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elected Chairman, IEC



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India is a key Priority Market and a Focus for Nutreco and Trouw Nutrition

Dr Saurabh Shekhar, MD, Trouw Nutrition India

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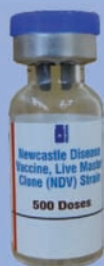
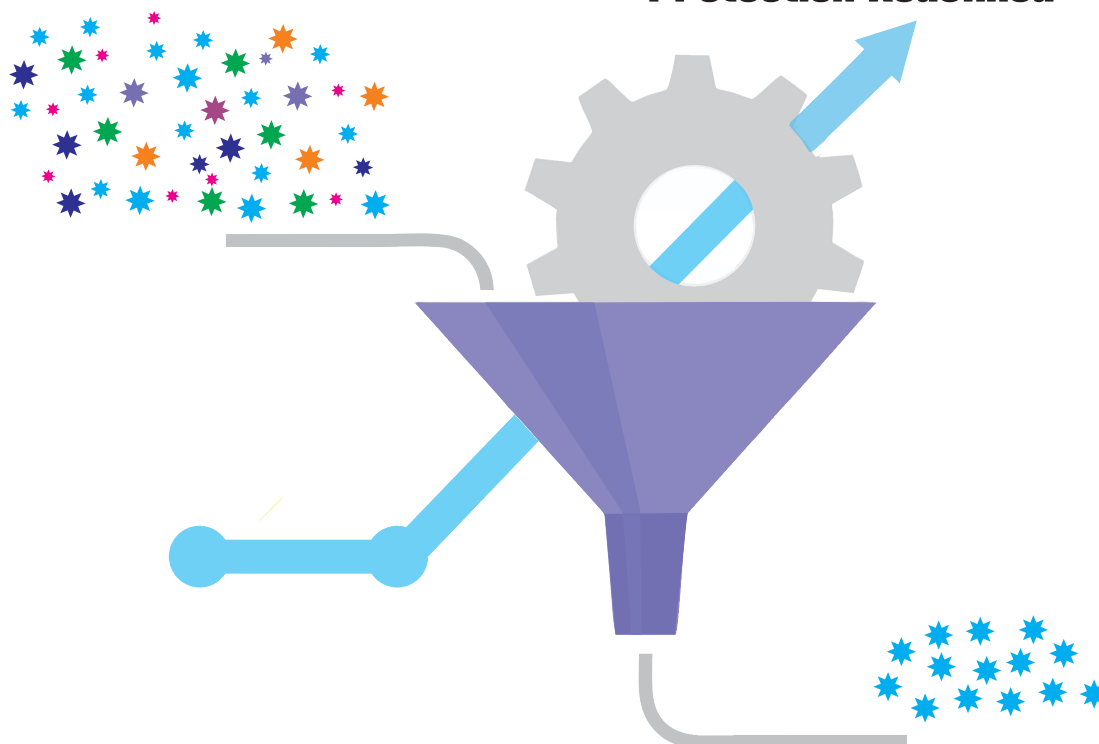
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- Editor



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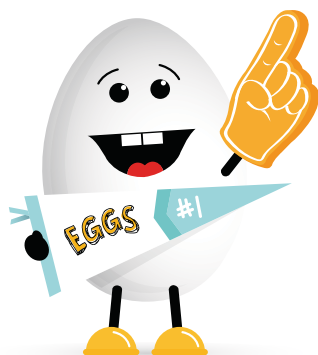
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Srinivasa Farms celebrates the World Egg Day by acknowledging the efforts of the layer farmers for providing nutritious eggs to lead a healthy life!

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Suresh makes India and Indian poultry industry feel proud of him



The October 2019 issue of **Poultry Fortune** is in your hands.

Mr Suresh Raydu Chitturi, Managing Director of Srinivasa Farms Pvt Ltd, has been elected as the

Chairman of International Egg Commission at the Global Leadership Conference held at Copenhagen, Denmark in the last week of September 2019. He is the first Indian and Asian to have been elected as IEC Chairman. He holds the position for two years, 2019 – 2021. After taking charge of IEC as its Chief, Suresh Chitturi made his first visit in India to Poultry Fortune media house on October 1 in Hyderabad. Poultry Fortune team in the office received Mr Suresh with the bouquet and honoured him. IEC Chairman spent in Poultry Fortune office about an hour discussing about poultry industry in India and internationally. We hope Suresh will make a mark serving for the promotion of Egg consumption in India and internationally. Poultry Fortune wish him to achieve further greater heights in poultry globally and serve farmers and other stakeholders of poultry sector.

In the News section, you may find news about, CLFMA of India, the apex organization and the voice of the country's dynamic livestock sector conducted its annual flagship event, 61st National Symposium on 22 and 23 August 2019 at New Delhi. The event focused on the Theme "Indian Livestock Farming: Prospects & Role of Government Policies" that will foster sustainable growth for Indian livestock sector.

