value discriminating between healthy and diseased birds, since most of these biomarkers will show a continuum ranging from birds in optimal health to the poorest birds in the flock. Probably, a baseline measurement per farm, house or even production cycle will be necessary.

Commercial chicks are hatched in a clean environment without contact with the parent birds, and transfer of the microbiota from the hen to the chicks by direct contact does not occur. Therefore, environmental factors have a large effect on microbiome development of the newly hatched chicks, and large variations in the gut microbiome between flocks and production cycles are observed (Stanley et al., 2013, 2016; Kers et al., 2018, 2019; Kubasova et al., 2019; Rychlik, 2020; Bindari& Gerber, 2022).

Furthermore, the gut microbiome not only regulates the intestinal physiological homeostasis but also has systematic effects that steer bird resistance towards environmental and infectious stressors (Kogut, 2019). Altogether, there is a lot of variability in microbiome composition, host molecular signals (such as protein or metabolite abundances), gut physiological parameters (e.g. intestinal villus height, crypt depth, or inflammatory T-cell infiltration) and bird performance between farms and between successive flocks (Kers et al., 2018, 2019; Van Limbergen et al., 2020; Ringenier et al., 2021; authors' unpublished data).

When comparing the host or microbiome characteristics of different farms, it seems that these parameters are not necessarily associated with inter-farm or inter-flock differences in bird performance. However, within each flock, various host and microbiome parameters are significantly linked to the occurrence of intestinal disturbances or variations in bird performance. One example is the measurement of faecal ovotransferrin, which can be used as a biomarker for intestinal damage and inflammation (Goossens et al., 2018). When comparing the faecal ovotransferrin measurements between different experimental trials, a significant difference in baseline ovotransferrin levels of healthy birds is observed. However, within each trial, the experimental challenge results in a significant deviation from the baseline measurement, which is positively correlated with the macroscopically scored disease severity (Goossens et al., 2018). Therefore, longitudinal non-invasive monitoring is important to establish flock-specific baseline values for (gut) health status-specific biomarkers, and to alert veterinarian or the farmer when deviations from the baseline are detected.

Moving forward in the era of precision livestock farming: towards the integration of multi-omics data in poultry production

The increasing global demand in poultry, together with the growing consumer concerns related to bird health and

welfare, pose a significant challenge to the poultry industry. Therefore, the poultry industry is increasingly implementing novel technologies to optimise and enhance bird welfare and productivity., such as precision livestock farming (PLF). The goal of PLF is to support farmers in livestock management by monitoring animal productivity, environmental impacts, as well as health and welfare. The power of PLF is based on automatic acquisition, access and processing of data from diverse sources to create an automatic management system (Sassi et al., 2016). In order to do so, the data are analysed by machine learning algorithms to generate predictions or risk assessment models. These modeling techniques are essential to interpret data from real-time monitoring devices, in order to develop control systems or to establish risk alerts (Sassi et al.,, 2016). As such, PLF techniques can adopt a farm-specific application that goes beyond a "one size fits all" approach, and as soon as the data deviate from the expected flock curve, the user can be alerted via connected devices (e.g. phones, computers, or tablets). This allows the farmer to detect and react to health issues at an early stage, thereby improving animal welfare and productivity (Sassi et al., 2016; Astill et al., 2018; Schillings et al.,, 2021). However, up till now, highly trained data specialists are still needed to perform high-level data analysis and accurate risk assessment.

Currently, different systems, such as sensors, cameras or microphones, are already employed in the poultry industry to monitor environmental parameters such as air temperature, humidity, ventilation, CO2% and ammonia levels, as well as systems to monitor chicken-related parameters such as feed and water uptake, body temperature and behaviour, amongst others (for reviews on PLF see Sassi et al., 2016; Schillings et al., 2021). These systems permit real-time monitoring of the production conditions and birds in a relatively simple and efficient manner, at an affordable cost.

Moreover, small implantable biosensors can provide detailed, individual, real-time data on various biometric parameters such as body temperature, heart rate or activity, as well as the measurement of specific biomolecules such as glucose, lactate or ATP (Wiedmeyer&DeClue, 2008; Koenig et al., 2016; Lee et al., 2016; Neethirajan, 2017; Reynolds et al.,2018; Rios et al., 2020). The integration of biosensors in PLF systems increases the ability to detect the onset of disease at an early stage, even before clinical signs occur. Even if individual monitoring of all birds is economically unfeasible for the poultry industry, biosensor-derived health data from a fraction of the birds, combined with the aforementioned parameters measured at the flock level, might provide valuable data on the flock health status.

The great potential of PLF relies on early warning, which allows farmers to take action in the initial stages of welfare problems or diseases. However, although these systems can inform the farmer about the health status of the birds, and even have the potential to detect signs of disease (Astill et al., 2018; Li et al., 2020), they are not specific enough to provide a diagnosis of complex multifactorial diseases such as dysbiosis, necrotic enteritis or bacterial chondronecrosis with osteomyelitis and lameness, all diseases that pose a significant burden on modern poultry industry. Currently, these diseases are diagnosed through routine necropsy of some birds at regular timepoints during the production cycle. As this diagnosis relies on the scoring of macroscopic lesions, only more advanced stages of the disease are detected. In order to minimise loss of bird performance and improve bird welfare, there is an urgent need for methods to detect early stages of the diseases, even before clinical signs occur. This is where the implementation of multi-omics approaches has great potential to advance poultry production. Indeed, the pathogenesis of complex, multifactorial diseases involves several cascades of events, that occur at various omics layers (e.g. microbiome, metabolome, host proteome and gene expression), either triggered or not by environmental changes. Given the complex, multifactorial nature of some important diseases challenging the modern poultry industry, together with the above described inter-flock variability in host and microbiome parameters, the development of robust, disease-specific biomarkers is not straightforward, and multi-omics approaches might be needed to identify discriminatory multi-omics signatures lined to each disease.

Previous research in human medicine has highlighted the potential of integrative analysis of longitudinal multi-omics data combined with non-omics clinical data for health assessment and predictions. The first study dates back to 2013, where longitudinal multi-omics monitoring of a single person resulted in the identification of temporal deviations in pathway expression levels that were consistent with disease status and progression (Stanberry et al., 2013). This concept was further expanded to a larger patient cohort to derive predictive models for long-term health monitoring that allow early interventions and treatment decisions for glycemic responses, cardiovascular health, infectious diseases and oncology (Zeevi et al., 2015; Kellogg et al., 2018; Piening et al., 2018; Oliver et al., 2019; Schüssler-Fiorenza Rose et al., 2019). These studies clearly illustrate the potential for predictive models based on multi-omics and clinical data.

Despite the great potential of multi-omics approaches in early detection, implementation of omics in clinical practice is non-existing in livestock production or veterinary medicine. It is also still in its infancy in human medicine, with only anecdotal usage in human oncology (John et al., 2020; D'Adamo et al., 2021). Hurdles to be taken before the implementation of these approaches are related to integration of these large omics datasets in an effective, practical way, and even more importantly, to the lack of large, publicly available, multi-omics datasets. Multi-omics approaches yield large datasets with significant heterogeneity, making it impossible to analyze these datasets with traditional statistical techniques. Over the last decade, artificial intelligence and machine learning techniques have become promising methods in multi-omics data analysis and have significantly improved the ability to monitor "big datasets" from multiple sources (D'Adamo et al., 2021; Kang et al., 2022). However, before machine learning models can be used in a clinical setting, these algorithms need to be trained and validated by using large amounts of data, after which these models can be used to perform risk assessments and disease

diagnoses based on new data (Wu et al., 2021). To date, the necessary datasets to train these models are not available.

To advance poultry health and productivity by implementation of multi-omics approaches in PLF, research should focus on the characterisation of integrated multi-omics disease signatures. In a first step, experimental models can be used to generate well-organised, structured datasets that link multi-omics measurements to specific diseases. In order to translate these multi-omics signatures to the practical conditions in the field, further research should focus on the longitudinal monitoring of birds in commercial poultry houses. In such longitudinal monitoring, each flock serves as its own control, thereby solving the problem of inter-flock variability. Data derived from continuous, real-time monitoring of environmental conditions should be supplemented with multi-omics measurements at specific pre-defined timepoints. In order to obtain a holistic profile of the bird's health status, these multi-omics measurements should target both the host and its microbiome. Whenever the real-time monitoring system detects an increased risk of disease onset (e.g. drop in water or feed intake), daily multi-omics sampling should be performed, combined with thorough veterinary examination to diagnose diseases. Such longitudinal datasets that combine environmental measurements, multi-omics data and detailed veterinary diagnoses, are essential to identify integrated signatures specific for complex diseases. Furthermore, the longitudinal sampling enables study of the transition between health and disease. These datasets can be used to train and validate decision models to be implemented in current PLF technologies. The resulting monitoring approaches should alert the farmer, not only on onset of disease, but also provide a disease diagnosis, which allows targeted timely interventions by the farmer or the veterinarian (Figure 1). However, to date, the development of such monitoring systems is still hampered by both the cost of the analyses and the lack of reference databases to train the decision models.

