

# हिंद पोल्ट्री

# HIND POULTRY

Vol. XX

March 2022

No. 9



### Tackling the Environmental & Financial Problems of Poultry Industry through proper Poultry Waste Management

- M.K. Vyas

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Vice Chairman  
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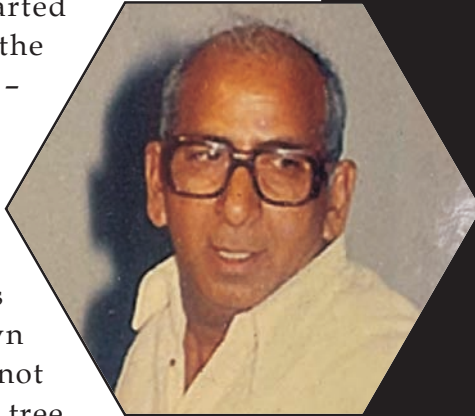
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**Shri P V Somarajugaru** was one of the founder members and National Vice Chairman of NECC and also one of the promoters and first Director of Agrocorpex India Limited. Late Sri P V Soma Raju is known as a exemplary fierce and articulate bold orator expressing his views overtly which has created confidence in the farming community. He supported **Padmasri B V Rao garu** without any expectation for establishing and the growth of poultry industry and NECC. He had very good command over Telugu which has made poultry farmers to fall in love with his fearless speech. He used to speak in Telugu even in non-Telugu speaking states with total involvement of heart and soul and this had made the people in the respective state to understand his message clearly and they started supporting the organization - NECC - for its growth.



But for his tireless efforts the seeds of NECC sown would have not grown a great tree providing shades and protection to lakhs of farmers of the poultry industry. His contribution cannot be forgotten and emulated by anyone. By his departure vacuum created cannot be filled by anyone in future. The present younger generation can remember the Yeomen services provided by the departed leader to the poultry industry and follow his footsteps to take the organization NECC and the industry to new heights. May his soul rest in peace. Heartfelt condolences to his bereaved family -

**By his friend admirer  
Mr. M B Desai - NECC**

**Hind Poultry** also on behalf of its staff, readers and all the well-wishers pray that his soul rest in peace.



## **Mr. M. B. Desai Vice Chairman NECC Remembers Mr. Soma Raju as a Staunch supporter of Poultry Industry**





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**Rendering is one of the scientific option which can convert poultry waste in to wealth. Here we will discuss Rendering:**

Rendering is a process of using high temperature and pressure to convert whole animal and poultry carcasses or their by-products with little or no value to a safe, nutritionally and economically valuable feed ingredient. It combines blending, cooking, pressurizing, fat melting, water evaporation, and microbial inactivation. Rendering process cooks the product while killing pathogenic agents and converting the product into a value-added product which can be used as pet feed ingredients or livestock feed ingredients. Although rendering is an effective method, only few poultry operations use it probably due to misconceived reason of its high operational costs.

In present conditions where environmental and pollution issues are addressed strictly by government authorities, Poultry Waste Rendering Plants are an indispensable part of poultry operations. Poultry Waste Rendering plants also perform one of the most complementing functions for modern slaughter houses. Rendering facility also produces a variety of by-products by further processing and development. Rendering is also the process to convert dead chicken, chicken waste, feathers, tissues, market waste in to valuable material like feather meal, chicken meal and animal fat which are very rich in protein. 🏠



**M.K. Vyas**

## **Tackling the Environmental & Financial Problems of Poultry Industry through proper Poultry Waste Management**

In India poultry industry is growing rapidly and contributes towards improving the standard of living of people through poverty alleviation and creating employment opportunities. The problem coming along with the growth in poultry production is the poultry waste that needs to be taken care of, as a non-appropriate treatment or disposal can become risky for environment and humans. For instance, different kind of poultry wastes can contribute in the spread of diseases and may pollute soil and groundwater resources if not properly handled. Poultry Waste can be defined as anything that is no longer useful and needs to be disposed off properly. The solid poultry waste consists of feathers, hatchery waste (empty shells, infertile eggs, dead embryos etc), shells, sludge, abattoir waste like offal, blood, feathers and condemned carcasses and mortality.

The disposal of poultry waste presents significant environmental, biological, and financial problems for the poultry industry. There are several ways of disposing of poultry waste including burial, rendering, incineration, composting, feed for livestock, fertilizer or source of energy. Each disposal option has its own advantages and disadvantages. Direct disposal of poultry waste, mortality and abattoir condemnations at the landfills, application on farm lands as a fertilizer, burning and composting are the most commonly practiced methods of poultry waste disposal used in India. These methods are challenged by environmental pollution Boards in India and it will not be easy to use these traditional method of disposing off of poultry waste and poultry producers will have to adopt scientific method of disposing off of poultry waste to convert poultry waste in to wealth.



## Poultry Dressing Plants

Type of Plants	Models & Capacity upto
Mini Plants	4 Models- 2000/ Day
Hybrid Plants	2 Models- 4000/ Day
Container Plants	2 Models- 4000/ Day
Conveyerised Plants	6 Models- 2000/ Hour



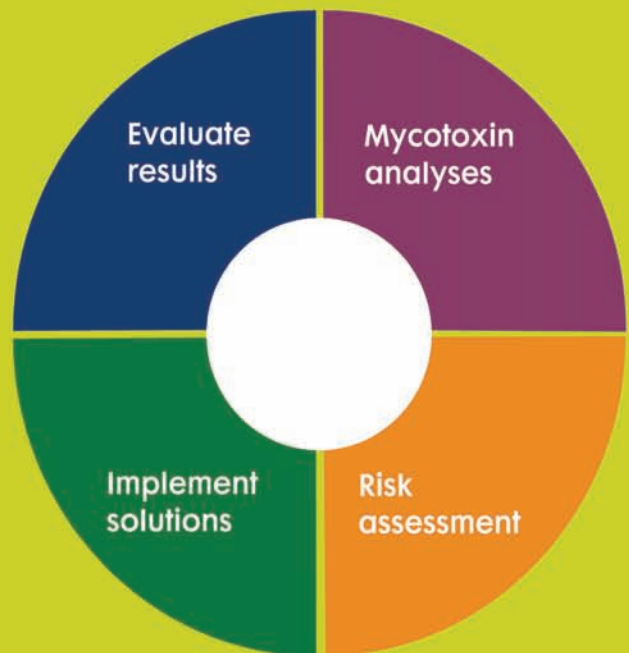
## Poultry-Waste Rendering Plants

*Eliminates waste, makes profit*

Type of Waste	Waste Capacity
Hatchery Waste	1 T - 2 T / Batch
Layer Manure	10 T & 20 T / Day
Slaughter Waste	250 - 3500 Kg/ Batch
Chicken Fat	1 T - 2 T / Day



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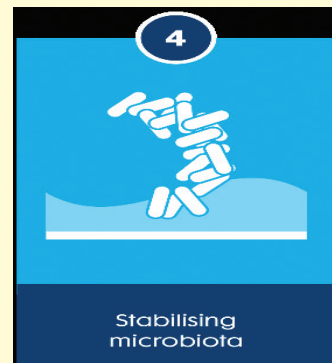
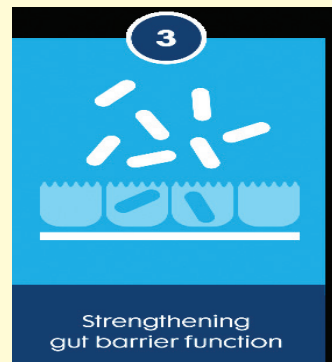
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**AMR (Anti-microbial resistance)** refers to antimicrobial adaptation of a microorganism (bacteria, viruses, fungi, protozoa and helminths) to which it was previously sensitive. It is estimated that globally every year at least 700,000 deaths are attributable to antimicrobial resistance (AMR). Given the current rate, the annual death toll can climb to 10 million by 2050. Given the rapid zoonotic prevalence, AMR bacteria may also spread from animals to humans through food. That's why World Health Organization (WHO) in 2017 has recommended to stop rampant usage of antimicrobials for growth promotion purpose. As a response to AMR reduction, Asian regions like India, China, Indonesia, and Vietnam banned usage of Colistin (antimicrobial) as a growth promoter. Using of Colistin as a feed additive (growth promoter). By limiting the use of antimicrobials, poultry producers can help to maintain the efficacy of these AMR prevention interventions, protecting animals' health and humans. Trouw Nutrition's global experience in working with integrators who are leaders in antibiotic reduction have demonstrated that it is possible to produce broilers without antibiotics and realize improved health performance of chicken for improved integrators profitability.

A successful AMR prevention requires a systematic integrated approach. Trouw Nutrition's Feed-Farm Health programme has been effectively demonstrated to reduce the reliance on antibiotics and eventually result in rearing without antibiotic approach (RWA). This programme includes analysis of critical control points across entire poultry production chain. Assessment of each component in the production value chain needs to be customized to provide a solution that addresses each integrator's needs. Of each component in the production chain can be made customized solution to address each integrator's situations. This integrated approach underlines Trouw Nutrition's commitment to help poultry producer reduce need for antibiotics while maintaining profitability. This tailor-made intervention helps to overcome challenges while reducing antibiotic usage. Below six steps approach will help to achieve high performing flocks without the use of antibiotics.



**Trouw Nutrition's 5 pillar to support gut health**

## **Step 1: Define the purpose of AMR prevention:**

First define and clarify the purpose of desired outcome of an antibiotic reduction, for e.g., Rearing without Antibiotics (RWA), reducing antibiotics or stop only antibiotic growth promoter (AGP). The purpose could be a result of objectives like certification on raising chicken without antibiotics, sustainability measures, or consumer demand etc. Successful antibiotic reduction efforts require commitment across the organization and high-level meetings to set out expectations at the start. Trouw Nutrition believes that this is an important step before designing the tailor-made programme as per poultry producer requirements.

## **Step 2 : Audit feed, farm, health baselines :**

Measuring progress requires establishing a bench mark for comparison. There are certain parameters to be evaluated at the level of feed, farm and health.

### **Feed management :**

The breedtype (Ross, Cobb and Hubbard etc.), needs to be considered whilst evaluating feed intake and feeding schedule. Information such feed form, feeding phase, daily feed intake, feeding pattern needs to be collected. Raw material and feed samples would be collected for nutritional, mycotoxin and microbiological analysis. Basis the pre-assessment results, necessary actions would be taken with respect to modulation of feed

formulation, inclusion of apt feed additives/supplements etc.

### **Farm management:**

All the aspects related to management would be assessed here. It starts from checking the day-old chicks for their quality, weight, uniformity, and body temperature. Other parameters that would be considered for evaluation are climate of the house, brooding temperature, floor temperature, ventilation, air quality, feeder and drinker arrangement, litter management, hygiene, biosecurity etc.

### **Health 1management:**

The current antibiotic program including that of anticoccidials will be evaluated for their purpose of use, effectiveness, type been used, rotation/shuttle program etc. The health status of birds will be assessed through evaluation of dropping consistency, gut lesion scoring for dysbacteriosis, coccidiosis, necrotic enteritis etc. The current vaccination schedule will be reviewed along with evaluation of water quality and the water treatment/medications followed.

## **Step 3. Introduce tailor made solutions**

Only after an audit (preferably after completion of batch) should targeted solutions be introduced. Following programs, models and services can be implemented.

### **Feed management:**

Solutions for optimal feed management would be targeted

towards precision nutrition concepts with equal emphasis been placed on feed safety and quality. At Trouw Nutrition, we incorporate NutriOpt - a precision nutrition strategy that aims at providing quick insights of raw material and feed nutrient matrix (NOA, NIR), optimal diets (FaaS, Bestmix) and optimal performance (Animal models). Feed safety programme of Trouw Nutrition helps to mitigate mycotoxin risk and microbial contamination through Toxo range (Toxo MX/Toxo XL), Fylax Forte HC and/or Fysal MP/Selacid GG and would be advised depending on risk assessment review.

### **Farm management**

With 90 years of global expertise, Trouw Nutrition provides services like advice on house climate, Feeder and drinker management and feeding pattern according to age of birds and other environmental challenges. An effective water cum gut acidifier concept like Selko pH from Trouw Nutrition can be introduced to improve water quality along with gut health benefits.

### **Health management**

For overall good animal health, ensuring good gut health is a primary challenge. Trouw Nutrition's 5-pillar approach (Fig 1) for ensuring eubiosis through a strategic use of synergistic combinations helps to achieve the desired health status. Products like Selko pH, Selacid GG, Presan-FY and IntelliBond C can support in ensuring healthy life. In addition,

our gut health experts can help in Dysbacteriosis gut health scoring, provide advice on Vaccination & Biosecurity.


#### Step 4: Calculate Return on Investment (ROI)

A solid AMR strategy must also make sense in terms of efficacy and producer economics. It is important to assess the same in regular intervals while also ensuring that there is a systematic approach in achieving the final objective.