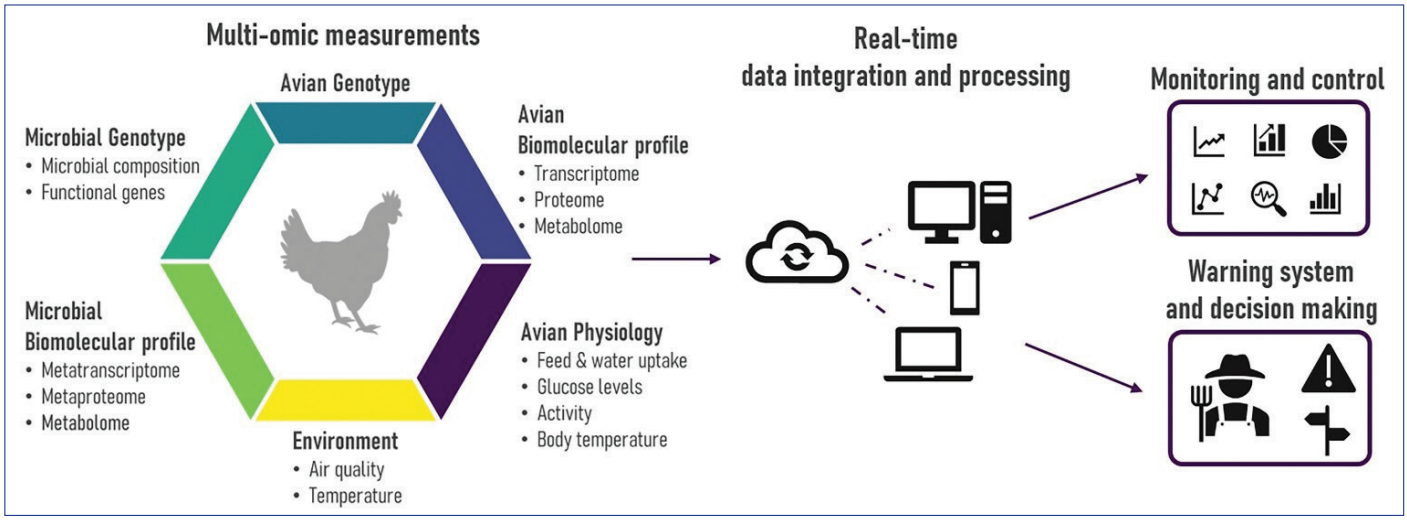


Figure 1: Overview of future integration of multi-omics measurements in precision livestock farming (PLF) technologies. Omics measures can target both the avian host and its microbiome. The type of omics analysis can target various biological layers, such as the (meta-) genome, (meta-) transcriptome, (meta-) proteome or the metabolome. These multi-omics measurements should be complemented with continuous monitoring of both avian physiological parameters and environmental measurements. All these data are integrated and processed in real-time using machine learning techniques and can be accessed from a mobile device such as a smartphone, tablet or computer. As such, the farmer can monitor the flock's status and will be alerted when an increased risk is detected. Furthermore, by using longitudinal monitoring, each flock serves as its own control, thereby solving the problem of inter-flock variability

Conclusion

Roughly every decade a new set of revolutionary research tools is discovered and further developed into techniques that give completely new insights in major research questions. Some of these research tools further evolve into routine analytical techniques that are widely implemented in the daily routine of medical and veterinary diagnostics. Others remain research tools. Omics technologies are not expected to be implemented directly in poultry production or veterinary diagnostics in the very short-term because they do not fulfill all of the criteria that need to be met to make the move to the routine labs. These criteria include, amongst others, speed, accuracy, specificity, low cost, easy scaling-up and a clear cut-off (an ideal cut-off would mean that there is no overlap between the healthy and the diseased population).

As research tools, however, omics technologies are already proving to be extremely valuable, and this value will only grow in years to come. Their future contribution to the advancement of poultry health and productivity lies not only in the new insights in poultry physiology and pathology, which are directly derived from the implementation of these tools, but also in the discovery of new biomarkers for specific clinically and economically important physiological and pathological conditions in the birds. The latter strategy is already delivering its first successes, including biomarkers for intestinal health based on, for example, host proteins that can be detected in faeces (Goossens et al., 2018; De Meyer et al., 2019; Giannuzzi et al., 2021). One may speculate that further future developments may be expected from the integration of longitudinal multi-omics monitoring into the sensor-based machine learning strategies of precision live stock farming.

Authors:
Evy Goossens, Tessa Dehau, Richard Ducatelle& Filip Van Immerseel
Livestock Gut Health Team (LiGHT) Ghent, Department of Pathology, Pharmacology and Zoological Medicine, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium

Disclosure statement

E. Goossens, R. Ducatelle and F. Van Immerseel are listed as coinventors on a patent describing the use of acute-phase proteins as marker for intestinal barrier failure: "In vitro method to detect intestinal barrier failure in animals" (International Publication Number [WO2019166531A1]). E. Goossens, R. Ducatelle and F. Van Immerseel are listed as coinventors on the patent "Intestinal and fecal biomarkers for intestinal health of poultry" (International Publication Number [WO2019206585A1]). F. Van Immerseel is listed as a coinventor on the patent "Intestinal biomarkers for gut health in domesticated birds" (International Publication Number [WO2020205841A1]). All references on request

Article

Comparative Study of Single and Multi-Protease Enzymes on Commercial Broiler Performance

Dr. Bharat L Sadarao, Dr. Sushant Labh, Dr. Partha Das and **Dr. Venket Shelke**
Kemin Industries South Asia Pvt. Ltd., Chennai

Introduction

In contemporary broiler diets, protein is the second-most essential and most costly nutrient, mainly supplied from maize and soybean meal and other sources[5]. Although corn and soybean meals are highly digestible, the presence of anti-nutritional factors (ANFs), such as trypsin inhibitors, lectins, and non-starch polysaccharides (NSPs), are not easily digested by birds, particularly during the starter period[20,7,10]. Due to this, a sizeable portion of protein (18–20%) bypasses the digestive system without being fully absorbed and digested[3,4]. As a result, the use of protease enzyme products in poultry diets, such as exogenous proteases, has gained momentum to improve the general performance of animals and birds[10]. However, the gastrointestinal tract (GIT) has a wide range of pH, from the very acidic proventriculus environment to the somewhat neutral environment of the small intestine to the alkaline environment in the large intestine. Proteases, like other enzymes, are pH-specific, and this wide pH range compromises the one-size-fits-all approach[19]. This warrants the use of a combination of proteases, which can act efficiently on such a wide pH range.

Several studies have been conducted on the effects of mono-component protease in broiler chickens[3,11,12,14,13,9,23] but very few on multi-component protease[27,6]. The current study aims to compare the effects of two exogenous protease enzymes, one single protease, and the other multi-protease, on performance parameters like body weight, feed conversion ratio (FCR), mortality rate, European efficiency factor (EEF), and economic returns in commercial broilers. Kemin has developed a new multi-protease compound named KEMZYME Protease Dry. KEMZYME Protease Dry has an innovative stable coating that protects it from heat denaturation during the feed pelleting process and provides gastric stability in the intestinal tract of birds at different pH conditions[15].

Protease Enzyme

Proteases are enzymes that break down protein molecules into the amino acids and peptides needed by animals and is an important factor in protein digestion as they hydrolyse the less digestible proteins in animal feeds and break them down into more usable peptides (Figure 1). Naturally, endogenous proteases are released in the stomach/gizzard and duodenum of the animal. Exogenous proteases, however, are frequently added as a supplement to feed to improve digestion and address the less readily digestible proteinaceous components, particularly in young animals with immature digestive systems. The impact of proteases, which is pH dependent, is a crucial factor in these circumstances since not all endogenous or exogenous proteases will be active at every part of the gastrointestinal tract (GIT) (Figure 2) [17,16].

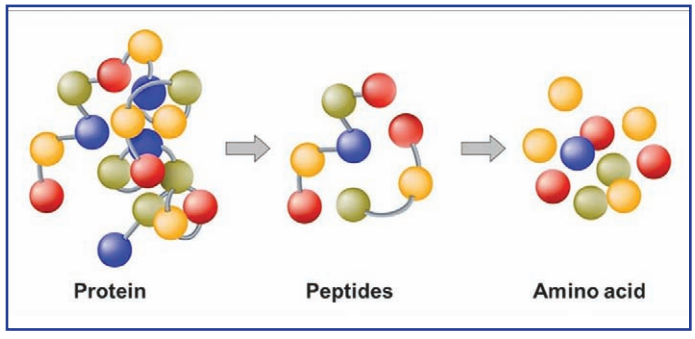


Fig. 1: Protease enzyme mode of action[16]

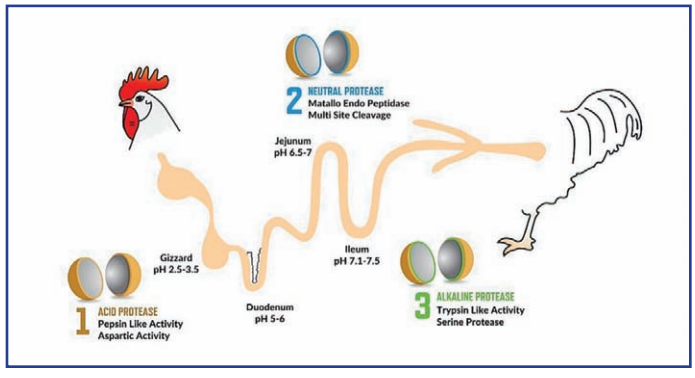


Fig. 2: Action of different proteases along the GIT[16]

KEMZYME Protease Dry

KEMZYME Protease is an innovative, patented (nr patent US 8,815,315 B2) combination of 3 different, coated proteases: an acidic, neutral, and alkaline one, produced respectively from Aspergillus niger, Bacillus subtilis, and Bacillus licheniformis. It provides broad enzyme activity on a variety of substrates, across the GIT, maximising protein digestibility while significantly reducing feed cost through feed reformulation following its nutritional matrix. The acid protease has a heat-stable coating and works in the proventriculus and gizzard at a pH of 2.5-3.5, which breaks down the protein into easily digestible peptides and amino acids. The neutral protease both has a heat stable and a gastric stable coating, to ensure optimal activity to further boost up protein digestion in the duodenum and jejunum at a pH 6.5-7. The alkaline protease also has a heat-stable and gastric-stable coating, aimed to act primarily in the ileum at pH 7.2-7.8, which further breaks down protein and

polypeptides into digestible amino acids. Figures 3, 4 & 5 show the mode of action of KEMZYME Protease at different pH along with the electron microscopic scan and schematic diagram of targeted release in GIT[17,16].