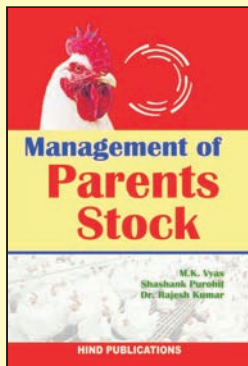
#### Step 5: Implementation is key point

Continuous collaboration, sharing of information and communication between the two parties is essential in ensuring the desired results. Trow Nutrition with the help of local, regional and global experts ensures the maximum knowledge sharing to meet poultry producer's requirements.

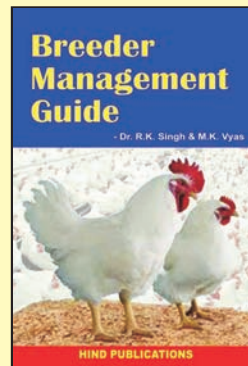
#### Step 6: Evaluate, Adapt, Repeat AMR programme

Finally, we assess whether the implemented intervention meets the customer's need as outlined in step 1. When this has been achieved, we proceed to the next step until we reach the next level of antibiotic reduction. The process is repeated until the final goal is achieved. In a dynamic market-place, the initial goal will inevitably be fine-tuned over time. Consistently deploying a six-step cycle which integrates feed, farm and health management, can take an AMR programme from vision to achievement. 

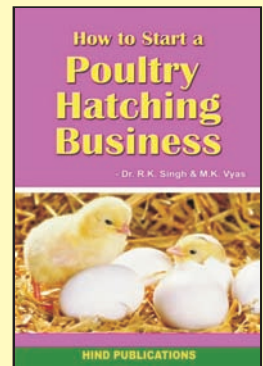
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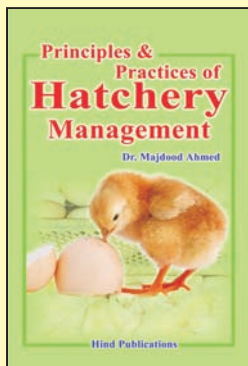
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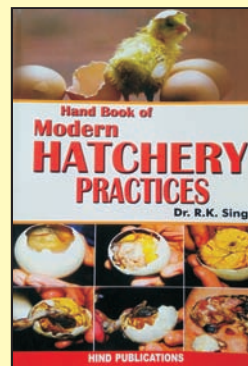
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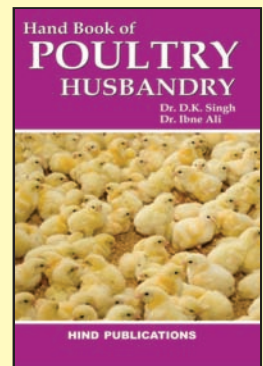
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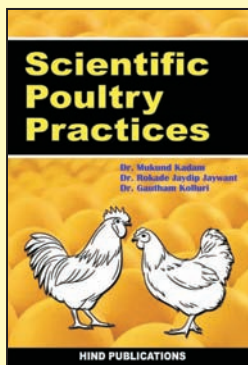
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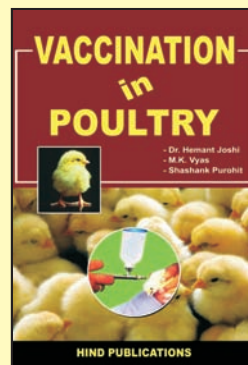
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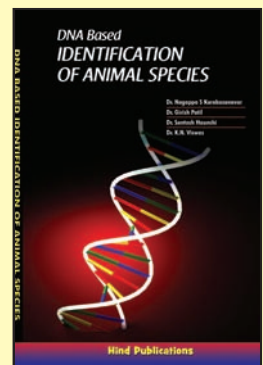
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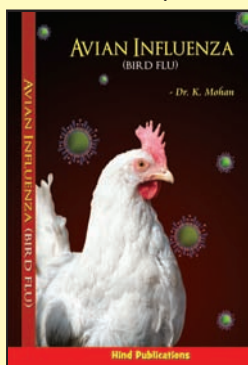
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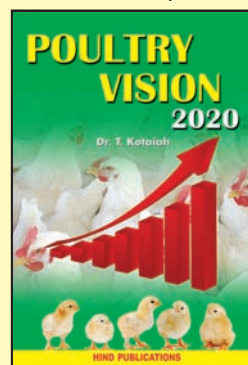
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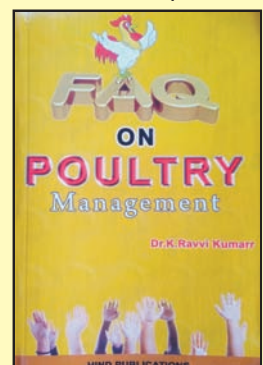
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# Avian Influenza

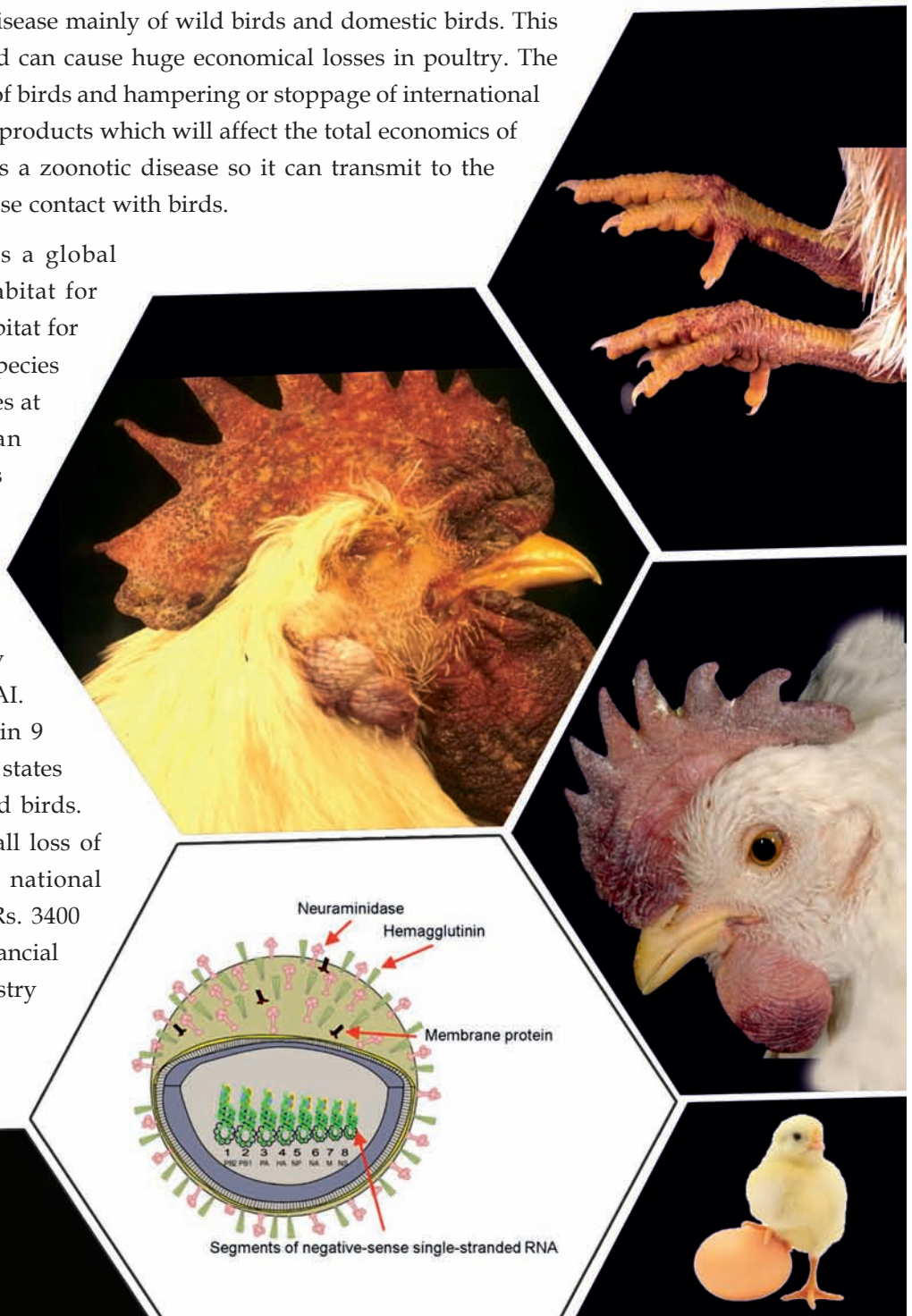
## A Major Economic Threat to Indian Poultry Industry



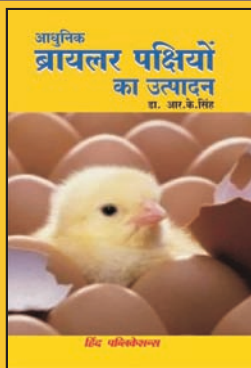
**A**vian Influenza a zoonotic disease which is also known as Avian Influenza, Bird flu, or fowl plague. Avian Influenza is highly infectious /contagious zoonotic viral disease mainly of wild birds and domestic birds. This disease spreads very fast and can cause huge economical losses in poultry. The losses may be due to culling of birds and hampering or stoppage of international trade of poultry and poultry products which will affect the total economics of the poultry industry. As it is a zoonotic disease so it can transmit to the human beings who are in close contact with birds.

India has emerged as a global hotspot for AI. It is also habitat for migratory waterfowl and habitat for several resident waterfowl species throughout the year. India lies at the heart of Central Asian Flyway (CAF), which spans 30 countries and covers 279 populations of 182 migratory water bird species. Last year in Jan 2021 Indian poultry industry suffered a lot of outbreaks of AI. Outbreaks were confirmed in 9 states in poultry birds and 12 states for other migratory and wild birds. As per the reports the overall loss of the poultry industry at the national level is estimated at about Rs. 3400 Cr due to bird flu as per financial expert from the poultry industry (Ref. TOI Hyderabad 2021).

### Etiology



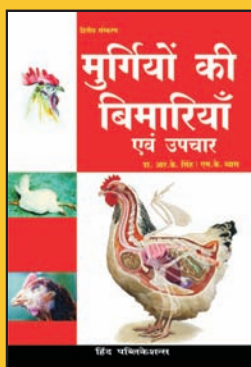
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Infectious virus belongs to Orthomyxovirus family, single stranded RNA virus. There are three types A, B and C which are differentiated by internal viral proteins. Influenza A type is responsible for human influenza and avian disease. Influenza B type is human only and type C causes milder disease and swine also.

Influenza A is more important for poultry. It is subtyped on basis of viral envelope glycoprotein hemagglutinin (HA) and Neuraminidase (NA). There are 16 different HA antigens (H1 to H16) and 9 different NA antigen (N1 to N9). Influenza A virus can infect variety of domestic and wild birds. Avian Influenza in domestic chicken and turkey is classified according to disease severity as HPAI (Highly Pathogenic Avian Influenza) and LPAI (Low Pathogenic Avian Influenza).

HPAI is highly virulent and it can cause near about 100% mortality in chicken. All subtypes found in poultry but subtype H5 and H7 are seen more as cause of outbreaks.

All the birds including domesticated birds are susceptible to avian influenza virus but migratory birds as water fowls and wild ducks are natural reservoirs of avian influenza virus. Chicken and turkey are also susceptible to virus and can cause fatal infection.

In recent studies shows that the low pathogenicity virus (LPAI) can mutate to highly pathogenic virus.

Haemagglutinin protein mediates attachment to and entry of

the virus into host cell by binding to sialic acid receptors on cell surface. Influenza A virus is genetically labile and can escape from host defense system. This virus lacks mechanism of proofreading and repair the error which occur during replication. This change, uncorrected error remains and genetic changes happens during passage through human and animals, and the original strain changes to a new antigenic variant. This changes in the antigenic component of Influenza A virus are known as "antigenic drift".

When two viruses from same host system or originally coming from different host replicate in the same cell and reassort or swap genetic material. In this process changes in NA or/and HA protein takes place. Such abrupt changes in virus antigen is called as "antigenic shift". The virus originates from this mechanism creates a novel virus subtype that differ from both original viruses which may have capacity to completely evade the immunity of host.

### Transmission and Spread

In winter more incidences of HPAI are seen, this may be due to agricultural practices, environmental changes, migratory birds flying from one place to another, water fowl and duck migration.

Low pathogenically avian influenza virus is distributed worldwide. Virus may be present in backyard poultry in villages without showing any symptoms but carrier as they directly come in contact with



wild birds and ducks. As migratory birds mostly resides near water bodies, so many times the outbreaks of AI are seen more farms in the close proximity of water bodies, lakes, ponds, etc.

H5N1 virus arise from mutation of LPAI virus, mainly H5 or H7, and which may cause high epidemics. The incubation period may vary from few days in birds to some days in flock. Virus transmission is due to inhalation or ingestion of infected material.