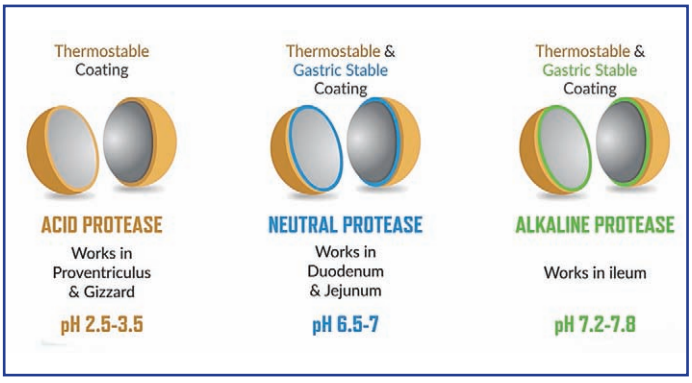


Fig. 3: KEMZYME Protease coating and activity at different pH in GIT[16]

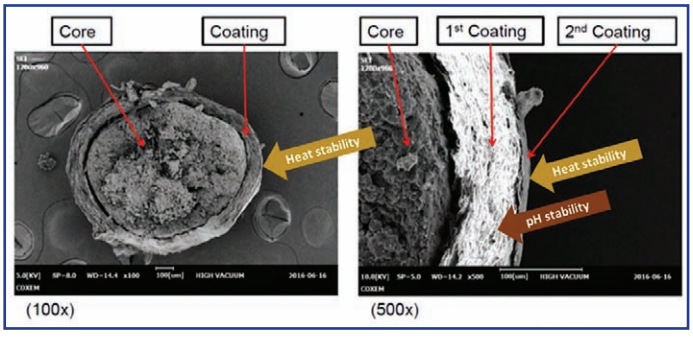


Fig. 4: Electron microscope scan of an enzyme granule within Protease[16]

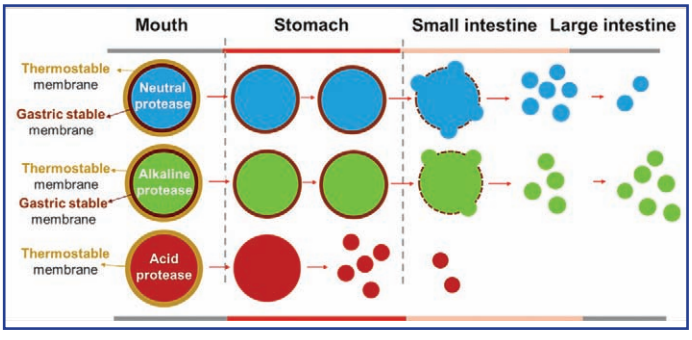


Fig. 5: KEMZYME Protease - A targeted delivery of activity[16]

Materials and Methods

Birds, housing, and management

The trial was conducted at a commercial broiler farm facility in the western part of India. A total number of 8,03,185 one-day-old Vencobb 430Y broiler chicks of mixed sex were used in this trial. The broiler chicks were randomly classified into 2 groups, viz. control, and treatment, with 9 branches in each group, and the trial lasted for 42 days (Table 1). The broiler birds were reared in an open-sided poultry house having a mud floor covered with a 2-inch layer of rice husk as bedding material. All birds were systematically vaccinated against Newcastle disease and Gumboro disease, and other needed prophylactic measures. Each group was provided with round bottom feeders while water supply was made available round the clock through a manual drinking system. All birds were reared under identical management conditions throughout the experiment.

Table 1: Number of chick placements in control and treatment groups

Branch	Chicks Placement	
	Control	Treatment
BRANCH – 1	59,671	61,835
BRANCH – 2	80,140	88,795
BRANCH – 3	37,262	49,375
BRANCH – 4	63,962	52,302
BRANCH – 5	30,553	24,041
BRANCH – 6	74,737	15,504
BRANCH – 7	36,215	38,994
BRANCH – 8	37,580	21,509
BRANCH – 9	26,795	3,915
Total Birds	**4,46,915**	**3,56,270**

Feeding Programe

All the birds were provided with a pellet-form diet in 4 dietary phases (Table 2): pre-starter (1 to 11 days), starter (12 to 22 days), finisher 1 (23 to 35 days), and finisher 2 (36 to 42 days). A corn-soya bean meal diet was used, to formulate the basal diet and to achieve the optimal nutrient requirements as per industry recommendation (Table 3). The control and treatment diet corresponds to the basal diet containing a single protease enzyme (Cysteine protease) and multi-protease enzyme complex (KEMZYME Protease Dry), respectively, added on top of the feed at a dose of 300 grams per metric ton, implying that no enzyme nutritional matrix was included in the ration calculation (Table 2). However, the dose of a single protease enzyme (Cysteine protease) is 250g/MT of feed as recommended by the company. Feed cost was measured by calculating raw material costs.

Table 2: Details of experimental groups and dosage levels

Groups	Description
Control	Basal diet with on-top Single Protease Enzyme@ 300g/MT of feed against the standard dose of 250g/MT as recommended by the company.
Treatment	Basal diet with on-top Multi-Protease Enzyme (KEMZYME® Protease Dry) @ 300g/MT of feed as recommended by the company.

Table 3: Ingredients and calculated nutrient composition of the experimental diets

Raw Ingredients/ Medicines	Pre-Starter (Kg/MT)	Starter (Kg/MT)	Finisher 1 (Kg/MT)	Finisher 2 (Kg/MT)
Maize	470	476	480	505
Soybean Meal	335	285	261	230
Meat and Bone Meal (MBM)	25	30	30	30
Maize Gluten Meal	30	40	40	40
Broken Rice	100	130	150	150
Crude Soybean Oil	6	10	15	22
Di-Calcium Phosphate (DCP)	6.20	3.00	1.50	1.20
Calcite	6.80	5.00	4.20	4.00
Sodium Bicarbonate	2.50	2.30	2.10	2.10
L-Lysine	3.50	3.70	3.50	3.40
DL-Methionine (98.5 %)	3.20	2.80	2.50	2.20
Salt	2.50	2.50	2.30	2.20
L- Threonine	1.00	1.00	1.00	1.00
Choline Chloride (60%)	1.00	1.00	1.00	1.00
Acidifier 1	1.00	1.00	0.00	0.00
Acidifier 2	0.00	0.00	1.00	1.00
Toxin binder	1.00	1.00	1.00	1.00
Anti-Mycoplasma	1.00	1.00	0.00	0.00
Organic Trace Mineral	0.70	0.70	0.50	0.50
NSP Enzyme	0.10	0.10	0.10	0.10
Protease Enzyme	0.30	0.30	0.30	0.30
Betaine HCl	0.50	0.50	0.50	0.50
AGP 1	0.50	0.50	0.50	0.50
AGP 2	0.13	0.13	0.13	0.13
Vitamin Premix	0.60	0.60	0.50	0.50
Liver Powder	0.60	0.60	0.50	0.50
Anti-coccidian	0.50	0.50	0.50	0.50
Chromium & Vitamin C	0.20	0.20	0.20	0.20
Antioxidant	0.15	0.15	0.15	0.15
Phytase	0.20	0.20	0.20	0.20
Haloquinoline	0.20	0.20	0.20	0.20
Total Feed (Kg)	1000	1000	1000	1000
Cost per kg feed (INR)	39.34	38.81	38.10	38.07
Average Feed Cost per Kg (INR)	38.58			
Nutrient Composition of the Diet				
Metabolizable Energy (Kcal/kg)	2950	3030	3110	3170
Crude Protein (%)	23.00	21.90	20.70	19.70
Digestible Lysine (%)	1.35	1.25	1.17	1.10
Chloride (%)	0.90	0.83	0.78	0.74
Available Phosphorous (%)	0.48	0.44	0.42	0.41
Sodium (%)	0.20	0.20	0.19	0.18
Chloride (%)	0.27	0.26	0.25	0.24
Crude Fiber (%)	3.30	3.20	3.10	3.00
Ether Extract (%)	4.00	4.30	5.00	6.00

Parameters Measured

Performance parameters such as body weight (BW), feed intake (FI), feed conversion ratio (FCR), corrected feed conversion ratio (CFCR), European Efficiency Factor (EEF)*, Cost of Production (COP), and mortality rate were recorded and compared, the Return on Investment (ROI) from the groups were calculated after 42 days.

*EEF= (Livability ×Average weight)/ (Mean Age × FCR) ×100

Statistical Analysis

Statistical analysis of the data for performance parameters was done using Stat-graphics Centurion XVI.II software. Data were analysed by one-way ANOVA with confidence limits set at 95%. The results were reported as the mean ± standard error (SE). A P-value of ≥0.05 was considered statistically non-significant.

Results

The performance data of commercial broilers fed with control and treatment diets containing a single protease and a multi-protease, respectively, were presented in Table 4. No significant differences (P≥0.05) were observed among the groups in any of the measured performance parameters. However, it was noticed that the inclusion of multi-protease enzyme (KEMZYME Protease Dry) in the treatment group had a positive impact on final body weight (BW), feed conversion ratio (FCR), mortality percentage, and European efficiency factor (EEF), changes comparing with control groups where it showed a numerical increase in all above performance parameters. Similarly, a lower cost of production (CoP) was observed in the treatment group than in the control group. Calculation of economic benefits revealed that the addition of KEMZYME Protease Dry in the treatment group diet delivered a return on investment (RoI) of 4:1 over the control group (Table 5).

Table 4: Effects of protease enzyme on broiler chicks' growth performance (n= 18)

Parameters	Mean ± Standard error		
	Control	Treatment	P-Value
BW	2.84 ± 0.045a	2.85 ± 0.042a	0.911
FCR	1.62 ± 0.014a	1.61 ± 0.01a	0.638
CFCR	1.41 ± 0.013a	1.4 ± 0.016a	0.689
Mortality	5.02 ± 0.229a	4.74 ± 0.225a	0.639
EEF	385.23 ± 4.525a	389.33 ± 5.078a	0.568

[a]Data within a row with the same superscripts is not significantly different (P≥0.05).

Body Weight and FCR

Final body weight (BW) and FCR were not affected by the on-top supplementation of any protease mixes in the basal diet during the trial period of 42 days (Figures 6 and 7).

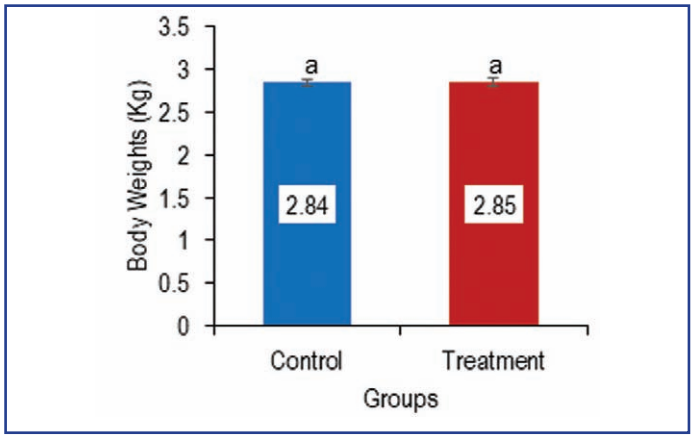


Fig. 6: BW in trial groups

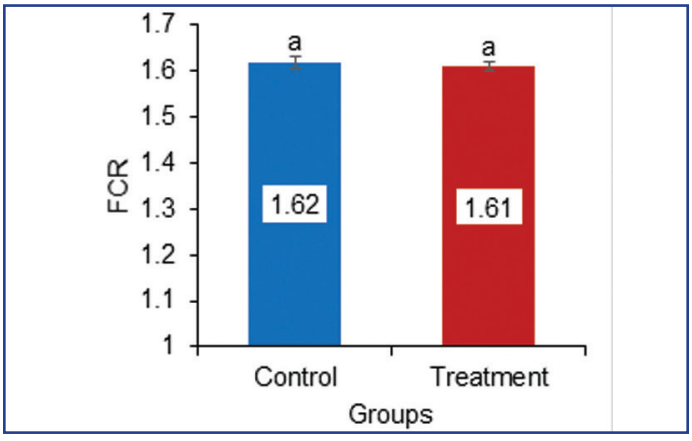


Fig. 7: FCR in trial groups

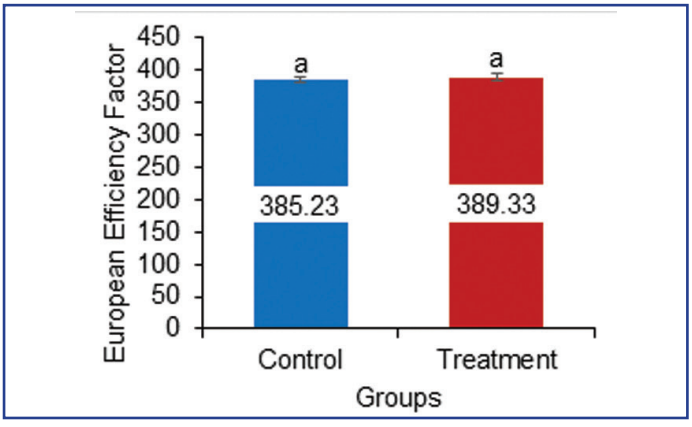


Fig. 8: EEF in trial groups

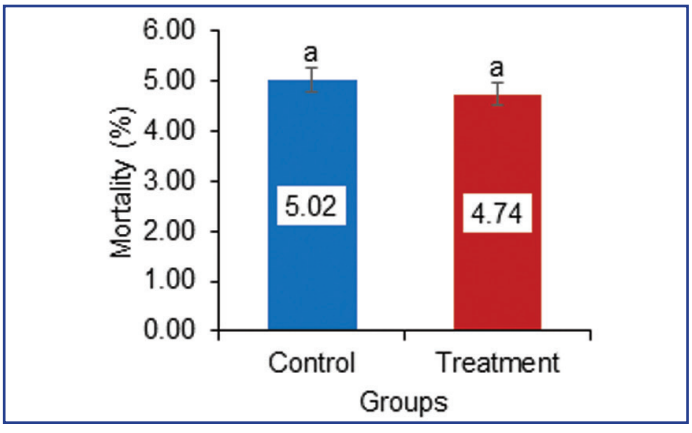


Fig. 9: Mortality % in trial groups

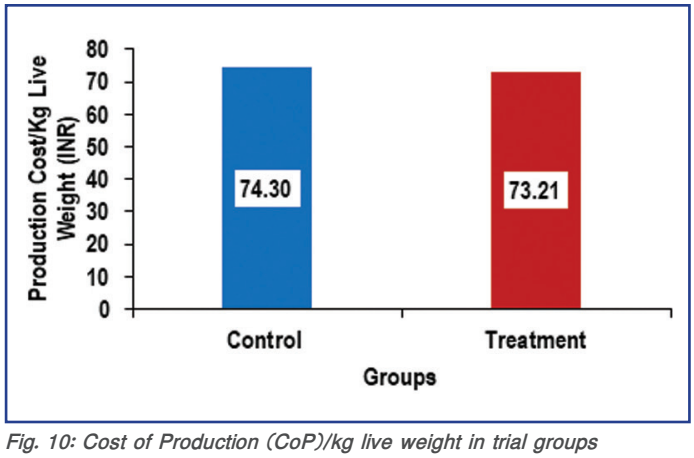


Fig. 10: Cost of Production (CoP)/kg live weight in trial groups

EEF and Mortality:

The European efficiency factor (EEF) was observed to be 4 points higher in the KEMZYME Protease Dry treated group compared to the control group (Figure 8). The treatment group observed a lowered mortality of 0.29% than the control group, but the difference was not statistically significant (Figure 9).

In economic terms, the cost of production expressed per kilogram of live broiler weight was lower by 1 rupee 9 paise (INR 1.09) in broilers fed the treatment group diet than in the control group, which demonstrated a return on investment (ROI) of 4:1 in favor of treatment group (Figure 10 and Table 5).

Table 5: Economic calculations and return on investment (ROI) details

Parameters	Control	Treatment
Number of birds	356270	446915
Mortality (Number)	18899	21597
Trial Period (Days)	43.30	43.33
Cull Birds (Number)	1134.00	1399.00
Livability (%)	94.38	94.85
Final Body Weight (Kg)	2.844	2.851
Feed Conversion Ratio (FCR)	1.62	1.61
CFCR	1.41	1.40
Avg. Feed Cost (INR)	38.58	38.58
Chick Cost (INR)	30	30
Total Birds Sold	336237	423919
Total Live Weight Sold (Kg)	949802	1207083
Total Feed Consumed (Kg)	1552250	1943100
Production Cost/Kg Live Weight (INR)	74.30	73.21
Live Weight Price Per Kg (INR)	95	95
Live Weight Per MT of Feed (Kg)	611.89	621.22
Gross Income Per MT of Feed (INR)	58129.29	59015.43
Net Income Per MT of Feed (INR)	19552.18	20438.32
Extra Income Per MT of Feed (INR)		886.14
Product Inclusion Cost Per MT (INR)		225
Return On Investment		3.94

Discussion

The performance parameters, including body weight, feed conversion ratio, European efficiency factor, and livability, were not significantly different ($P \geq 0.05$) between treatments. However, numerically improved body weight, FCR, EEF, and livability were recorded in the treatment group supplemented with multi-protease enzyme KEMZYME Protease Dry. However, a single protease enzyme (cysteine protease) supplementation has been observed to have inconsistent performance results in the control group compared to the treatment group.

Many of the earlier experiments have shown benefits in growth performance from dietary protease supplementation using multi-protease complexes rather than single proteases or mono-component proteases. They noticed that the variations in broiler performance are consistent with the effect of the multi-protease complex on the bird's capacity to better utilise ingested nutrients from the partially digestible substrates present in the feed ingredients through enhanced nutrient digestibility in terms of energy, amino acids, and nitrogen[26,18,2,22,8,21]. However, despite improvements in apparent ileal digestibility, a set of trials evaluating the supplementation of mono-component protease enzymes such as acidic, neutral, alkaline, and keratinase proteases, among others, failed to produce beneficial effects on

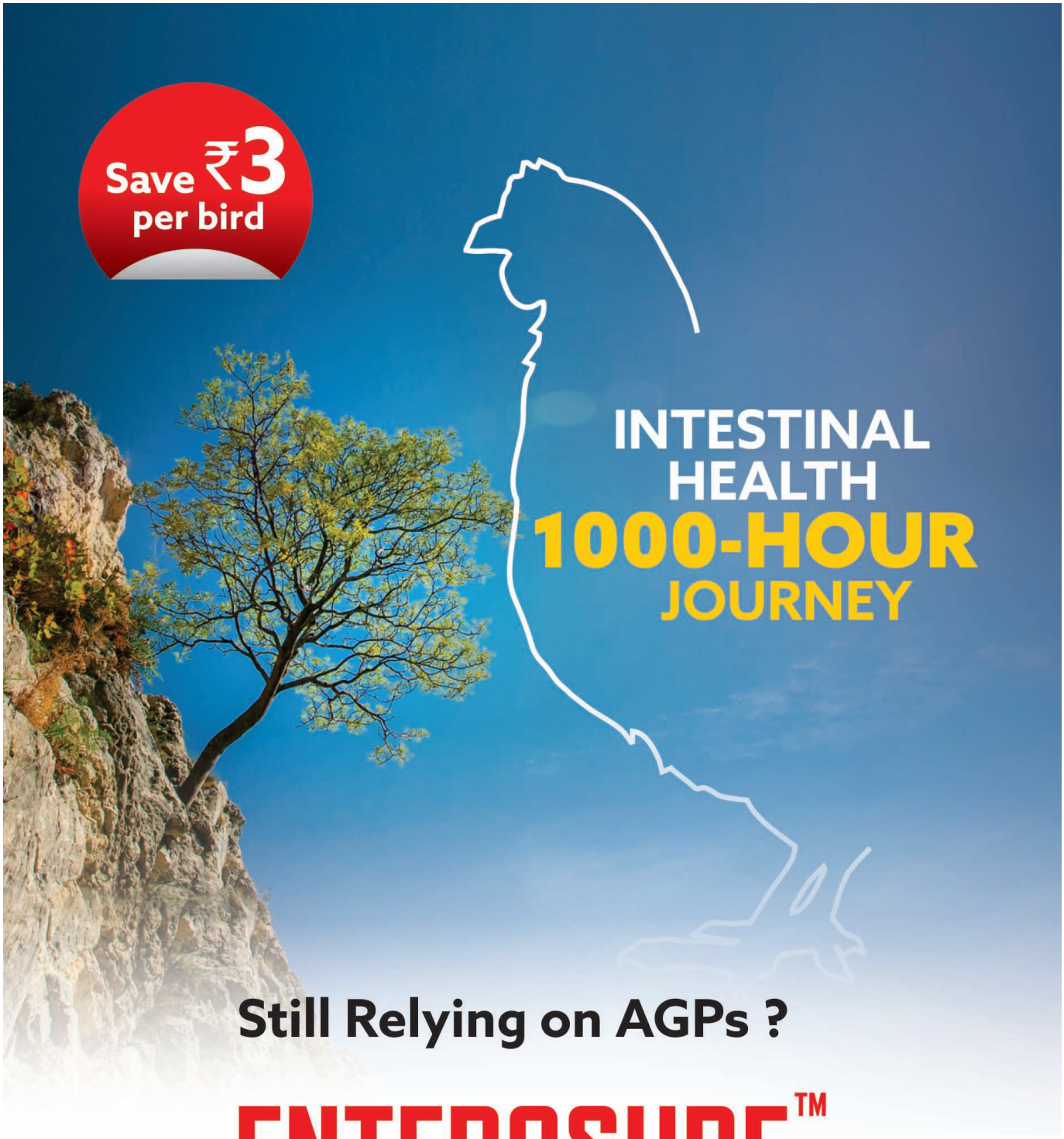
poultry growth performance due to decreases in the intake of digestible amino acids (AID)[28,24,25]. Similarly, Zheng et al., 2023 and Wealleans et al., 2023 in their experiment observed that the addition of mono-component proteases with a more limited pH range was not able to achieve the same performance improvements[26,28].