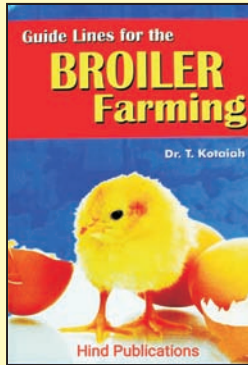
Spread is due to lack or breaches in farm biosecurity norms, as movement of birds, close contact of flock with wild or migratory bird, contaminated droppings, fomites as equipment, trays, gunny bags and trucks carrying live birds, coops. Airborne transmission is possible between farms but in close distance and not far off distance.

AI virus sheds in feces and respiratory secretion of birds. The aquatic birds as water fowl and duck fecal material contain large amount of virus. Once AI virus enters poultry flock it can spread on the farm by both fecal-oral route and aerosols due to close proximity of birds. House flies can act as mechanical vector/carrier but not far distance.

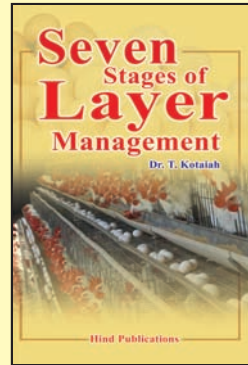
### Clinical Signs

LPAI - Low pathogenic virus causes mild illness in poultry and shows symptoms like decrease egg production, mis- shaped eggs, decrease fertility or hatchability in breeder flocks, sneezing, coughing and ocular / nasal discharge in affected flocks, swollen infraorbital sinus, decreased feed and water

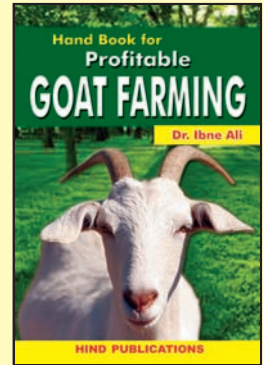
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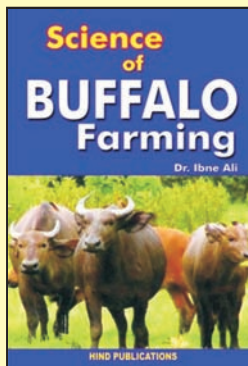
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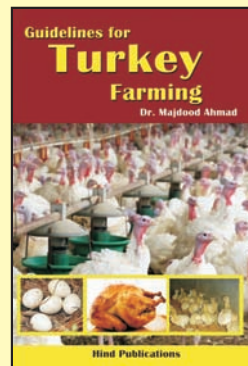
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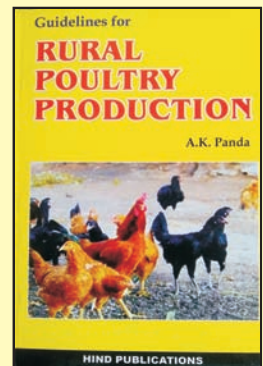
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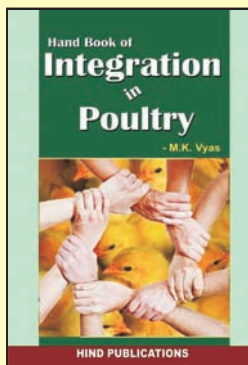
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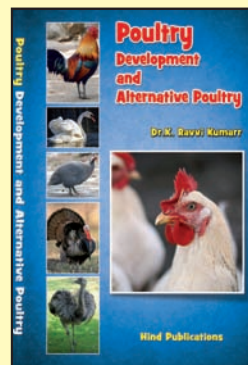
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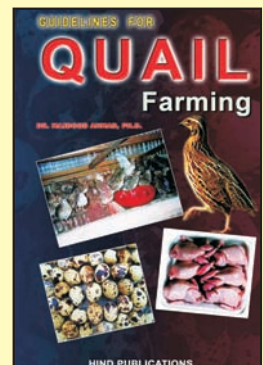
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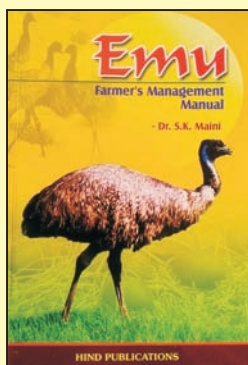
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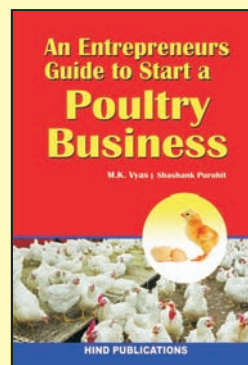
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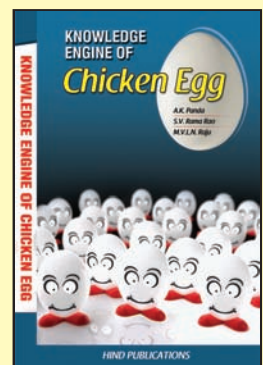
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consumption and gradually increase trend in mortality. HPAI - Highly pathogenic virus shows severe illness in poultry and chicken. Marked depression, decreased feed and water intake and often neurological and respiratory signs are seen, sudden heavy mortality occurs in flock. Signs as coughing, sneezing, sinusitis, blood-tinged oral nasal discharge, ecchymoses on shank and feet, edema and cyanotic lesions on unfeather skin i.e., on wattles and comb, diarrhea, drop in egg production and misshaped eggs.

### Post Mortem Lesion

LPAI - Rhinitis, sinusitis, congestion and inflammation of trachea and pneumonia in some birds, hemorrhagic ovaries, involuted or degenerated ova in reproductive system in layer birds, airsacculitis, peritonitis is also seen in birds.

HPAI - Classical symptoms of oedema and cyanotic lesions on head, comb and wattle. Gross lesions may not be classical lesions as bird die per acutely. Hemorrhagic lesions on shank and legs

### Prevention, Control And Biosecurity

In some countries the live or killed vaccine is available and regularised. It is depend upon the Regulation from AH dept. Govt. of India, GOI has not permitted for Poultry AI vaccination in India.

So, control through biosecurity as there is no effective and economical treatment in poultry.

### Virus Effective Disinfection

AI virus is susceptible to

various disinfectant and can be destroyed with Sodium hypochlorite solution, Ethanol 60- 95%, QAT, Aldehydes (Glutaraldehyde, Formaldehyde), phenols, povidone iodine.

### VIRUS CAN SURVIVE

1. In dry/wet faces for 8wk at 40C but 18hrs at 420C or for 24hrs at 370C, so temperature increases virus will get destroyed. At 00C or sub-zero temperature as in frozen lakes or water bodies for 30days, 6 days at room temp ie at 370C. On plastic virus can stay for 24-48 hrs, on cloths and paper 8-12 hrs. But it can survive or stary alive for decades in frozen lakes, snow.

### For Effective Biosecurity

- Isolation
- Traffic control
- Decontamination/Sanitation

### Some of the Basic Biosecurity Measures

Keep the poultry houses from wild birds, pests and other livestock. Don't grow any fruit or flower plants near the poultry shed which may attract wild birds which can be carrier for AI.

Keep visitors to a minimum. Allow only those people who are important to visit your farm. Make sure that they use proper biosecurity measures before entering the flock.

Use foot bath and dedicated shoes for visiting the flock. Use some good disinfectant in foot bath which can be effective in presence of organic matter. (Prophyl 75TM)

Make sure you have effective pest control program

mainly rodent and insect control.

Do not visit any other farm and don't keep any birds or desi birds at farm premises. Keep close watch if any of the workers coming from outside are keeping any birds at their house, as far as please avoid.


Don't bring any equipment or feed from other poultry farm. If equipment is brought outside, please ensure they are properly cleaned and disinfected with effective disinfectant. (Benzo DTTM)

Ensure your flock is healthy and if any problem get the help from veterinarian.

Once you dispose of any flock, please ensure you remove all litter material properly and dispose of away from the poultry farms.

Cleaning and disinfecting the farm with proper disinfectant is very important to keep the next flock and farm away from the disease. (VulkanTM S)

All the vehicles coming to farm must be cleaned and disinfected. Use wheel dip for the vehicles entering your farm premises. (Prophyl 75TM). But don't take outside vehicle near to shed or flock.

In shed Cleaning & Disinfection (C&D) first dry cleaning, then wet cleaning with some detergent / foam (DT FoamTM) and disinfecting with effective disinfectant or fumigation. If possible, take Sanitary break as surface or facility to dry before entering birds in the shed, so keep the shed vacant for 2/3 days, this is to stop multiplication of organism and break the cycle. (Benzo DTTM) 

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2	HOUSE TYPE-2	45'x270'	17,654	528/-	93,21,312	2	13	6	27,54,024	3.4 yrs
3	HOUSE TYPE-3	45'x220'	14,192	576/-	81,74,592	2	13	6	22,13,952	3.7 yrs

- \* Prices are valid until 31st of March, 2022 and exclusive of taxes, erection, installation, transportation charges, subject to any revision from the company.
- \*\* ABW- (Average Body Weight) as per industry average norms .
- \*\*\* GC- (Growing Charges) will be revised post completion of every 8 batch based on the electricity charges and labour charges.

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# 'Food Futurism' Set As The Theme for Protein Day

**Right to Protein**, ahead of India's third annual Protein Day celebration on 27th February, declares 'Food Futurism' as the theme for 2022 as it takes ahead its mission to drive food and especially protein sufficiency in the country through awareness, advocacy, and action. 'Food Futurism' as a conversation will bring together nutrition experts, food scientists, biologists, among others to help Indians better understand the basic science behind healthy nutrition and its role in food security and protein sufficiency. The pandemic highlighted the need to "build back better" sustainably. The effects of global warming on agriculture, the inequality in access to food have further necessitated a paradigm shift in how we think about food. Emerging scientific innovations present us with a growing range of opportunities to transform our food and agriculture structures to fulfill the vision of a hunger-free India. Therefore, through this educative initiative, this year, Right to Protein will be initiating informed discussions and dialogues about the role of science and how methods such as genetically engineered foods can have in achieving food security. The discussions will address genuine concerns, misperceptions, and 'GMO anxiety' among other topics. Supporting the effort, Varun Deshpande, Managing Director of Good Food Institute India (GFI India) says, "In the face of challenges like climate change and pandemics, India needs a more secure, sustainable, and just food system. Reimagining our protein supply is key to that future. Plant-based foods and other smart protein sources are

a generational opportunity to align planetary health stewardship, public health resilience, and economic growth. But to bring delicious, sustainable protein onto plates across the country, we need to invest in science, develop talent, and bridge knowledge gaps. We are glad to support Food Futurism as the theme of Protein Day 2022 to achieve these goals in service of a better future." Dr. Suresh Itapu, Nutraceutical Expert, Director - NutriTech India, Human Nutrition Consultant - USSEC and Supporter of the Right To Protein initiative said "As with any stream of science, we've often looked at different nuances of 'food science' with skepticism mainly due to lack of knowledge leading to confusion,

overblown fears, and myths. For instance, our concern about GMOs stems from a lack of awareness of how genes function - it is simply a production technique. I believe that Food Futurism as the theme for Protein Day 2022 will help address some of these apprehensions while enhancing our scientific understanding as we collectively deliver on our larger food security and sufficiency goals." Since the inception of India's first Protein Day in 2020, Right To Protein is all set to complete a treble, where like-minded citizens, nutritionists, food industry experts, chefs, and brands will come together to raise awareness and take a step towards making India a protein sufficient country through food science. 🇮🇳

## **U.S. Poultry & Egg Association names Jonathan Cade - President Hy-Line International as its Secretary**



Jonathan Cade, President Hy-Line International is named as Secretary to the U.S. Poultry and Egg Association board at IPPE 2022. Jonathan Cade is entering his first year on the executive board, after multiple years of serving on the main board with the U.S Poultry and Egg Association. Speaking after this honor Jonathan Cade, said that "I am honored to serve the U.S. poultry industry as Secretary of the board," "I hope to bring an international layer industry as well as a U.S. perspective and experience to the board to support local egg farmers." Jonathan Cade graduated from Harper Adams University in the United Kingdom (UK). Before becoming president of Hy-Line International in 2012, he served as managing director of Hy-Line subsidiary, Hy-Line International UK Ltd from 2009. The U.S. Poultry & Egg Association is an American industry trade group located in Tucker, Georgia that "represents its poultry and egg members through research, education, communications and technical services." Founded in 1947, it is the world's largest and most active poultry organization. Billed as an "All Feather" association, membership includes producers and processors of broilers, turkeys, ducks, eggs, and breeding stock, as well as allied companies. 🇮🇳

## Immune Booster Chicken is the meat of the future recommends Suguna Foods

Healthy dietary choices are one of the pillars of having a healthy life since they contribute to overall well-being. A well-balanced, protein-rich diet enhances muscle building, acts as an immune booster, and lowers the risk of any illness. Chicken is unquestionably the most abundant source of protein, acting as an indomitable sponsor, and should be included in the diet 2-3 times each week. Here are some of the advantages of eating chicken. Chicken has a high protein content. This vitamin is essential for every cell in the body. Protein is required by the body to produce enzymes, hormones, and other substances. It also aids in the stability of bones, muscles, tissues, blood, and cartilage. Aside from protein, chicken is high in calcium and phosphorus, two nutrients that help keep bones healthy and strong. One can grow strong bones and reduce the chances of arthritis and osteoporosis by consuming adequate calcium in their daily diet. Chicken helps to boost immune cells in the body, which helps fight infection and recover from illness. Its protein also includes amino acids that help produce antibodies to combat illness. The Vitamin B5, magnesium, and tryptophan in chicken help to alleviate stress and improve mood. Commenting on this, Nutritionist Ms. Shivangi Tiwari, Breathe Wellbeing said, "Protein is a critical nutrient for our immune system. Chicken, being a high-quality protein food, can help to boost immunity. Aside from protein, chicken is also a wonderful source of a range of other nutrients, such as Retinol (an active form of Vitamin A), Vitamin B B3, Vitamin B9, Zinc, and others, all of which aid in immune function. Therefore it's important to include chicken as part of one's daily diet. 🐔"

Perstorp is proud to announce that Dr. Antonia Tacconi has joined the Animal Nutrition team as Global Product Manager Gut Health, with effect from 1 February 2022.