Therefore, while supplementing animal feed with protease enzymes, the manufacturers, source, type, features, dosage, activity, quality, ability, and specificity should all be carefully taken into account[1,28,24]. A holistic protease solution like KEMZYME Protease Dry used adequately and appropriately, enhances protein utilisation in poultry by facilitating protein digestion, followed by higher amino acid absorption. This will reduce production costs and result in a profit opportunity for broiler producers.

Conclusion

It was concluded that the supplementation of a multi-protease complex (KEMZYME Protease Dry) in a standard broiler basal diet from day one till liquidation age had a positive role in improvements in overall production performance than the single protease enzyme. The current study also revealed that broilers fed with multi-protease diets showed higher European efficiency factor (EEF), better livability, and lowest broiler production costs, which could be attributed to generating a better return on investment (RoI) of 4:1 than the control group supplemented with a single protease enzyme. The usage of the multi-protease complex in the present study may create an opportunity for commercial poultry producers to optimise production costs while maintaining the performance of their birds and increasing their profitability.

(References are available upon request)



Still Relying on AGPs ?

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Feed Safety Culture is Not a "One Size Fits All" Proposition

Sarwar Ali
Deputy General Manager – Sales & Marketing
Immeureka Animal Health Private Limited

Every feed miller in today's global feed industry, no matter how small or large, adheres to some degree of feed safety practices. Most of these practices have maintained a safe feed production and supply for many years and will continue to do so. It is widely recognised that feed safety standards are important since a significant portion of feed production is being integrated both vertically and horizontally. Despite this, the market is still complex and fragmented, requiring more than written rules, regulatory oversight, and feed safety practices.

To ensure feed safety, it is necessary to strengthen collaboration between stakeholders, share information, and develop innovative solutions. Additionally, it is important to invest in the necessary infrastructure to ensure that feed safety is maintained. Creating a safe and sustainable supply of feed requires more than just formal regulations; it is essential to understand the company's culture as well.

Unlike the rule, culture draws its power from the people, from the unspoken to the intuitive, from simple to complex observation, and from beliefs as fundamental as "This is the right thing to do" and "We would never do this." Rules state facts; culture lives through the human experience. A positive culture of feed safety can be developed and maintained by feed millers regardless of the size of their operations.

A feed safety culture can be defined as the shared values, beliefs, and norms that influence organisational mindset and behaviour toward feed safety. Industry professionals can foster a positive culture of feed safety within their respective organisations. Experts from different segments of the feed industry will contribute their experiences and perspectives to this important discussion.

Emphasis can be placed on following:

1. Leadership and management play an important role throughout an organisation, from the CEO to the feed mill operator and from the feed distributor to the farm manager
2. The importance of regular communication, education, metrics, teamwork, and personal accountability in advancing feed safety for the future
3. In addition to learning new skills, adaptability is an essential component of ensuring that a safe feed practice is carried out in real time

A table like the following can help foster culture change from both top-down and bottom-up perspectives in the feed safety culture maturation process.While these qualities can be developed naturally within a supportive and positive culture, they also require conscious investment, strategic oversight and a commitment to continuous improvement.

Five Dimensions & Critical Component of Feed Safety

Mission	People	Consistency	Adaptability	Risk
✓ Business Structure	✓ Stakeholders	✓ Accountability	✓ Industry Expectation	✓ Information & Education
✓ Direction & Expectation	✓ Communication	✓Performance Management	✓ Agility	✓Engagement
✓ Messaging	✓ Rewards & Incentives	✓ Documentation	✓ Crisis Management	✓Verify Hazard & Risk

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Article

The Great Month of October

A Symphony of World Food Day and World Egg Day

"I'm so glad I live in a world where there are Octobers." The quote from Canadian author LM Montgomery's celebrated book Anne of Green Gables should gladden the hearts of all closely associated with the food sector, for in the month of October- a month ushering in the Fall, a time perfect for focusing on dreams and goals- we celebrate two of the most significant events related to food, one after the other: World Food Day on 16th October, preceded by the World Egg Day on the second Friday of the month which happened to be 11th October.

"Right to foods for a better life and a better future" is the theme of this year's World Food Day. Please note, food has been expressed as a plural "foods". The FAO explains this curious expression thus, ""Foods' stands for diversity, nutrition, affordability, and safety. A greater diversity of nutritious foods should be available in our fields, in our markets, and on our tables, for the benefit of all."

Complementing this thematic statement emphasising the right to 'foods' and recognising their immense diversity is the simple yet powerful theme of World Egg Day 2024: "United by Eggs". Isn't it wonderful that the amazing egg, in the global quest of food and nutritional security, has the potential to connect and unite people from all corners of the world. The International Egg Commission explains, "eggs can be found in cuisines across our planet's cultures and countries, showcasing their universal appeal and essential role in global nutrition."

The right to adequate food, as a universal human right, is enshrined in the 1966 International Covenant on Economic, Social and Cultural Rights (ICESCR). It is interlinked with other essential rights, such as the right to health, water, education, and life itself. The right to food is legally binding for 172 countries under the ICESCR, requiring them to take concrete steps to prevent hunger and achieve food security and nutrition. States hold the primary responsibility for respecting, protecting, and fulfilling this right. This includes ensuring that people have the means to produce and procure food that is "nutritious, free from harmful substances, and culturally acceptable." In brief, the universally recognised and accepted right binds the states to ensure a) everyone has access to sufficient, safe, and nutritious food to live with dignity; b) social inclusion addressing inequalities, and empowering marginalised communities; c) a human rights-based approach that encourages participation, accountability, non-discrimination, human dignity and empowerment; and d) a future where the right to food is guaranteed reducing the risk of food crises caused by diverse factors such as political instability, climate change, and economic shocks.

"The world's farmers produce enough food to feed more than the global population yet, hunger persists," admits the FAO, "a specialised agency of the United Nations that leads international efforts to defeat hunger." The goal of this "specialised agency" is described as "to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives." The World Food Day commemorates the establishment of FAO on 16th October 1945 in Quebec, Canada during the first session of the United Nations. 75 years have gone by and the FAO evaluates the state of food and nutrition in the world informing us that "around 733 million people are facing hunger in the world." This hunger is further characterised, quite tragically as "acute and chronic." The reasons may be many, from the vagaries of the weather to conflicts to economic downturns, yet it points towards a collective failure of the global community and the inter-governmental institutions, such as the FAO. The magnitude of the problem is further exacerbated when we find that hunger "impacts the poor and vulnerable most severely, many of whom are agricultural households, reflecting widening inequalities across and within countries."

If this state of affairs was not disturbing enough, "over 2.8 billion people in the world are unable to afford a healthy diet." Unhealthy diets are the leading cause of all forms of malnutrition- undernutrition, micronutrient deficiency and obesity. A staggering 43% of the world's population is afflicted by either hunger or malnutrition. Shouldn't it call for serious introspection leading to interventions that are effective rather than symbolic. We in India have to demonstrate greater purpose and intent in addressing the twin challenges of hunger and malnutrition as we hold a position way down near the bottom of the Global Hunger Index (GHI). India is placed at position number 105 in a list of 127 countries; our neighbours appear to have been more serious on this issue as their positions are: Sri Lanka 56, Nepal 68 and Bangladesh 84. Even if we were to legitimately question this ranking, the gravity of the problem cannot be undermined.

The silver lining, rather a golden sunny side up, against this grey backdrop is provided by the humble egg seeking to "unite" the world of food and nutrition. World Egg Day was established in Vienna in 1996 by the International

Egg Commission (IEC) to celebrate the power of the egg on the second Friday in October each year. Egg, a potent nutritious powerhouse, has fans around the world, hence it is an appropriate candidate to create a "united" world of food. While we are proclaiming the "right to food" for a "better life and better future", we had celebrated the incredible egg "for a healthy future" during the year gone by. Its nutritional power carries immense potential to combat common nutrient deficiencies across the world: the oval-shaped versatile egg contains as many as 13 essential nutrients in one small package; and the package is super yummy. Egg offers a solution, if not the whole at least a major part of what the FAO is looking for to combat malnutrition. The IEC gives us a cheerful dose of optimism on Egg Day, "as well as being an environmentally friendly animal protein source and their abundance of nutritional benefits, eggs have the power to bring people together. They can play a crucial role in fostering cross cultural understanding and promoting solidarity within communities across the world."

How about "Eggs for world peace and harmony" as the theme for the future World Egg Days? After all, for most of the cultures and beliefs around the world, the egg has been a symbol of the genesis of gods, the earth and life.

The key messages IEC aims to deliver during this year's World Egg Day are ambitious no doubt, yet they communicate the boundless power and energy of this awkward humpty-dumpty to foster a "united" world much beyond its quest for health and nutrition. IEC illustrates and articulates it convincingly in the following manner.

Egg offers a solution, if not the whole at least a major part of what the FAO is looking for to combat malnutrition

United in the pursuit of health: Eggs are nutrient dense, contributing to health, development and function of the body and brain. Eggs provide essential vitamins, minerals and high-quality protein which are vital for every stage of life. Eggs are widely available sources of high-quality protein, making them accessible to people across different socio-economic backgrounds, fostering unity in nutrition. Choosing eggs helps contribute to a healthier planet for all of us. Eggs require few resources and produce few greenhouse gas emissions. Eggs are a simple, versatile and complete source of nutrition.

Uniting people through tradition: Eggs are a universal food found in cuisines across cultures and continents, bringing people together through shared culinary traditions. Eggs play a central role in many cultural and religious festivals, highlighting their significance in bringing communities together.

Uniting families and supporting communities: Supporting local egg farmers boosts local economies and food security. This fosters a sense of unity and collective well-being within communities. Due to their outstanding versatility, eggs can be enjoyed as an ingredient or the centre of a dish, for any mealtime throughout the day. Nothing brings people together like the joy of a home-cooked meal, make sure to add an egg to amplify your nutrient intake."

"October Theory" trending on social media calls it a time of introspection, reflection and to set new goals. The twin days of food and egg this month should awaken the world to admit that "a hungry man is not a free man." And hence resolve to invest in the creation of a food secure and nutritious world.

What Would Happen if All the Cows were Suddenly Gone?

New documentary filmed in 40 global locations over three years explores the impact of cattle on economies, ecosystems, cultures and human nutrition

The official theatrical trailer has been released for "World Without Cows," a new documentary that examines the multifaceted and often surprising ways cattle impact our world. Through interviews with those on the frontlines of agriculture and environmental science, "World Without Cows" explores the cultural and economic significance of cows, their role in nourishing the world and their impact on climate.