Reporting to Jeroen Pos, Vice President of Marketing & Technology for Animal Nutrition, Dr. Antonia Tacconi brings technical and commercial expertise to this exciting role. Aart Mateboer, Executive Vice President for Perstorp Animal Nutrition commented "I am very excited to have Antonia on board. This role requires a mixture of detailed technical knowledge with strategic and commercial awareness, all of which Antonia brings to Perstorp from her experience and career in the animal nutrition industry." Antonia graduated in 2015 from the University of Natural Resources and Life Sciences with a PhD in Bioanalytics focusing on the detection of antibiotic residues in animal-derived foods. Since then, her career in the international feed additives



## Antonia Tacconi joins Perstorp in Pivotal Role as Global Product Manager for Gut Health

industry has given her experience of working with various types of feed additives as well as with a range of livestock species. "This is an exciting time to join Perstorp. I look forward to using my knowledge and experience to drive product strategy in this expanding focus segment. With the ever-increasing responsibility to produce safe, healthy food for a growing global population in a sustainable way, we have plenty to do. I'm confident that the Perstorp portfolio of gut health products will continue to deliver towards these purposes and that through innovation we will meet the demands of tomorrow." commented Dr. Tacconi. The gut health segment is at the core of Perstorp's strategic direction, and Tacconi's role is pivotal for its success. As an expert and known innovator in the field of esterified organic acids for both gut health and preservation, Perstorp is developing a healthy innovation pipeline to meet the requirements of the future. 🐔

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#### Presentation:

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**CU**  
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**Mn**  
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(For 'Trace Mineral Optimization' in Poultry)

\*TMO Plus standard premix from Novus\* contains MINTREX\* minerals as source of Zn, Cu and Mn  
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# EGGS and PROFITABILITY

**Dr. Kaushik De**  
Director, Technical Services,  
SCA Novus International

## Importance of Eggs:

Eggs are an amazing self-contained food source. Each one represents the most complete source of protein available in a single form. That's why it is so important to meet the needs of a growing population by consistently providing eggs that are of the highest quality, both internally and externally.

The eggshell quality is very important for the profitability of the layer operations. The target is to have the best eggshell quality during the whole life of the layers for having the biggest number of saleable eggs. Having a premium eggshell quality will allow to have more saleable eggs. For a good egg production, we need to produce the best pullet quality. The optimum characteristics of a premium pullet quality is the body development and good immunity status.

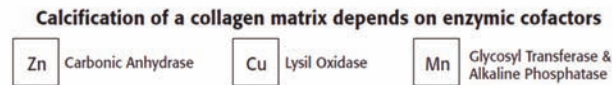
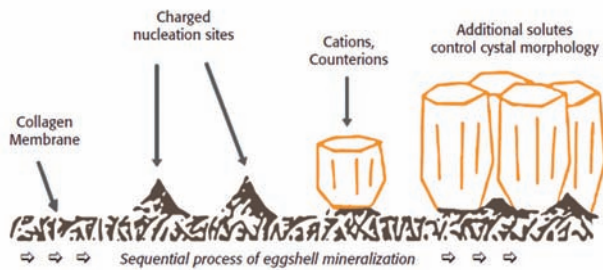
Whether they are bound for the table or a hatchery, high quality eggs begin with a well-structured hen nutrition program. Maintaining mineral balances supports shell strength, the internal structure of the egg and tissue integrity of the unhatched chick. And, as laying hens age, mineral nutrition plays an increasingly important role, ensuring continued production of plentiful, high quality eggs and the overall well-being of the hen. Optimal nutrition means optimal performance.

## Trace Mineral in eggshell formation:

The stages of eggshell mineralization are consecutively progressed in the distal portion of the isthmus (or red isthmus/tubular shell gland) through calcification at charged nucleation sites on the surface of the outer eggshell membrane. Then, organic aggregates are deposited on the surface of the outer eggshell membranes, where calcium carbonate spontaneously begins to precipitate in the form of calcite, and then microcrystals of calcite are arranged to form the shell attached to the outer membrane. When these processes complete, the eggshell has a well-orientated structure that is described as the mammillary cone layer, the palisade layer of the mineralized shell



*Trace minerals play an important role in enzyme activities that are responsible for maintaining eggshell formation and membrane quality*



with the main component of calcium carbonate, and the cuticle composed of glycoprotein.

If we see the Calcification process of the Egg shell it has two parts, the calcium shell, and the collagen membrane where the calcium shell will be deposited on. The strength and the structure of the collagen is influenced by the Zn, Cu and Mn. Using MINTREX in the diet will improve the structure of the collagen, making a better "basement" for the calcium crystal that will be deposited on top. The amount of Ca in small and big eggs is similar, so this collagen membrane will be more and more important as the eggs get bigger and the amount of Ca/cm<sup>2</sup> decreases.

The calcium amount will depend on the balance of Ca/P/Vitamin D of the diet and the deposition of the Ca will depend on several enzymes where the co-factors are Zn, Cu and Mn. A highly Bioavailable Chelated Mineral will provide the right levels of trace minerals for the activity of these enzymes.

### Trace Mineral in Bone Structure:

Bone has basically two Matrix. Organic Matrix which is the basal structure of the bone and is a bonding of multiple fibers, mainly collagen fibrils (fine fiber, approximately 1 nm diameter). The collagen fibrils are type I collagen; produced by the osteoblast, a specialized fibroblast. Collagen represents approximately 80 to 90% of the organic matrix

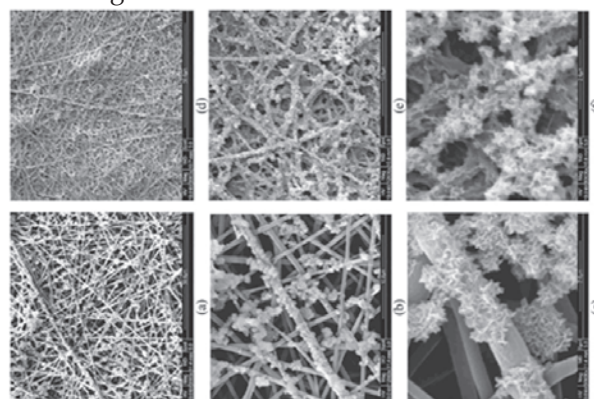


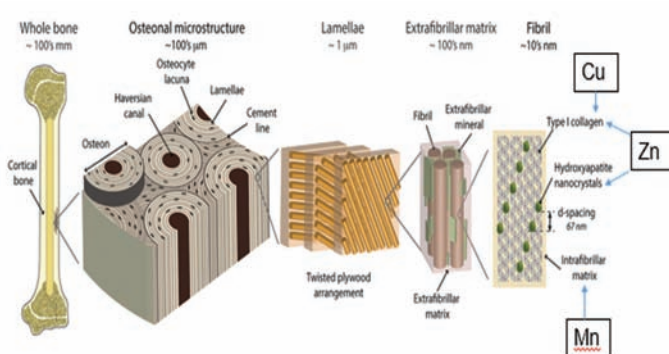
Fig. 2. Mineralization of n-HA on nanofibers after Ca-P treatment. (a) to (c) denote n-HA deposition on PLGA nanofibers. (d) to (f) represent n-HA deposition on PLGA/Col nanofibers.

- Inorganic part: it gives the strength to the bone. It's composed by hydroxyapatite crystals (Ca<sub>10</sub>[PO<sub>4</sub>]<sub>6</sub>[OH]<sub>2</sub>). These crystals are produced due to the osteoblast activity.

During the bone development Ca and P are very important but also the trace minerals play a key role in this process:

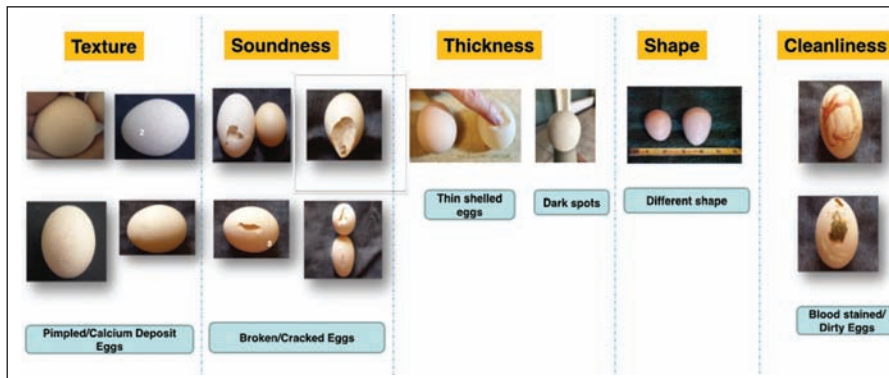
<b>Zn</b> Zinc	<ul style="list-style-type: none"> <li>Micromineral involved in enzyme function for eggshell deposition</li> <li>Critical cofactor for calcium metabolism enzymes</li> <li>Necessary for deposition of eggshells</li> <li>Zinc nutrition becomes increasingly important late in lay</li> </ul>
<b>Cu</b> Copper	<ul style="list-style-type: none"> <li>Important micromineral for crosslinks of microstructure</li> <li>An important cofactor in cartilage forming enzymes</li> <li>Important for shell membrane formation, the foundation of a quality eggshell</li> </ul>
<b>Mn</b> Manganese	<ul style="list-style-type: none"> <li>Important in the synthesis of mucopolysaccharides</li> <li>Mucopolysaccharides are critical for bone and cartilage formation</li> <li>Inadequate Manganese nutrition can lead to eggshell thinning and reduced hatchability</li> </ul>
<b>Se</b> Selenium	<ul style="list-style-type: none"> <li>Integrally involved in the hen's oxidation defense system</li> <li>Can have a positive effect on egg interior quality and Haugh Units</li> <li>A key mineral for a functioning immune system</li> </ul>
<b>Ca</b> Calcium	<ul style="list-style-type: none"> <li>Eggshell is composed of Calcium in the form of Calcium Carbonate</li> <li>Calcium is derived from the diet and medullary bone reserves</li> <li>Inadequate consumption results in reduced production, eggshell quality and overall bird health</li> </ul>
<b>P</b> Phosphorus	<ul style="list-style-type: none"> <li>Macro minerals play important support role for Calcium mobilization</li> <li>Imbalances can result in caged layer fatigue and end eggshell production</li> </ul>

Highly Bioavailable trace mineral helps improving the collagen cross linking and ossification in bone tissue matrix.



if we split it down the bone structure in smaller components, at the end we will see a matrix formed by collagen & intrafibrillar matrix and areas where Ca & P are deposited in the spots. Cu & Zn are important for development of collagen and nanocrystals and Mn for IFB matrix. A highly bioavailable chelated mineral will ensure proper formation of Collagen and intrafibrillar matrix and thereby ensure proper Ca & P deposition.

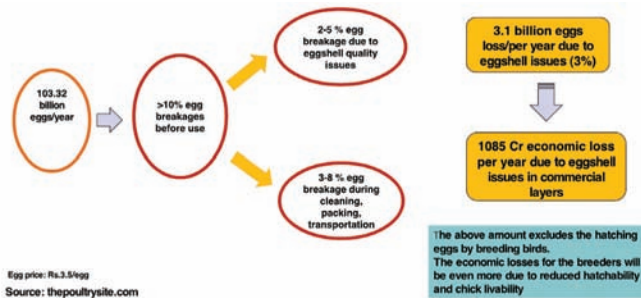
## Common Problems in Eggshell



Economic Losses due to Poor Egg Shell quality & Egg Breakage:

How Much Trace Mineral is squeezed by Egg?

The feed of commercial layer and breeder can easily cause trace mineral deficiency in bird. Normally



these diets contain high amount of Ca & phytate Phosphorus which is around 0.4-0.5% considering usage of bran in layer diet.

Let's see below example,

Now let's take Zn as an example and see how much of Zn is getting excreted and Absorbed through feed.

- Egg yolk: 30% egg white 58% egg shell 12%
- Trace mineral in yolk: Zn 38-60mg/kg Cu 2-2.5 mg/kg Mg 1.1-1.2mg/kg
- Trace mineral in egg white: Zn 0.5 mg/kg Cu 0.02 mg/kg Mg 0.04mg/kg
- Every 100g eggshell content 3-4mg Zn and 8-10mg Fe

Trace mineral	Zn	Cu	Mn	Iron
Egg yolk	0.68-1.08 mg	0.04-0.05mg	0.02 mg	
Egg white	0.02 mg	0.001 mg	0.001mg	
Egg shell	0.02-0.03 mg			0.06-0.07 mg
<b>Total</b>	<b>0.72-1.11mg</b>	0.04-0.05mg	0.02 mg	0.06-0.07 mg

From the above example we can analyze a significant amount of Zn is getting excreted in the environment.

## Bis Chelate in Improving eggshell breaking strength:

MINTREX Chelated trace mineral is the only globally available bis chelate having 2:1 metal to ligand ratio and a neutral charge ensuring the metal has maximum protection.

Novus experience has shown that when we use MINTREX minerals at reduced dosage (Zn: Cu 20:4) it can improve the eggshell breaking strength and can replace high level of ITM (Zn: Cu 80:16

### Zn as sample:

Layer feed intake	110g
Zn in layer feed	85ppm
<b>Zn intake very day</b>	<b>9.35mg</b>
Zn bio-efficacy in Zn sulfate	20%
<b>Zn absorption</b>	<b>1.87mg</b>

➤ Zn excreted by egg 0.72-1.11mg, it is about 38%-59% of Zn intake in body!

Low dosage of MINTREX improve eggshell breaking strength (kg/cm<sup>2</sup>)

## Egg Shell Surface is smoother in MINTREX Group & denser than Control group.

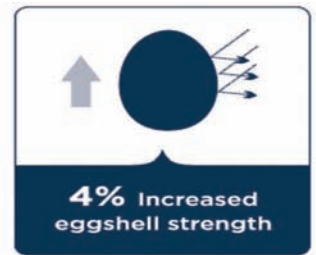
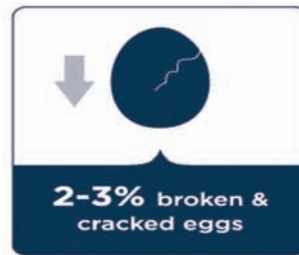
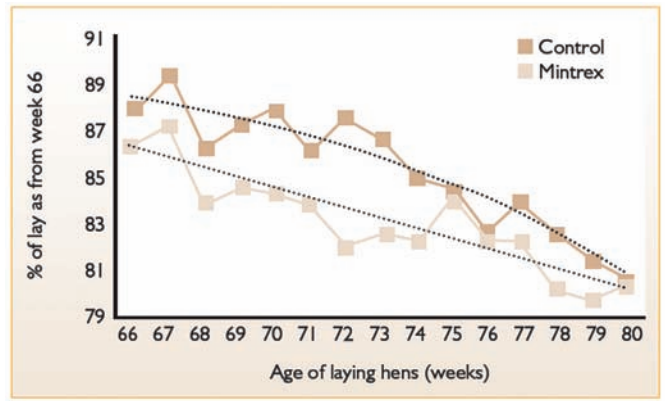
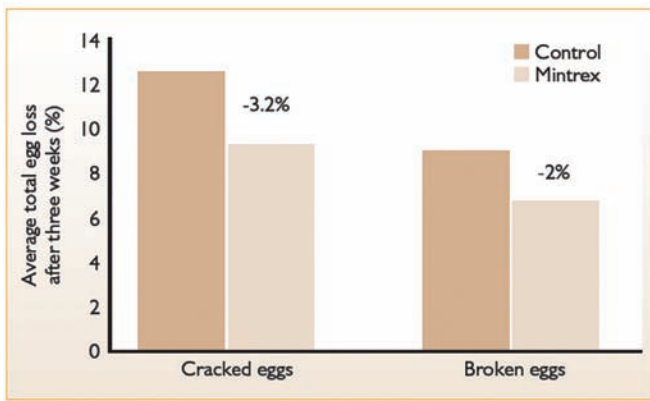
MINTREX improves eggshell strength and eggshell thickness in layer.

A trial comparing a diet supplemented with MINTREX and a normal feeding program showed improved eggshell quality late in lay, as well as improved egg weights without compromising shell strength. Comparisons with both inorganic trace minerals and other organic trace mineral sources indicate MINTREX improves tissue supply of zinc, copper, and manganese, and has a direct beneficial effect on connective

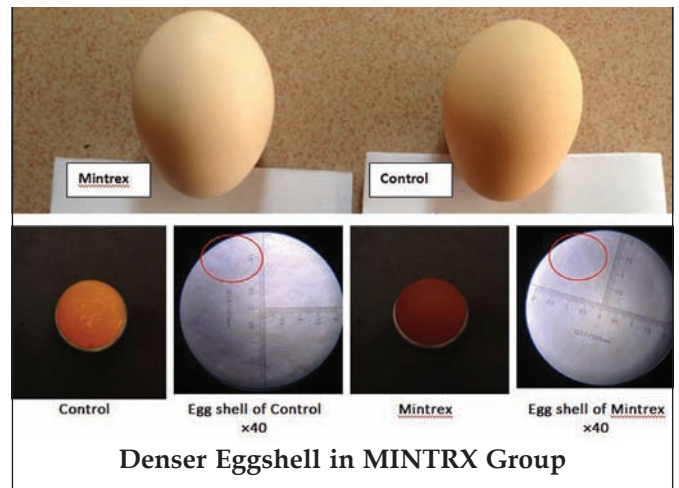
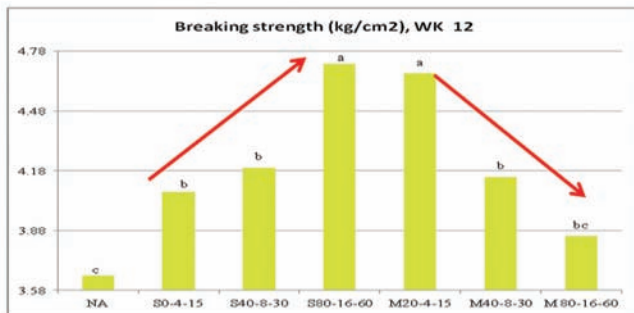
tissue and bone development in poultry.

In layers, these effects support improved bird health, eggshell strength and egg quality factors which are critical to today's industry performance parameters.

Novus meta-analysis of various research globally have shown that inclusion of MINTREX improves Egg shell quality.



\*Results based on meta-analysis of various research trials done globally



Treatment	Eggshell strength (kg/m <sup>2</sup> )	Eggshell thickness (mm)		
		Sharp side	Middle	Blunt side
Control	3.99 ± 0.72	0.35 ± 0.03	0.34 ± 0.02	0.33 ± 0.02
Mintrex	4.39 ± 1.04**	0.37 ± 0.02**	0.38 ± 0.02**	0.36 ± 0.03**


\*\* p<0.01

### Conclusions:

Egg quality, both internal and external, determines the degree of profitability in commercial layer operations. Trace minerals play an important role in enzyme activities that are responsible for maintaining eggshell formation and membrane quality. The risks associated with trace mineral deficiency include reduced egg mass and poor eggshell quality.

For any layer operation, getting more saleable eggs is the key to increasing profitability. Challenges such as dirty eggs, broken and weak shells can lead to poor

interior quality, due to potential contamination from external pathogens. The most effective way to achieve the highest production possible is by boosting flock performance through optimal nutrition.

In addition to performance improvements, feeding layers a special mineral enriched diet can enhance the mineral content of eggs they produce. Zinc, copper, and manganese can be passed on to the egg in higher levels, provided the animal is fed a highly bioavailable source of those trace minerals. Consumers eating these eggs will then have the added benefit of consuming more healthy minerals in their diet. Only MINTREX chelated trace minerals consistently deliver more essential trace minerals to the bird, while also minimizing mineral excretion. That translates into healthier layers, more efficient production and ultimately, improved profitability for the producer. 

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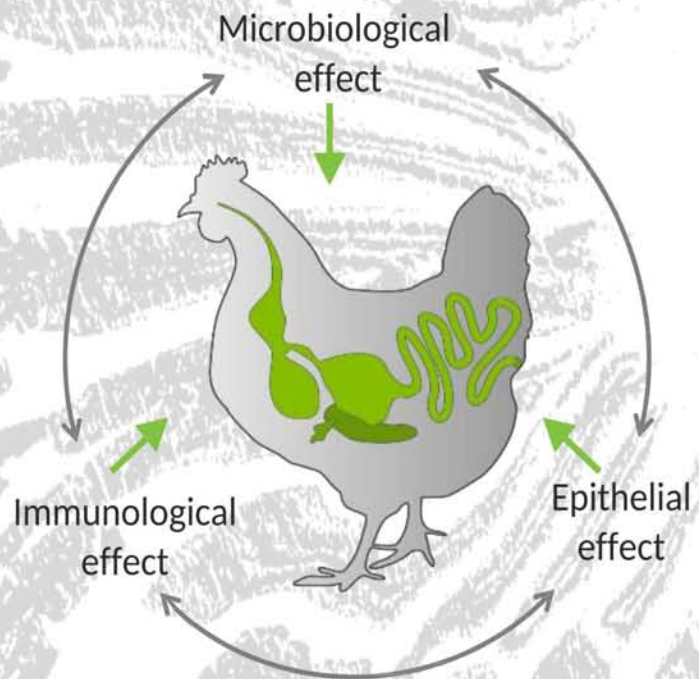


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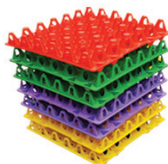
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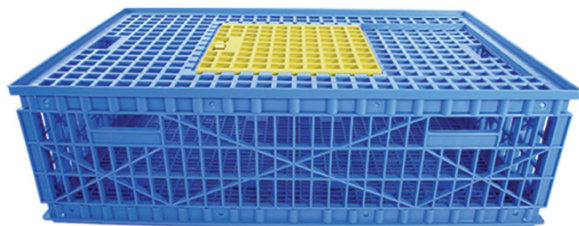
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# Saving Feed Cost by Reformulating Broiler Diets with the use of

**Nutrase BXP 200 TS**

**N**utraseBXP 200 TS is a blend of enzymes, containing endo-xylanase,  $\alpha$ -glucanase,  $\alpha$ -amylase and 6-phytase activities. This multi-enzyme complex is developed for production animals to guarantee an optimal digestibility of feed and supply of nutrients to the intestinal microbiota to improve gut health.

**Endo-xylanase and  $\alpha$ -glucanase.** Arabinoxylans (AX) and  $\alpha$ -glucans are important anti-nutritional factors in raw feed ingredients. Their most well know anti-nutritional effect is the increase of viscosity in the intestinal content, making digestion and absorption of nutrients extremely difficult. Also, unfavorable hindgut fermentation is stimulated. The presence of endo-xylanase and  $\alpha$ -glucanase in Nutrase BXP 200 TS reduces these anti-nutritional effects of feed ingredients.

**$\alpha$ -amylase.** Starch is the main energy source in cereals for production animals. During starch digestion,  $\alpha$ -amylase and gluco-amylase are produced by the animal and secreted into the small intestines. However, in young animals and during transition periods the endogenous production might be insufficient. In this case, the presence of  $\alpha$ -amylase in Nutrase BXP 200 TS will support the animal to digest starch. **6-phytase.** Phosphorous (P) is a key element in all known forms of life. In cereal grains, P is mainly stored in the form of phytic acid or phytate. Monogastric animals are unable to utilize P from phytic acid or phytate, as they lack endogenous phytase. Nutrase BXP 200 TS contains a bacterial 6-phytase that releases phosphate from phytic acid or phytate and increases the availability of a whole range of nutrients (e.g. P, Ca, Zn, Fe, Cu). The aim of this trial is to investigate the effect of Nutrase BXP 200 TS to a corn-based diet with reduced energy, P and Ca matrix values on broiler performance.

## Materials And Methods

A pen trial was conducted in which Cobb 430Y male broilers were reared in a poultry house (AgriVet, India) for 42 days. A three phase dietary program (starter d0-14, grower d15-28 and finisher d29-42) was used in which all diets were fed *ad libitum*. A total of 180 broilers were randomly allocated to 3 treatments (Table 1) with 6 replicates per treatment (11 birds/pen at the start of trial). The composition of the dietary diets is listed in Table 2. Body weight and feed intake were recorded at weekly intervals. Feed conversion was calculated from the measured weight gain and feed intake. Pen mortality was recorded to correct feed intake.