This compelling exploration was led by Michelle Michael and Brandon Whitworth, two journalists who travel the world telling stories about agriculture. Three years ago, they set out on an adventure that took them to more than 40 locations around the world — from the American heartland to Kenya, India, Brazil and beyond — as they sought to answer a seemingly simple question, "Are we better off in a world without cows?"

Along the way, they tapped into a global network of agricultural and environmental scientists, farmers, ranchers, academics and other experts who offered an up-close look at the impact of cows on our world and the potential consequences of their removal. What they found was far from simple: When it comes to cows, it's not black and white. Humanity's reliance on cattle is more complex than often realised, and so, too, are the conversations at global and local levels about their role in enabling people and the planet to thrive.

"The resulting documentary, "World Without Cows", features a diverse group of experts who explore the impact of cattle from a cultural, social, economic, nutritional and environmental perspective.

The 85-minute documentary aims to broaden the conversation, encouraging viewers to think more deeply about how cattle impact our world and discover that there's much more to consider when it comes to cattle and the vitality of our planet.

One of the experts Michael and Whitworth consulted is Jack Bobo, a food futurist and director of the Food Systems Institute at the University of Nottingham.

"For 10,000 years, farmers and ranchers have been asked to do one thing, and that's produce more food," Bobo said. "We're adding a billion people every 11 or 12 years. The challenge is, every day between now and 2050, it gets harder to feed the world."

Justin Sherrard, a global strategist at Rabobank, estimates that about one in 10 people in the world depends on cattle for their livelihood directly— more than 800 million people. "Ultimately, we've got to address every part of the global foodsystem," he said.

Dr. John Lynch, a climatologist from the University of Oxford, said scaling down greenhouse gas emissions is urgently needed.

"What's the world going to look like in 30 or 40 years if we just carry on heating up the planet and making these more extreme events occur more often?" Lynch asked

"I think we could do a survey, and many people would say, yes, cows are the worst thing in the world for the climate," he continued. "Cows are not the biggest contributor to climate change. That's still fossil fuels."

Dr. Frank Mitloehner, a professor and air quality specialist who leads The CLEAR Center at the University of California, Davis, addresses global land availability, greenhouse gas emissions and the impact of cattle on climate.

"I'm not a person telling you livestock has no impact, or that it's a tiny impact," Mitloehner said. "Like every part of society, animal agriculture needs to do its part and help reduce our impact on climate. We can and we should do that. But we should not make up stories of these animals being responsible for the majority of emissions. They're not responsible for the majority of emissions."

Visit worldwithoutcows.com to view the official trailer. To learn more about the filmmakers' experiences and hear insights from their travels around the world, watch their behind-the-scenes video, "The Making of World Without Cows."

"World Without Cows" will be featured in two upcoming film festivals, the Twelve Lions Film Festival and the San Pedro International Film Festival.

INTERNATIONAL

Official Trailer

The Making of World Without Cows

Kamdhenu University and Qper India Pvt. Ltd. Sign MoU for Joint Research

Kamdhenu University (KU), a premier institute specialising in veterinary and animal sciences located in Gandhinagar, Gujarat, signed a Memorandum of Understanding (MoUon 26th September with QperIndia Pvt.Ltd. (QIPL), an Anand-based company focused on research and development of nutritional and non-nutritional solutions for poultry, ruminants, and fisheries. This MoU marks the beginning of a strategic partnership aimed at advancing research and innovation to enhance animal health and productivity through cost-effective solutions.

Dr. N.H. Kelwala, Vice-Chancellor of KU, highlighted that this collaboration with QIPL is a significant step toward fulfilling KU's commitment to advancing livestock research.

Samir Patel, Managing Director of QIPL, expressed his enthusiasm for the partnership, stating, "We are excited to partner with KU. This MoU will enable us to combine our technological expertise with the university's research capabilities, paving the way for innovative solutions contributing to better livestock management in India.

In the near future, Mr. Harsh Patel, Director of QIPL, will initiate several new research projects in collaboration with KU.

Poultry Farming Witnesses Massive Boom In Meghalaya

Poultry industry in Meghalaya has recently witnessed a boom. Due to the deficiency of poultry products in the state, many people have now taken up poultry farming as backyard farming, rearing the poultry to meet the family demands as well as for commercial business.

B.K.Mawthoh, Joint Director, Animal Husbandry and Veterinary Department, Meghalaya, said, "We need the help of the rural and small farmers to help us increase in the egg production. That's why we stressed maximum on backyard poultry farming where every farmer of the village can rear 15-20 birds in their backyard."

He said the department has introduced low input birds, especially broilers.

The farmers are now being pushed towards backyard poultry farming to increase the egg production.

"Our emphasis will be on how to increase egg production in the state to avoid importing poultry products from other states", he added.

The livestock mission also aims at improving the livelihood of the farmers. The farmers are being trained on rearing the layer, broiler and turkey poultry as well as on hatching program. Domestic birds of many kinds, like chickens, turkeys, ducks and geese are reared because of the eggs and tender meat.

According to the state officials, there is sufficient amount of chicken meat but the sector lags behind in production of eggs.

Punjab's Most Innovative Livestock Farmers Receive Chief Minister's Awards

Three of Punjab's most innovative livestock farmers have been named in the Guru Angad Dev Veterinary and Animal Sciences University's Chief Minister's Award list this year, recognising their significant contributions to the state's agricultural sector.

Among the awardees is a farmer producing 350,000 broilers annually, a dairy farmer using artificial intelligence (AI) to manage his herd of 145 cattle, and another entrepreneur who processes 618 tonnes of dressed chicken and 49 tonnes of ready-to-eat poultry products each year, employing more than 250 people in the process.

The awards, were conferred at the recently held PashuPalan Mela on 13thSeptember, highlight excellence in cattle farming, poultry farming, and the value addition of livestock produce.

Dr. Parkash Singh Brar, Director of Extension Education at the university, said the institution is making concerted efforts to advance the state's livestock industry through its extension and outreach programs.

"These awards are a way to motivate farmers in various sectors to adopt best practices and innovate," he said.

The Chief Minister's Awards in Cattle Farming, Poultry Farming, and Value Addition of Livestock Produce each come with a plaque, a shawl, a citation, and a cash prize.

Kuljas Rai Arora from Wadala Viram, Amritsar, has been awarded for his work in value addition of livestock produce. Beginning his journey in 1975 with a layer farm of just 1,000 birds, Arora transitioned to broiler farming in 1992, eventually expanding to a capacity of 30,000 birds per batch. In 2010, he ventured into the hatchery business, and by 2017, he established a hightech poultry processing unit under the brand 'Rai Chicken'. Today, Arora's operation markets 618 tonnes of dressed chicken and 49 tonnes of ready-to-eat products like sausages, nuggets, and seekh kebabs each month, employing 245 workers.

Harpreet Singh, from Sohal village in Tarn Taran, received the award in the cattle farming category. Operating a farm with 145 cows and producing 1.25 tonnes of milk daily, Singh has implemented cutting-edge AI techniques to monitor and record every activity of his herd. His farm features a milking parlour, shed, automated waste management systems.

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35th PFI AGM

27 - 28 December, 2024

At Leela Hotel, Gurugram

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IPR Knowledge Review Across Borders: A Resounding Success






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The inaugural Nepal edition of IPR Knowledge Review by Indian Poultry Review was organised at Kathmandu on Saturday, 5th October.

This seminar marks a significant milestone in fostering cross border collaboration between India and Nepal's poultry sectors. The event attracted poultry producers, veterinarians, consultants, feed manufacturers, academicians and policymakers from across Nepal.

Poultry has evolved as one of the fastest growing segments within agriculture, providing employment, improving livelihoods, and ensuring food security. However, the very core of this growth rests on one critical element – innovation.

The theme of the seminar, "Driving Innovation in Poultry Sector", provided a platform for experts to share their knowledge and experiences with the audience.

The Chief Guest of the seminar was Mr. Guna Chandra Bista (Swami Krishna Nand Bharti), President, Nepal Poultry Federation. Guests of Honour were Mr. Somu Kumar Ambat, Founder & CEO Sapience Agribusiness Consulting LLP and Dr. Dibyendu Dey, Executive Director, Immeureka Health Pvt. Ltd.

Dr. Shirish Nigam, President, Indian Federation of Animal Health Companies (INFAH) delivered the Keynote Address.

Other speakers at the seminar were:

- Dr. Subir Singh & Dr. Dinesh Gautam, Senior Poultry Consultants of Nepal
- Prof. (Dr.) Ajit S. Ranade, Former Dean, Mumbai Veterinary College
- Prof. (Dr.) P. K. Shukla, Professor and Head, Department of Poultry Science, DUVASU, Mathura
- Mr. Prashant Kumar, Co-founder and Director, Sapience Agribusiness Consulting LLP
- Dr. Sandeep Dwivedi, Manager Technical Services, EW Nutrition
- Dr. Mithilesh Jaiswal, Senior Research Scientist, Expatica Biopharmaceutica

Dr. Subir Singh delivered the inaugural address and welcomed the delegates. Thereafter, the Chair of the seminar, Dr. Rebanta Kumar Bhattarai, Senior Vice President, Nepal Poultry Entrepreneur's Forum felicitated the dignitaries.

Mr. Guna Chandra Bista, in his address, welcomed the start of IPR Knowledge Review seminars in Nepal. He spoke about how innovation was important for the poultry sector and gave a brief history of his journey in the industry. He added that innovation and technology need to percolate down to the producers for the industry to progress.

Mr. Somu Kumar Ambat spoke about the critical importance of innovation in today's business scenario while Dr. Dibyendu Dey addressed the audience about ensuring safe and nutritious animal feed as a route to food safety and human health as well as a necessity for animal health and welfare.

In his Keynote Address on Driving Innovation in the Poultry Sector, Dr. Shirish Nigam spoke about the Poultry Innovation Equation – 10% nutrition & management and 90% genetics. He went onto say that with poultry consumption expected to rise 18% by 2030, the broiler of tomorrow needs to embrace innovation through balanced breeding, biodiversity, breeding efficiency, improving cardiovascular and leg health and adaptability. Dr. Nigam enumerated the characteristics of modern broilers – all emanating from leading genetics. He also spoke about feed efficiency as a way to make poultry production even more sustainable. He further spoke about antimicrobial resistance and how it has emerged into a global public health threat. Dr. Nigam concluded by saying that innovation is not about trends. Sustainability and antibiotic reduction are not trends. It is about keeping the industry running today and ensuring that it runs tomorrow as well!