**Dr. Amit Patra**



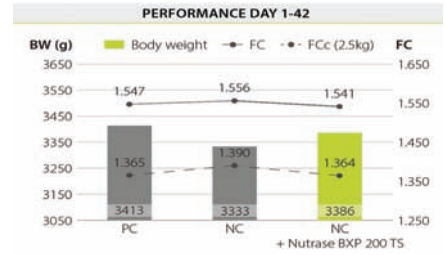
**Jesse Stoops**



**Geert  
Van de Mierop**

**TABLE 1: DESCRIPTION OF DIETARY TREATMENTS**

TREATMENT	DESCRIPTION
Positive control (PC)	Corn-soy-based broiler diet. The diet was formulated according to the nutrition specification of Cobb 430Y without enzyme supplementation
Negative control (NC)	The positive control diet was reformulated to contain approximately 100kcal/kg, 0.14% and 0.12% less apparent metabolizable energy (AME), phosphorous (P) and Calcium (Ca), respectively, without enzyme supplementation
Negative control + Nutrase BXP 200 TS	Negative control diet supplemented with 200 g/ton of feed Nutrase BXP 200 TS



**TABLE 2: NUTRIENT COMPOSITION OF THE EXPERIMENTAL DIETS**


	STARTER D0-14		GROWER D15-28		FINISHER D29-42	
	PC	NC	PC	NC	PC	NC
Ingredients (g/kg)						
Corn	541.3	566.6	568.5	595.2	583.8	622.9
Soybean meal	301.5	296.6	249.6	228.8	225.4	220.4
Full fat soybean	60.0	36.6	80.0	80.0	80.0	80.0
Meat-bone meal	25.0	25.0	25.0	25.0	25.0	25.0
Rape seed meal	-	25.0	-	24.5	-	-
Rice bran	20.0	20.0	25.0	20.0	25.0	20.0
Soybean oil	15.2	-	18.8	-	30.9	8.2
Dicalcium phosphate	18.4	8.8	16.7	7.3	13.7	4.3
Nutrients (%)						
Crude protein	23.00	23.00	21.00	21.00	20.00	20.00
Calcium	0.90	0.78	0.84	0.72	0.76	0.64
Available P	0.48	0.34	0.45	0.31	0.40	0.26
Lysine	1.28	1.28	1.15	1.15	1.08	1.08
Methionine	0.47	0.62	0.56	0.56	0.54	0.54
AME (kcal/kg)	2900	2800	3000	2900	3100	3000

**Results** : At the end of the trial period (day 42), the birds fed the negative control diet presented the worst results for body weight and feed conversion. The nutrient and energy reductions of the negative control diet effectively reduce broiler growth performance. The supplementation of Nutrase BXP 200 TS resulted in a higher body weight

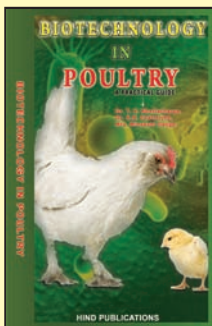
(+ 53g) and improved feed conversion (by 2.6 points) compared with the negative control group. Moreover, the feed conversion of the Nutrase BXP 200 TS group equaled the FC in birds fed the positive control diet.

**Conclusions** : The supplementation of Nutrase BXP 200 TS improved the performance of broilers fed diets

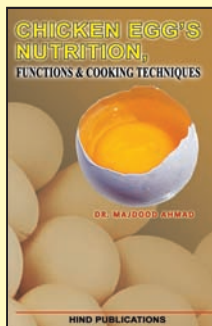
with reduced nutrient and energy levels.

Based on these trial results, Nutrase BXP 200 TS can be supplemented to a corn-based diet with matrix values of 100 kcal AME, 0.14% P and 0.12% Ca without any probable detrimental effect on broiler performance. 

## BOOKS FOR SALE



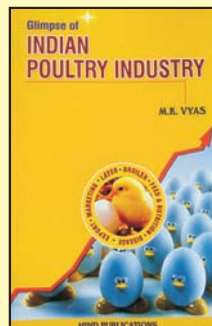
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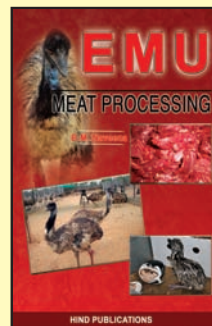
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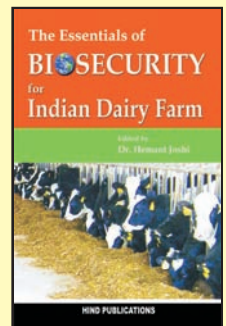
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# Breeding Sustainability – Aviagen Illustrates CO<sub>2</sub> Reduction Contribution to Global Poultry Industry


How can the food production chain meet the needs of the world's ever-growing communities without overwhelming the planet? Aviagen® addresses this question through "Breeding Sustainability." Sustainable poultrybreeding contributes to a decrease in carbon emissions through a continuous improvement in biological efficiency, fitness and welfare traits. Feed Conversion Ratio (FCR) or the rate at which feed is converted to body weight is a key indicator of biological efficiency and has the greatest direct impact on the industry's carbon footprint. Due to an FCR improvement of 1.5-2.0 points per year, Aviagen contributes to a 1% year-on-year carbon footprint reduction. This video tells the story of the "FCR Advantage" through a balanced breeding approach, resulting in a yearly reduction in the poultry industry's greenhouse gas (GHG) emissions. The global population is growing. The United Nations (UN) estimates just over 8.5 billion people by 2030, and the world will face the challenge of providing food for everyone. The OECD-FAO Agricultural Outlook 2021-2030 predicts that meat production will need to rise by 44 million metric tonnes by 2030, with half of the increase supplied by poultry. The food industry currently contributes close to 25% of the world's annual GHG emissions, and of this amount, poultry meat is responsible for about 6%.

As a result of FCR improvements, the modern broiler generates 50% less carbon footprint than the bird in 1970, and fast forwarding to 2030, the bird of the future will create a 15% lower carbon footprint than the bird of today. In 2020, 133.3 million metric tonnes of poultry meat were produced globally, at a carbon cost of 6 kilograms CO<sub>2</sub> for every kilogram of meat. That translates to 800 million tonnes of CO<sub>2</sub>. "To illustrate the impact with a hypothetical example, based on our FCR gains, if every bird were an Aviagen bird, this amount would be reduced by 8 million metric tonnes per year. To put it in perspective, this is the carbon equivalent of flying around the world on a Boeing 747-400 5,906 times," explained Aviagen's Director of Global Genetics Dr.



Santiago Avendaño. "As a poultry breeder, we are at the beginning of the food production chain, and we take our responsibility of contributing to the sustainability of the entire industry seriously. We have worked for years to breed efficiencies that make poultry production more sustainable, while at the same time advancing bird health, welfare and performance. Because we care about the planet, our customers and the communities they serve, we are committed to continually breeding for sustainability for decades to come." Aviagen has made Balanced Breeding one of its top 5 corporate commitments. Balanced Breeding simultaneously promotes the Environmental, Economic and Social pillars of sustainability, helping farmers around the world feed their communities with a healthy, affordable and sustainable source of protein, while breeding efficiencies that help to preserve our planet for today and for generations to come.

## About Aviagen

Since 1923, Aviagen® has been a preferred global poultry breeding company with a mission to help its customers – the world's chicken meat producers – supply sustainable, affordable and nutritious protein to their growing communities. Putting into practice its corporate value of "Breeding Sustainability," Aviagen implements efficiencies that make commercial chicken production environmentally and socially responsible and economically beneficial to producers, while at the same time promoting bird performance, health and welfare. To meet varied market demands, Aviagen offers a full portfolio of breeding stock under the Arbor Acres®, Indian River® and Ross® brand names. The Rowan Range® and Specialty Males® target slower-growing and other niche market needs. Aviagen is based in Huntsville, Alabama, US., with operations across the UK, Europe, Turkey, Latin America, India, Australia, New Zealand, Africa and the US, and joint ventures in Asia. The company employs close to 8,000 people, and serves customers in 100 countries. 

# Monensin - A Tool For Methane Emission & Rumen Related Disorder

## INTRODUCTION

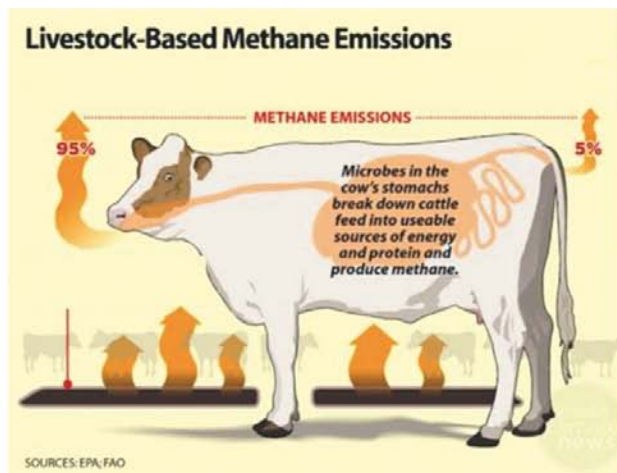
- Microbial digestion by ruminant microflora yields metabolites able to be used for synthesis of milk constituents, as well as carbon dioxide and methane.
- The types of metabolites arising from fermentation (including acetic, propionic and butyric acids) are affected by diet composition and the microflora, especially bacterial species and the protozoa.
- India hosts 18% of the global dairy cattle population. More over urbanization in India has increased rapidly and the share of urban population has doubled in the past 60 years.
- Greenhouse gas emissions from livestock farming and in particular enteric methane (CH<sub>4</sub>) from ruminants are criticized for being one of the main contributors to climate change.

## WHY METHANE?

- Methane is an especially potent trace gas due to its global warming potential, 25 times that of carbon dioxide.
- It is the second largest anthropogenic greenhouse gas, behind carbon dioxide.
- Also, methane is able to increase ozone in the tropospheric region of the atmosphere where the greenhouse effect occurs.
- Globally, 50–60% of methane emissions are from the agricultural sector, specifically from livestock production operations; the principal source of methane is from ruminant animals.

## HOW METHANE IS PRODUCED BY RUMINANTS

- Ruminant livestock – cattle, sheep, buffalo, goats, have a fore-stomach (or rumen) containing microbes called methanogens which are capable of digesting

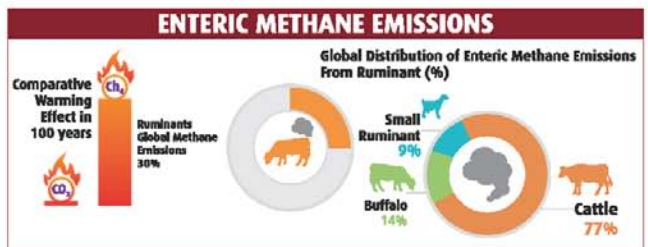


- coarse plant material and which produce methane as a by-product of digestion (enteric fermentation).
- This microbial fermentation is referred to as enteric fermentation, produce methane as a by-product, which can be exhaled or eructated by the animal.
- The amount of methane produced and excreted by an individual animal depends primarily on the animal's digestive system and the type of feed it consumes.

- Rumen archaea are strictly anaerobic and are the only known microorganisms present in the rumen capable of producing methane. Such archaea are referred to as methanogens.

## WHAT IS METHANOGENS

- Methanogens belong to the domain Archaea and the phylum Euryarchaeota Unlike Bacteria, methanogens lack peptidoglycan in the cell wall.
- Archaea are found in the rumen in the range of 10 to 10<sup>10</sup> cells per ml, accounting for less than 4% of the microbial community. Methanogens are among the strictest anaerobes.



- Most methanogens remove hydrogen gas by reducing CO with hydrogen gas to form methane. Producing methane keeps hydrogen concentrations in the rumen low, allowing methanogens to promote the growth of other species, and enabling a more efficient fermentation.
- Methanogenesis is the only mechanism of ATP synthesis available to methanogenic archaea.
- However, methane produced in the rumen is eructated, leading to atmospheric pollution. It should also be noted that methane production by archaea represents an energy loss of about 2 – 12% of gross energy intake, meaning this energy is no longer available for animal growth, lactation, maintenance or pregnancy.
- Manipulating the diet of ruminants to reduce the number of methanogens would therefore both help reduce the negative impact on the environment, and also improve the efficiency of livestock production.

## DIETARY COMPOSITION

- The components of the diet fed especially type of carbohydrate, are important for methane production as they are able to influence the ruminal pH and subsequently alter the microbiota.
- The digestibility of cellulose and hemicellulose are strongly related to methane production.
- Grinding forage feed before it is ingested by the cows also seems to decrease the production of methane.
- Increasing the rate of digestion and flow through the gastrointestinal tract limit the time available for methane to be produced within the rumen.
- It is important to note that increasing the amount of rapidly fermentable carbohydrates in a diet can increase the rate of passage from the rumen, as well as lower the ruminal pH.

## WHAT ARE IONOPHORS

Ionophore antibiotics are molecules diverse in chemical structure having several oxygen atoms spaced throughout the molecule. Ionophore have polar and nonpolar regions that enhance cation entrapment and interaction with membranes. Carboxylic acid, polyether ionophore were initially developed to improve the performance of cattle by altering the pattern of rumen fermentation.