In his presentation titled, "Nepalese Poultry Industry: Current Challenges, Innovations, and Sustainable Pathways for Future Growth", Dr. Dinesh Gautam provided a detailed overview of the Nepalese poultry sector. He added that Nepal has achieved self-sufficiency in meat, eggs, chicks, broiler day old chicks and feed (except some floating types and dog food). It is, however, dependent on imports for GP, feed ingredients (70-75%), medicines, vaccines and equipment. Dr. Gautam listed out the major challenges being faced by the Nepalese poultry industry – emerging diseases, poor disease surveillance, insufficient elements of biosecurity, availability of trained manpower, credit transactions, banking and insurance, illegal trade, insufficient implementation of existing laws and regulations, implementation of stringent laws due to One Health concept, import dependence on raw materials, non-availability of quality raw materials. On the subject of innovation, Dr. Gautam said that the Nepalese poultry sector was an early adopter and has already made world-class investments in EC sheds and biosecurity, feed milling, raw materials processing and vaccination & vaccination systems, processing and retail network expansion, fast food restaurants, precision feeding and nutrition including alternative feed raw materials, egg collection system and grading, incubation and hatching, knowledge of disease diagnostics and

prevention. He listed the opportunities for the industry as value added products, branding and market expansion, vertical integration and efficiency improvements, technology and research driven interventions in farming, disease control and nutrition. In conclusion, Dr. Gautam said that the poultry sector in Nepal is being driven by strong consumer demand, GDP growth, protein awareness, affordability, ease of availability, health benefits of white meat, fastest possible production among all agriculture sub-sectors, no religious taboos.

Dr. Ajit Ranade presented on "Advancements in Poultry Nutrition and Feed". He began with a breakdown of the components of poultry nutrition and an overview of the various additives and supplements – enzymes; prebiotics, probiotics and symbiotics; herbal extracts and saponins; organic acids, antioxidants and phospholipids; mould and bacterial inhibitors; flavouring agents. Dr. Ranade gave a detailed explanation of the alternatives to AGPs – organic acids, prebiotics, probiotics, postbiotics and phytobiotics. He went on to speak about the alternative ingredients for poultry feed, both for energy and protein. He concluded by speaking about the popular alternative protein source, DDGS, a byproduct of bioethanol production from cereal grains with a protein content of 25-30%.

Dr. P. K. Shukla's presentation on "Emerging Poultry Diseases in South Asia" spoke about how the poultry industry in the area faces significant challenges from emerging diseases and the key issues, impacts and strategies for management of this vital sector. Dr. Shukla began with an industry overview. He then spoke about the challenges presented by emerging diseases – the economic impact, disruptions in poultry supply impacting food security and zoonotic diseases like avian influenza posing a risk to public health. Dr. Shukla attributed disease emergence to three factors – intensified production, trade and movement, and emerging pathogens. He then provided a brief overview of the common diseases in South Asia covering India, Bangladesh, Sri Lanka, Bhutan and Pakistan. He went to great details to speak about the three important emerging diseases in Nepal – Avian Influenza, Newcastle Disease and Colibacillosis. Dr. Shukla also spoke of the other diseases – coccidiosis and fowl pox. He further spoke about the economic impact these diseases were having on Nepal. Dr. Shukla stressed on the importance of adopting the One Health Approach to tackle the impact of emerging diseases. He concluded by enumerating the suggested future directions of enhanced surveillance, tailored vaccination and capacity building.

Prashant Kumar addressed the audience on "Digital Transformation – Shaping the Future of Poultry Farming". To highlight the need for innovation, Kumar began by speaking about the six challenges faced by poultry producers – cost pressure, disease outbreaks, impact on environment, antibiotic free poultry production and animal wellbeing and welfare. He added that use of data is critical to driving a balance between growing demand and sustainability of business. He further stated that South Asia accounts for some of the lowest per capita consumption trends currently. However, poultry will grow at a CAGR of 20% YoY from 2023 to 2032. Before going further, Kumar defined digital transformation – a fundamental change in how businesses operate and deliver value through technology. He then illustrated how business insights gained through data can be applied to poultry farming through the use of cloud farm management systems and mobile apps. Kumar further explained how technology can be incorporated in a poultry house and the impact of digital tools. He advocated digital transformation to start with building digital capabilities. For the poultry sector this will mean genetics & breeding (precision breeding with AI and data-driven selection); nutrition management (smart feeding systems powered by real-time data and AI), environmental control & disease monitoring (IoT sensors monitoring conditions in real-time to improve bird welfare); automation & robotics (from robotic egg graders to automated cleaning systems, reducing manual labour and errors), blockchain & supply chain transparency (ensuring traceability of products from farmto consumer using blockchain). He then presented two examples – one for complete environmental control and the other for predictive diagnostics to illustrate a transition from traditional monitoring to A.I. precision animal farming. In conclusion, Kumar suggested the following through digital transformation - a) Enhance Efficiency (stay competitive with automated, data-driven operations b) Reduce Costs (optimising resource use) c) Improve Animal Welfare (monitoring health and conditions with sensors and AI d) Deliver Better Products (safer, higher-quality poultry products to consumers.

The penultimate presentation of the seminar by Dr. Sandeep Dwivedi focused on "Current Trends and Challenges in AMR Management in Poultry". He started by saying that each year, at least 700,00 deaths globally are caused by drug resistant bacteria. Unfortunately, antibiotic use in animal husbandry is often presumed to drive bacterial resistance while the fact is that, in India, the volume of antibiotics used in animal healthcare is significantly lower (1/50th) compared to human pharmaceuticals. Antibiotics are used in animal husbandry for two reasons – medicinal treatment of infections and improvement of animal growth (as antibiotic growth promoter). Dr. Dwivedi added that globally, the use of antimicrobials in food animal production is projected to increase by 67% by 2030. Citing a case study from China, he said that the cost of an AMR outbreak in the poultry sector alone is about $ 67 billion in the first two weeks itself. Dr. Dwivedi went onto say that for antibiotic reduction to happen in livestock, the animal production industry must be provided solutions to grow healthy animals in a sustainable, cost effective way. The way forward is to provide customised programmes that offer support for animal health and welfare, cost effective measures to prevent antibiotics needs and reliable monitoring for threats. He further added that the gut is the gateway to reduce AMR – in feed interventions support animal production. Dr. Dwivedi explained about the different sources of microbial contamination in the feed mill. Feed sanitation, he added, contributes to improving microbiological quality of feed which leads to improving production parameters and improving general animal health on the farm. He then

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spoke about phytomolecules for gut health as a driver to reduce AMR. Dr. Dwivedi concluded by saying that the poultry sector is part of the food industry, poor gut health increases antimicrobial use, the dose of antimicrobials is suboptimal, gut health impacts the productivity of poultry operations. Smart nutrition can help reduce AMR by improving feed hygiene, reducing mycotoxins in feed for profitability, using phytomolecules to improve gut health and production parameters, rationalising the usage of antimicrobials is the key to sustainability.

Dr. Mithilesh Jaiswal's presentation centred on "Transitioning to Next-Gen Biotics for Sustainable Poultry Production". This transition, he said, involves adopting innovative, eco-friendly, and efficient microbiome management solutions. He added the United Nation's Sustainable Development Goals cover three dimensions – economic growth, social inclusion and environmental protection. The poultry sector, being an important provider of food and nutrition security, has the potential to help achieving most of the SDGs. He went onto speak about the global regulatory status of probiotics in animal feed. He added that the next- gen biotics include probiotics, prebiotics, postbiotics, parabiotics, psychrobiotics, synbiotics. He explained in depth on probiotics, their usage and their effects. Dr. Jaiswal further said that postbiotics and parabiotics were the new horizons of microbial functional bioactive compounds and explained their potential for the poultry sector. He said that postbiotic functions and advantages for poultry include maintenance of normal intestinal microbiota, stimulating immune response, declining pathogens of the gut, improving antioxidant indices, increasing digestive enzyme activities, improving intestinal morphology. This results in improvements in body weight, egg production, feed conversion ratio and overall product quality.

The Chair of the session, Dr. Rabanta Kumar Bhattarai proposed the vote of thanks.

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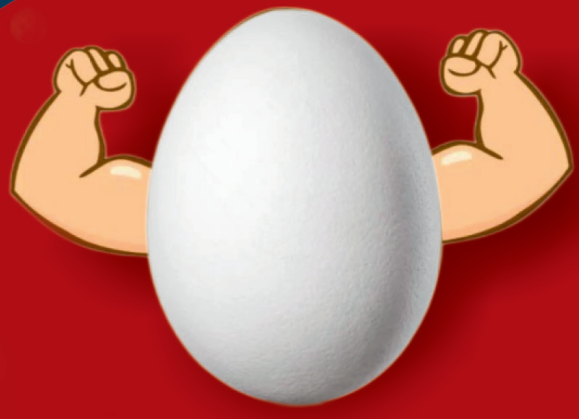

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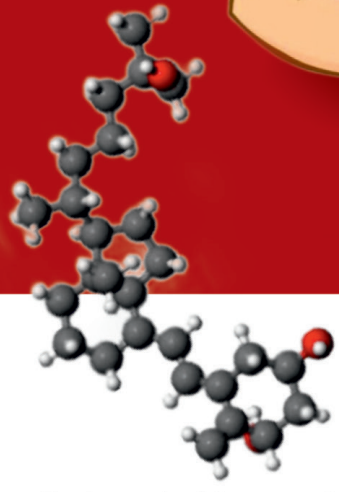

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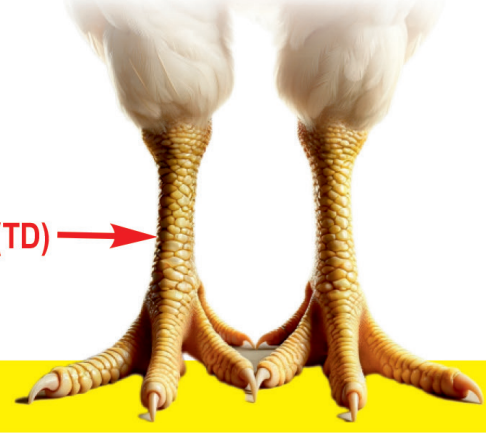

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AdNex 2024 – Innovating for Tomorrow

ABTL hosted the inaugural AdNex 2024 in Bangalore on 3rd and 4th October. This conference, dedicated solely to next generation entrepreneurs and innovators, featured a series of insightful sessions offering an industry overview and exploring the challenges and opportunities in building both personal and business brands.

The conference commenced with an address by O.P. Singh, Managing Director, ABTL, who highlighted the poultry revolution in India, the structural transformation of the industry's value chain, and strategies to sustain growth. Mr. Singh also touched upon the challenges facing the poultry sector and the importance of strategic partnerships and alliances.

The second speaker of the day, Prof. (Dr.) P.K. Shukla, Professor & Head of the Department of Poultry Science, DUVASU, Mathura, discussed emerging trends and strategic opportunities in shaping the future of India's food industry. He focused on protein production in poultry, integrated poultry processing plants, and the role of social media platforms in the industry.

The next day featured a keynote by Chirag Shah, a Leadership and Business coach, who emphasised the importance of developing both personal and business brands. He also spoke on the need for increased self-awareness and leading with emotional intelligence.

O.P. Singh returned as the second speaker of the day, offering insights into financial strategies, sustainable profit models, the direct-to-consumer (D2C) vertical, and more.

The final speaker, Tarun Shridhar, Former Secretary, Ministry of Fisheries, Animal Husbandry, and Dairying, Government of India, took the audience on a journey

through the history of agriculture and livestock, from the origins of Homo sapiens to the evolution of eggs and meat as functional foods. He also explored food safety versus nutritional security and conducted a comprehensive SWOT analysis of the sector.

AdNex 2024 provided a valuable networking platform for young innovators to meet, interact, and learn from each other's business models and future prospects.

The conference ended with a vote of thanks by O.P. Singh, who expressed his gratitude to all speakers and delegates, recognising their contributions in making the event a resounding success.

Stallen Hosts Technical Symposium 2024

Stallen recently hosted its Technical Symposium 2024 from 24th to 27th September at Bali, Indonesia. The event brought together 55 leading consultants and veterinarians from India's animal health industry, creating a collaborative platform to explore the latest advancements and challenges in veterinary science.

The symposium kicked off with a lively welcome reception at a beach club, where attendees were immersed in Bali's vibrant culture through fire dances and traditional performances, setting the stage for the engaging sessions that followed.

The event opened with a thought-provoking session by Professor Camarda from the University of Bari, Italy, who shared insights on "Prevalence & Damages Due to Salmonella in Poultry: Constant Challenges and New Insights to Food Safety." This was followed by a presentation by Dr. Paulo Bravacinni of FATRO, introducing SGP695AV—the world's first live Salmonella vaccine administered via drinking water.

This innovation promises to transform Salmonella control in India's poultry sector.

Later that afternoon, Professor Camarda returned to discuss the persistent issue of Mycoplasma in Poultry, highlighting FATRO's novel solutions, including the MYC Vac and MS Vac vaccines.

That evening, participants got the chance to dive into Bali's culture, featuring the exotic Kechak dance, a celebration of Indonesia's rich Hindu heritage.

Day two commenced with an informative session by Dr. Ladislav Urban, CEO of Biopharm, Czech Republic, who reviewed "Coccidiosis in Poultry: Diagnosis, Control, and Interaction with Gut Health." The re-launch of Livacox Q, a live attenuated vaccine for coccidiosis, through Stallen in the Indian market, generated significant interest due to its potential benefits over conventional feed additives.

In the afternoon, the spotlight shifted to Stallen's remarkable 26-year journey of innovation and growth, led by Aniket Parikh. This was followed by Dr. Sanjay Singhal, Stallen's Chief Operating Officer, who unveiled two new feed supplements: Pepigro, an antimicrobial feed additive, and Phytogic, a phytogenic supplement—both aimed at improving profitability and sustainability in poultry production.

The event also marked a pivotal moment for Stallen, as the company introduced its new corporate identity, signalling its commitment to a biotechnology-driven future.

The symposium concluded with a vote of thanks to all participants, along with mementos presented to the distinguished speakers.

Avitech's Annual Sales Retreat

Avitech Nutrition held its Annual Sales Retreat in Goa from 5th to 7th September.

The event began with a welcome address from Rahul Kapur, Managing Director, Avitech Nutrition. He shared a comprehensive presentation outlining the company's future goals and strategic initiatives. This was followed by a session led by Dr. Dinesh T Bhosale, a distinguished expert with over 22 years of industry experience. Dr. Bhosale emphasised the significance of leadership and the critical role of teamwork in driving success.

On the second day, the focus shifted to in-depth product training sessions aimed at empowering the team with the latest knowledge and insights.

The retreat concluded with a celebratory awards ceremony, recognising the outstanding individual and team accomplishments of Avitech's sales team over the past year.

In addition to the productive sessions, attendees enjoyed time to relax amidst Goa's picturesque settings, participating in team-building activities and networking in a more informal, enjoyable atmosphere.

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World Egg Day Celebrations by Optima Life Sciences

To celebrate World Egg Day, Optima Life Sciences, partnered with Matoshri Ramai Ambedkar Primary & Secondary Residential Aashram School in Pune, an institution supporting children from single-parent families and those with limited access to education.

The day kicked off with the distribution of boiled eggs, symbolising the nutritional value of this affordable superfood. Dr. Swapnil Survase spoke about the health benefits of eggs as a rich source of protein vital for the students' growth and development. The distribution of eggs was more than a symbolic gesture—it was a commitment to the children's well-being and proper nutrition.

Alongside this, Optima Life Sciences provided the students with drawing kits, fostering creativity and enriching their educational journey. Dr. Kalyani Sarode expressed deep gratitude for the opportunity to make a meaningful difference in the students' lives. Drawing inspiration from Vinay Kulkarni, Chairman, Optima Life Sciences, she said, "We believe in the power of education and good nutrition to transform lives. This collaboration on World Egg Day underscores our commitment to fostering positive change in our community."

Vets in Poultry Organises 6th AGM

Vets in Poultry (VIP) recently held its Annual General Meeting (AGM) in Karjat, marking a significant milestone in its mission to strengthen the poultry industry. The event began with a ceremonial lamp lighting by distinguished dignitaries, including Dr. Ajay Deshpande, Dr. C. B. Pathak, Dr. Ajit Ranade, Dr. Girish Kolwankar, Dr. Ravindra Reddy, Dr. Mahindra Singh, Dr. Santosh Ire, and Dr. Vishal Rawat.

Dr. Ajay Deshpande, President of VIP, presided over the meeting, setting the tone for the day's agenda. Dr. Santosh Ire, Secretary of the association, welcomed attendees and reflected on VIP's remarkable five-year journey while presenting the annual report.

Dr. Prasad Kulkarni followed with the financial report, and Dr. Ajit Ranade, Technical Advisor, announced the new executive body for the upcoming term. During his presidential address, Dr. Ajay Deshpande outlined the association's future objectives, highlighting VIP's vision and welcoming the newly appointed committee members:

1. Dr. P.G. Pedgaonkar
2. Dr. Anju Deshpande
3. Dr. B. A. Pawar
4. Dr. Sahebeb Rao Rathod
5. Dr. Anurag Jenna
6. Dr. Amol Pawar

After formally concluding the AGM, Dr. Ajay Deshpande initiated the technical sessions, which were led by Dr. Amol Pawar and supported by industry experts such as Dr. Girish Kolwankar, Dr. Anil Phadke, and Dr. Badgujar. One of the engaging presentations was Dr. Anju Deshpande's talk on work-life balance, a topic that resonates strongly in the demanding veterinary profession.

Dr. Gunasekhar shared innovative insights on probiotics, while Dr. Jayashri captivated the audience with a detailed presentation on a controlled house project for scientific trials, showcasing cutting-edge data and results.

A highlight of the event was the

prestigious Lifetime Achievement Award, presented to Dr. Girish Kolwankar, a visionary and pioneer in the poultry industry. In his acceptance speech, Dr. Kolwankar reflected on his distinguished career and offered valuable advice to young professionals, encouraging them to excel in this dynamic field.

The AGM concluded with a vote of thanks delivered by Dr. Onkar Pawaskar.

As VIP looks ahead, every member remains dedicated to ensuring the delivery of quality and safe protein to the nation, poised to lead the association and the poultry sector to new heights of success.

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Optima Life Sciences Inaugurates New Manufacturing Facility

Optima Life Sciences inaugurated its new state-of-the-art manufacturing facility at Jejuri, Pune on 16th October in a ceremony attended by industry leaders, local government officials and business partners.

Spanning 4.5 acres, the newly opened facility is equipped with advanced technology designed to enhance both production efficiency and product quality. This major investment in operational capabilities positions Optima Life Sciences to meet the increasing demand for its products with greater scale and precision.

"Our new plant in Jejuri is a game changer for Optima Life Sciences," remarked Vinay Kulkarni, Executive Chairman of Optima Life Sciences. "With advanced manufacturing capabilities and a commitment to quality, we are well-positioned to serve our customers better and respond to market needs with agility."

The Jejuri facility boasts a number of advanced technological systems, including:

- Advanced Nauta Mixer Technology: This state-of-the-art 6 MT/Hr mixing solution enables precise ingredient integration, resulting in consistent and high-quality formulations with CV less than 0.1%.
- Fully Pneumatic Transfer System: This automated system enhances efficiency by transporting materials without manual handling, minimising contamination risks and improving safety.
- Auto Bagging and Heat Sealing System: This innovative packaging solution ensures accurate filling and secure sealing of products, enhancing shelf life and product integrity.
- Rack Storage System: With a capacity of 750 MT, this system allows for efficient and organised storage of raw materials and finished goods, streamlining inventory management.
- Quality Control Systems: 310 sq. mt. fully equipped laboratory ensures rigorous testing and monitoring systems are in place to maintain the highest standards of product safety and efficacy.
- Research and Development Labs: Dedicated spaces for R&D will facilitate the development of new and innovative health products, driving commitment to continuous improvement.

Optima Life Sciences places great emphasis on environmental sustainability, incorporating eco-friendly practices throughout the facility:

- Energy Efficiency: The plant utilises energy-efficient machinery and renewable energy sources to minimise its carbon footprint.
- Waste Management: Effluent Treatment Plant for Sewage Water Treatment with capacity of 25KL
- Water Conservation: Advanced water recycling systems are in place to reduce water usage and promote sustainability in manufacturing processes.

The launch of this GMP, HACCP, ISO, and FAMI-QS certified facility positions Optima Life Sciences for future growth and continued innovation in the animal nutrition and health sector. The expansion strengthens the company's ability to develop and deliver a wide array of health solutions, ultimately benefiting both customers and communities.

"As we look to the future, we are excited about the opportunities this facility presents for our company and the positive impact we can have on health and wellness globally," adds Vinay Kulkarni.

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