## CONTROL OF METHANE EMISSION BY DIETARY SUPPLEMENTATION OF MONENSIN

- Monensin is a carboxylic polyether ionophore compound fed to ruminants to modify rumen fermentation dynamics by selectively inhibiting growth of gram-positive bacteria, which produce most of the acetate, lactate, and hydrogen in the rumen.
- Anaerobic fermentation in the rumen derives energy from substrate oxidation by the transfer of electrons (and hydrogen) to acceptors other than oxygen. The reduced compounds formed are mainly VFA and methane. Fermentation balance requires that an increase in propionate production must be accompanied by a decrease in methane production.
- Up to 12% of the gross energy of feed can be lost as eructated methane.
- Interest has been renewed in monensin as a mitigation strategy for methane production, as it is known to inhibit gram-positive microorganisms responsible for supplying methanogens with substrate for methanogenesis.
- Ionophores inhibit methanogenesis by lowering the availability of hydrogen and formate, the primary substrates for methanogens. Bacteria that produce these substrates are sensitive to ionophores, whereas methanogens are more resistant.
- This favors growth of gram-negative bacteria and production of propionate in the rumen. Increased production of propionate in the rumen increases hepatic gluconeogenic flux which improves the overall energy status of ruminants.
- It is hypothesized that monensin does not affect methane production by inhibiting methanogens, but instead inhibits the growth of the bacteria, and protozoa, providing a substrate for methanogenesis.
- The reductions in methanogenesis following ionophore supplementation vary from minor to 25%.
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- The reductions in methanogenesis following ionophore supplementation vary from minor to 25%.

## MONENSIN HELPS TO CONTROL RUMEN RELATED DIGESTIVE DISORDERS

Certain rumen related digestive conditions, e.g., bloat, acidosis, and ketosis are related to disturbances in ruminal fermentation. These conditions are reduced when Monensin are fed because of a specific effect on a particular bacterial species or changes in end products of fermentation.

### BLOAT


Bloat results from the excess production of stable foam in rumen. Gas becomes entrapped within the reticulo-rumen and failure of eructation mechanism caused the abdominal distension. The acute nature of the disorder often leads to death within hours after the ingestion of bloat provocative meal. Feeding an ionophore can also reduce the potential for bloat. Monensin inhibits rumen protozoa that normally produced gas & foam stabilizing substances thus leading to a reduction in bloat potential.

### ACIDOSIS

Current levels of milk production and the relative cost of grain to forage have resulted in an increased proportion of rapidly fermentable carbohydrate in the diet of dairy cows. Consumption of rapidly fermentable diets places the dairy cow at risk for acidosis. Acidosis is generally linked to lactic acid production. In many cases, digestive disorders are associated with or secondary to other health problems such as mastitis, retained placenta, or metritis associated with calving. Ionophores have the potential to ameliorate the disease of acidosis. Ionophore effects on lactic acid producing strains of bacteria such as *Streptococcus bovis*. Monensin inhibit many of the major strains of rumen bacteria that produce lactic acid.

### KETOSIS

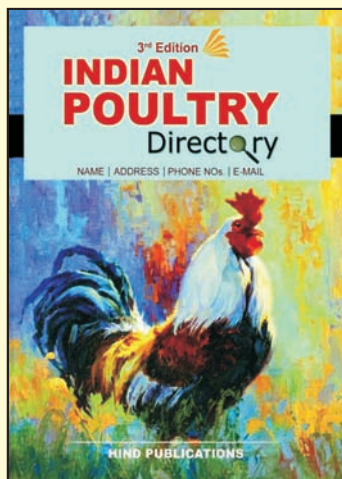
The sudden onset of lactation places significant metabolic demands on the cow. Glucose precursors, primarily propionate and amino acids, become essential for a successful lactation. Glucose synthesis must increase to meet the needs of lactose synthesis.

- High producing dairy cows meet the increased energy requirement by mobilizing body fat. Adipose tissue releases NEFA into the blood. The NEFA may be oxidized, reesterified, or metabolized to ketone bodies.
- The liver of the dairy cow has a higher rate of triglyceride synthesis than secretion. This imbalance contributes to fat deposition in the liver (fatty liver).
- Ketogenesis by the liver leads to elevated blood concentrations of BHBA, acetoacetate (ACAC), and acetone.
- Excessive ketogenesis, resulting in most cases from reduced feed intake, often leads to the metabolic disease of ketosis.
- Cows fed monensin had lower concentrations of BHBA in blood during the first 3 wk of postpartum & other studies have reported reduced blood concentrations of NEFA and BHBA when monensin was fed postpartum.
- This pattern of energy metabolites in blood is indicative of an improved energy status for cows fed monensin especially during early lactation. 

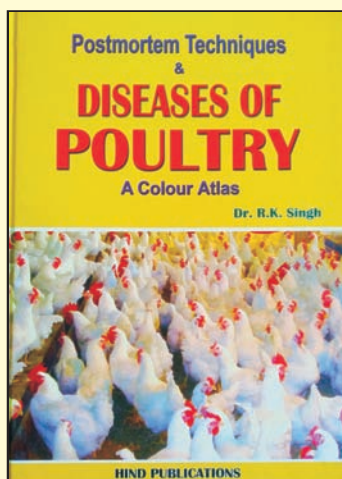
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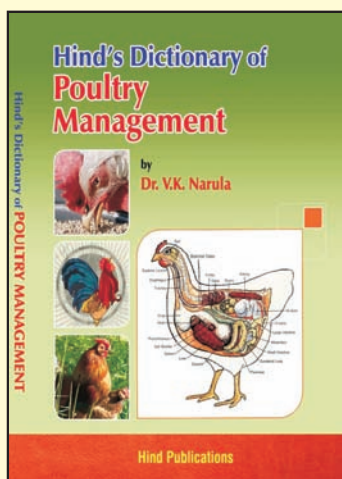
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## International companies have confirmed their participation in the ILDEX Exhibitions AS Vietnam and Indonesia plan to open their borders in in March and April

Almost all countries in Asia have maintained a balance between Low-Moderate-Strict Entry Requirements with the same normal rules that all


travelers need to follow, such as fully vaccinated travelers, proof of a negative RT-PCR test result for COVID-19 issued no more than 72 hours prior to departure, and still having quarantine rules to follow. But beginning in March, many countries will relax some travel restrictions, signaling to the trade industry that it is time to re-plan your trip to the trade show in 2022.

### Update: Vietnam Travel Restrictions

Vietnam's tourism ministry proposed that the country be fully reopened to foreign visitors and that nearly all travel restrictions be lifted from March 15, three months earlier than planned. The proposal includes maintaining a one-day quarantine requirement for visitors plus requiring negative COVID-19 tests before departure and upon arrival. The ministries proposed that the government resume the unilateral visa exemption policy for 13 countries and the bilateral visa exemption for 88 countries and territories, as it had been prior to the pandemic. The 8th edition of **ILDEX Vietnam** is thus scheduled for August 3-5, 2022, at Hall A1, SECC, Ho Chi Minh City, Vietnam, organized by VNU Asia Pacific and VEAS, the local organizer.

### Update: Indonesia Travel restrictions

In April, Indonesia is considering lifting all quarantine requirements for inbound travelers, as COVID-19 hospitalizations and fatality rates remain under control despite a resurgence in cases. In the meantime, the required quarantine period for incoming travelers who have received a third dose of vaccines is reduced to 3- days from 5-days, according to LuhutPanjaitan, the cabinet minister in charge of the pandemic response in Java and Bali, in his weekly briefing. Also, the PCR testing requirements will remain in place for those arriving travelers. The 5th edition of **ILDEX Indonesia** is scheduled for November 9-11, 2022, at the ICE, Jakarta, Indonesia.

**Hind Poultry** will continue to update opening of the borders across the globe wherever poultry and livestock exhibitions will take place. 





## STRAINS MATTER: Selected combinations is the key to a successful solution

Christophe Bostvironnois, DVM – Chr. Hansen, Hoersholm, Denmark

Roland Koedijk, PhD

Bacteria were first observed and described by Antonie van Leeuwenhoek in 1676 when he published his observations in a series of letters to the Royal Society.

Now, centuries later it is estimated that there are approximately 1 trillion microbial species on earth – a diverse population with major differences between them. If you would compare this number to all plant and animal species combined (approximately 10 million species), then we can conclude that we live in a bacterial world.

Everywhere around us we are surrounded by bacteria. Humans and animals have an interesting relationship with bacteria. For instance, we rely on them as bacteria help us with the digestion of fibres in our intestinal tract – fibres that we cannot digest ourselves.

Mammals rely on microbes to digest these for them instead. There is a clear mutual benefit in this relationship.

On the other hand, we also might fear them as some microbial species can be pathogenic and can cause diseases. It all depends on the species and strains of microbes. **Strains matter.**

Microbes (like all species) are described in different levels from Domain, Phylum, Class, Order, Family, Genus down to Species. In Table 1 the classification steps are shown for bacteria (left) and for humans (right).

Scientific classification	<i>Bacillus subtilis</i>	<i>Homo sapiens</i>
Domain	Bacteria	Animalia
Phylum	Firmicutes	Chordata
Class	Bacillus	Mammalia
Order	Baciliales	Primates
Family	Bacillaceae	Hominidae
Genus	Bacillus	Homo
Species	<i>Bacillus subtilis</i>	<i>Homo sapiens</i>

Table 1. Classification steps for bacteria and humans.

In the human case it ends with Homo Sapiens at species level. However, the same steps take the bacterial definition down to *Bacillus subtilis* level, while there is a bigger variety of microbes than people in a species level. Providing microbes with a strain code makes it possible to identify which *Bacillus subtilis* is being referred to.

Microbe strains and their characteristics differ significantly from each other within a species level.

Within *Bacillus subtilis*, there can be thousands of different strains which can be considered as unique individuals. Strains can be considered as individuals within a population.

Consequently, a colony of strains is then like a clone population of the same individual.

A strain is a subtype of a microbial species with:

- Unique genetic identity
- Distinctive morphological, biochemical and behavioural features

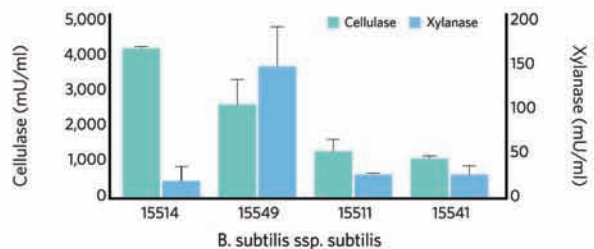
For instance, the bacterial species *Bacillus subtilis* consists of more than 1,000 strains that are recorded in international strain banks. In contrast: the 250 cattle, 190 dog, and 65 chicken recognised breeds together are not close to the 1,000 *Bacillus subtilis* diversity within one species. A few examples are provided to highlight some of the diversity found within *Bacillus subtilis*.

### EXAMPLE 1

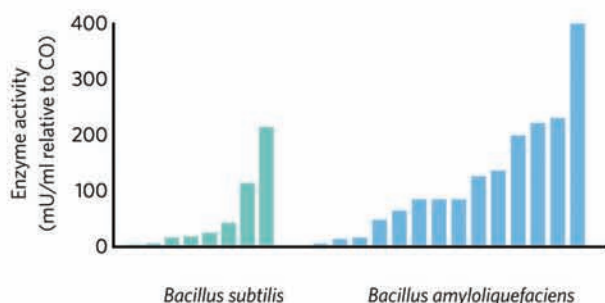
#### Enzyme production characteristics of *Bacillus subtilis*

Cellulase and xylanase are two fibre degrading enzymes needed to break down cellulose and hemicellulose, respectively. Their activity varies exponentially across different *Bacillus* strains.

Fig. 1a. Cellulase and xylanase level produced by four *Bacillus subtilis* strains as identified by their strain code (modified from Larsen et al. 2014).



**Fig. 1b.** *Bacillus subtilis* and *Bacillus amyloliquefaciens* strains with their xylanase activity.



*Bacillus* strains differ significantly within the *Bacillus subtilis* group in terms of cellulase and xylanase activity. This shows that not all *Bacillus subtilis* will therefore have the same effect when fed to an animal as a probiotic.

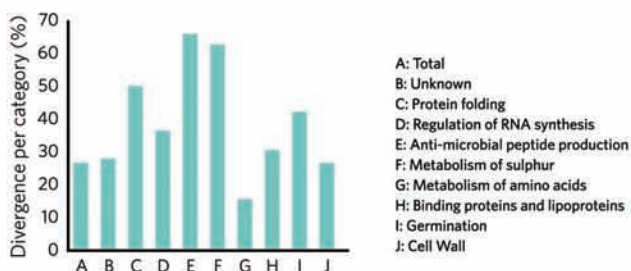
**EXAMPLE 2**

**High genetic diversity within *Bacillus subtilis***

In the same category or function, genes of the same strain or species can be identified as divergent if their expression would lead to a different outcome.

The number of genes associated with different category groups and the levels of total divergence among a certain strain identify diversity can be evaluated by genotyping. In Fig. 2, 17 different *Bacillus subtilis* were genotyped (Earl et al. (2017) in order to understand the level of genetic similarity for a certain function.

**Fig. 2.** Level of genetic divergence between 17 *Bacillus subtilis* strains (modified from Earl et al., 2017).



Traits crucial for the survival of the strain were identified such as: cell wall production, metabolism, germination, etc. We can see a very high diversity of genetic divergence for most of the function, from 16% for metabolism of amino-acids to even 66% of divergence for anti-microbial peptide production.

**EXAMPLE 3**

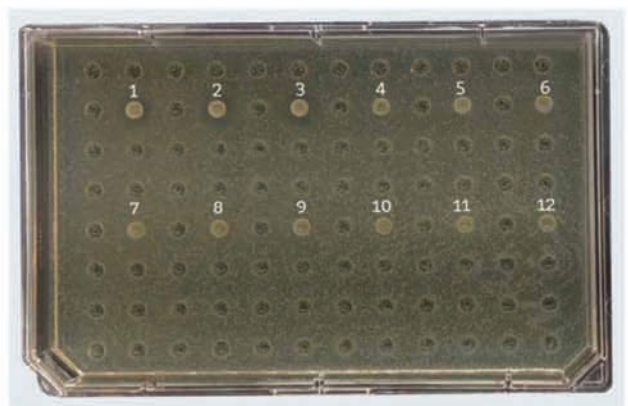
**Pathogen inhibition activity**

To test inhibitory effects against *Salmonella heidelberg* an *in vitro* pathogen inhibition test was conducted in Denmark (EXP-18-AH5439).

*Salmonella heidelberg* was plated in agar and *Bacillus* strains were inoculated to see their inhibitory effects to this pathogen. Inhibition zones were measured. The inhibitory activity of different *Bacillus subtilis* strains against the pathogenic bacteria *Salmonella heidelberg* varies greatly. Some *Bacillus* strains have no effect on *Salmonella* inhibition, while others do.

In Fig. 3, we can visualise the pathogen inhibition effect of some *Bacillus* strains from Chr. Hansen bank of strains vs other *Bacillus* strains present on the market.

**Fig. 3.** *Salmonella heidelberg* inhibition by different *Bacillus* (Chr. Hansen Animal Health Innovation). Products were diluted in peptone saline diluent. Product suspensions were added to 'hedgehog' plate. 1,2,3 = inhibition, 4-12 = no inhibition.



**Conclusion**

Assessing bacterial genetic diversity is critical for strain identification. Selecting and differentiating strains is the basis for success as different strains all have unique properties. When the right strains are selected for the right target solution they can be an effective solution to counter major food and health challenges.

There is not one strain that is effective against each problem. It is a matter of selecting the right strains or combination of strains for the right objective.

Chr. Hansen recently selected three *Bacillus* strains in a new product for the poultry market: **GALLIPRO® Fit**. The foundation was the selection and combination of strains that were most effective for the poultry industry. The strains were selected due to their strong pathogen inhibition and enzyme production abilities.

**Strains matter.** Selected combinations of strains is key to a successful solution from which poultry farmers can benefit.



# Heat Stress Management

Srinivasa



The major poultry producing areas in India are subject to high environmental temperatures from April to June. It is customary for egg producers to experience increased heat-related mortality and reductions in egg production, bird feed intake and body weight growth for rearing-stage pullets during summer. An efficient heat stress management system is required to combat the negative effects of heat stress. Below mentioned are few management practices that can reduce the impact of heat stress on performance.

## Heat and Humidity

It is not only increased temperature that causes discomfort to the birds, but the combination of temperature and humidity. The sum of ambient temperature in Fahrenheit (°F) and relative humidity (RH) percent is called “Heat Stress Index.” (e.g.: Temperature: 80° F + 70% RH = Heat Stress Index of 150).

*Rule of Thumb: A Heat Stress Index of 160 and above is more likely to cause heat stress and negatively affect flock performance.*

In general, environmental temperature rises during the day while %RH falls. The opposite effect occurs at night (temperature falls while %RH rises). Therefore, during the hot season, it is possible for birds to feel the effects of heat and humidity discomfort at any time during the day and night, depending upon the temperature and humidity in the location. It is difficult to regulate body temperature in extreme hot and humid conditions without additional care and management; hence it is important to measure the temperature and humidity at different periods during the day and night to adopt an ideal heat stress management program.

Temperature		Heat Stress Index														
		Percent (%) Relative Humidity														
°C	°F	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
46.1	115	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205
43.3	110	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200
40.6	105	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
37.8	100	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190
35.0	95	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
32.2	90	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180
29.4	85	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
26.7	80	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170
23.9	75	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165
21.1	70	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
18.3	65	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155
15.6	60	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150
12.8	55	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145

Heat Stress Index = Temperature °F + Percent (%) Relative Humidity

Bird comfort zone (Heat Stress Index < 140)

Begin taking heat stress reduction measures in the flock (Heat Stress Index = 140 to 160)

Heat stress conditions exist, take immediate measures to reduce heat stress in the flock (Heat Stress Index > 160)

## Preparation for Summer Management

1. Orient new poultry sheds in an east-west axis to minimize solar heating.
2. Remove any unneeded metal objects from around the sheds (machinery, vehicles and other junk) which could radiate heat into open houses.

3. Remove the manure in the houses in February /March. Manure is a source of heat and its presence in the shed increases the shed temperature .
4. Adjust the number of birds in the cage to have an ideal stocking density (72 inches<sup>2</sup> per hen, with 1 nipple per 6 hens). The overcrowding of birds in cages increases the heat produced within each cage and limits air movement around the birds.
5. Roof Insulation - Insulate the roof to reduce the heat radiation inside the shed. Use thatching material (rice straw, grasses or corn stalks) on the roof of the shed during the dry season to provide insulation from heat (Figures 1-2).



*Fig 1: Roof thatching provides insulation to keep the shed cool*



*Fig 2: Effective use of thatching materials to reduce roof heating*

Application of roof sprinklers with thatching can be utilized wherever water sources are adequate or White-wash roofs to increase heat reflection.

6. Fans with foggers provide the most benefit for evaporative cooling. Do not sacrifice water supply to the birds to run foggers. Use good quality foggers, which give a fine mist. Check for proper working of foggers before the onset of summer.
7. Roof overhangs should be at least 1.1 m to prevent sunlight from shining into the sheds.
8. Open-ridged roofs (monkey roofs) allow heat to escape from the shed.
9. Grow vegetation and grass around the poultry sheds to cool incoming air and reduce the heat reflection into open sheds.
10. Drinking water tanks should always be inside the shed (Figure 3). If they are outside the shed and exposed to direct sunlight, the tank should be thatched to avoid direct sunlight (Figure 4) or painted white.



*Figure 3. Water tank inside the shed keeps the water temperature cool.*



*Figure 4. Outside water tanks should be white, insulated and covered to avoid direct sunlight.*



*Figure 5. Water tanks should be covered to avoid excessive heating from the sun.*

## Managing Flocks during the Summer Period



Figure 6. Shed using stir fans and foggers to reduce heat load.

1. Keep the birds' drinking water cool by flushing water lines in the afternoon. Water in the pipelines becomes hot in the summer. Birds drinking hot water are more prone to heat stress.
2. Do not disturb the birds during the daytime. Carry on the required handling early in the morning or during the night (beak trimming, transfer of birds and vaccinations).
3. Proper management of foggers is done by monitoring the temperature and humidity in the location. During the daytime, the temperature goes up, whereas the humidity will decrease. Foggers will cool best with this lower humidity and provide relief from heat stress (Figure 6). In the evening, humidity increases and the temperature decreases and hence running of foggers at night may increase humidity and cause increased heat stress to the birds. When the humidity is high, increased air movement using fans will help to reduce the negative

effect.

4. Adjust fogger run time to provide frequent short periods of fogging in the day time. If humidity is high during the night time hours do not use foggers.
5. Do not feed the birds or stimulate for feeding during the hottest part of the day. Make changes in the feeding schedule to feed early morning and late evening.
6. Use electrolytes and vitamin C in drinking water wherever possible.

### Tips for Vaccinating Birds

1. Adjust the amounts of vaccine and medication volumes used for water treatments to reflect the increased water consumption of the flock during hot weather.
2. Maintain the cold chain of vaccines properly during storage and mixing of vaccination.
3. Vaccinate flocks during the cool hours of the morning.
4. Never withhold water prior to water vaccination during the summer.

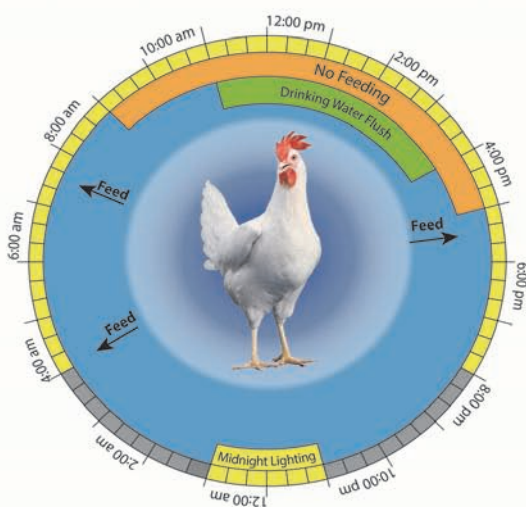
### Nutritional Management Tips

1. The most important effect of heat stress is reduced feed consumption followed by production loss. During the hot season, the daily energy requirement of the birds may actually drop but the requirements for protein, amino acids and vitamins remains the same. Hence, give more concentrated feed based on actual feed intake to compensate for reduced feed intake during the summer season.
2. Use oil at 2-3% in the feed as energy source. This will reduce the heat produced during digestion and improve appetite. Rice bran and vegetable oils can be added to replace corn.
3. Increase vitamins during the hot season to eliminate stress:
  - Vitamin A – 800 IU/kg diet
  - Vitamin C – 200 to 300 g/ton
  - Vitamin E – 65 to 250 IU/kg diet
4. Do not use nicarbazin (anticoccidial drug) during warm weather in the rearing flock, as it can aggravate heat stress-induced mortality.

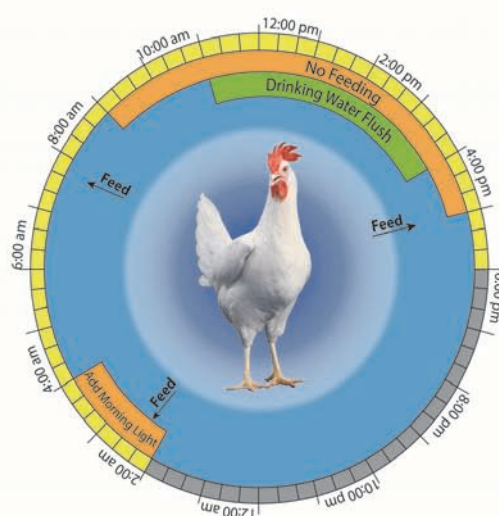
## Stimulate Appetite during the Summer

1. Provide a midnight feeding during summer to stimulate the appetite of the birds during the night. Give 1–2 hours of light for feeding during the night, leaving 3 hours of darkness before and after midnight lighting. Midnight lighting enables the bird to eat more in the coolest part of the day. 2 to 5 grams of extra feed consumption per bird can be expected from midnight feeding.
2. Midnight lighting could be practiced for the flocks in rearing from 6 weeks onwards to improve the appetite and minimize production loss from heat stress.
3. Adjust the lighting schedule to provide more hours in the morning. This will encourage more feed consumption when temperatures are cooler.
4. Optional: Feed wet mash in the afternoon. Proper management is required to prevent moldy feed.

### Management with timers in the shed



### Management without timers in the shed



The above program is a model and need to be adjusted based on the local climatic condition. For further more information please contact our technical service representative.

## Treatment of the Heat-Stressed Flock

- In emergency situations, the flock can be sprayed with cool water to save the bird's life. Comatose birds are rarely saved.
- Potassium chloride, ammonium chloride and sodium bicarbonate (2–3 kg /Mt of feed) have been beneficial in heat-stressed flocks.
- During the hot season, colibacillosis (E. coli) is frequently seen, so use appropriate water sanitation procedures.

The key to minimizing the effects of heat stress is *anticipating* periods of high environmental temperatures and implementing appropriate *management* and *nutritional* measures prior to the rise in temperatures.

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Hy-Line

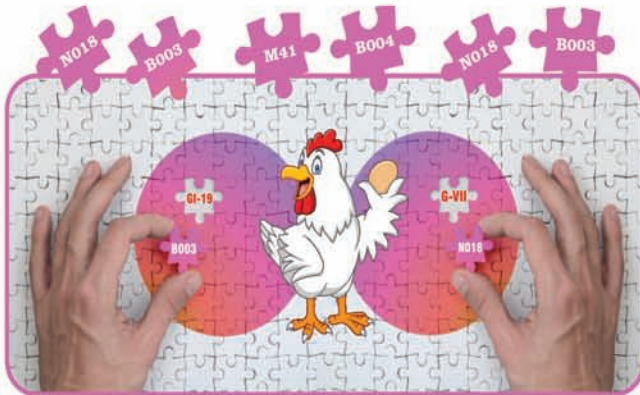
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