Telangana State cabinet decided to come out with a policy for the development of poultry farming sector in Telangana state. The decision was taken at the cabinet meeting held at Pragathi Bhavan here on October 1.

Feed mills are facing major challenges. Price variation of raw materials, speculations, feedstuff supply uncertainty, energy cost, consumer demands and concerns, competition pressure, regulatory requirements, price fluctuations for livestock products, and the

high complexity of the feed chain are just a few examples. All this makes it difficult to predict the final financial results. Under this scenario, controlling and saving cost is imperative. The possibilities for improvements in feed manufacturing are endless. Changes and advances made in feed processing technology and techniques will significantly impact feed mill profitability. To address these challenges, Kemin organized a one-day seminar on Advance Technology for Efficient Feed Milling.

There is a Special Feature published on Trouw Nutrition founded in 1931 as a family business by Adolf Trouw and Johannes Siemons in The Netherlands to import fishmeal and animal meal for cattle feed became a part of one of the world's largest feed concerns Nutreco in 1944. Nutreco was acquired by SHV Group in 2015 based in Utrecht, which was founded in 1896. Trouw Nutrition has been in India through their representative for the past 15 years and is now constructing their own state-of-the-art production facilities at Jadcherla, around 70 kms from Hyderabad, with their office located at Hyderabad. In India Trouw Nutrition business is headed by Dr Saurabh Shekhar, its Managing Director. Poultry Fortune had an exclusive interview with Dr Saurabh Shekhar.

Readers are invited to send their views and comments on the news, special feature and articles published in the magazine which would be published under "Readers Column". Time to time, we shall try to update you on various aspects of poultry industry. Keep reading the magazine regularly and update yourself. Wish you all fruitful results in your efforts.

M.A.Nazeer
Editor & Publisher
Poultry Fortune



Poultry Fortune

Our Mission

Poultry Fortune

will strive to be the reliable source of information to poultry industry in India.

PF will give its opinion and suggest the industry what is needed in the interest of the stakeholders of the industry.

PF will strive to be The Forum to the Stakeholders of the industry for development and self-regulation.

PF will recognize the efforts and contribution of individuals, institutions and organizations for the development of poultry industry in the country through annual Awards presentation.

PF will strive to maintain quality and standards at all times.

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Suresh Chitturi elected Chairman, IEC

IEC represents Egg Producers globally and aims to Unite Global Egg industry and Promote Nutritional value of Egg to Consumers as well as Health and Nutrition Professionals



Past Chairman of IEC Mr Tim Lambert shaking hand with Present Chairman Mr Suresh Chitturi

Hyderabad: Mr Suresh Raydu Chitturi, Managing Director of Srinivasa Farms Pvt Ltd, has been elected as the Chairman of International Egg Commission at the Global Leadership Conference held at Copenhagen, Denmark in the last week of September 2019. He is the first Indian and Asian to have been elected as IEC Chairman.

After taking charge of IEC as its Chief, Suresh Chitturi made his first visit in India to Poultry Fortune media house on October 1. **Poultry Fortune** Editor M. A. Nazeer

and his team in the office received Mr Suresh with the bouquet and honoured him. IEC Chairman spent in Poultry Fortune office about an hour discussing about poultry industry in India and internationally.

Poultry Fortune had an interview with Mr Suresh Chitturi and he spoke on different aspects of IEC. Excerpts:

On IEC Global Leadership Conference

Mr Suresh Raydu Chitturi, Chairman, International Egg Commission said that

the IEC Global Leadership Conference was this year hosted in Copenhagen, Denmark with over 400 executive level delegates in attendance representing international egg businesses. There was a fantastic array of speakers, all providing top-level insight on a variety of topics that are important to the egg industry.

IEC new body for 2019 - 2021

Chairman: Suresh Chitturi, India

Vice Chairman: Greg Hinton, USA

Vice Chairman: Juan Felipe Montoya, Colombia

International Egg Foundation Chairman: Tim Lambert, Canada.

Board Member: James Han, China.

Board Member: Kent Antonio, Australia.

The existing members of the board can all be found on the IEC website.

Programmes of IEC in the next 2 years

The International Egg

Commission represents egg producers globally and the programmes and activities conducted over the next few years will reflect this. Human nutrition will play an increasingly important role in the work of the IEC, highlighted by launch of the **International Egg Nutrition Centre** and the supporting nutrition expert group, which aim to unite the global egg industry and promote the nutritional value of the egg to consumers as well as health and nutrition professionals, the IEC Chief said.

Plans and Targets for IEC

The IEC is committed to supporting egg industries around the world, and with the most diverse executive board at the helm, it is well positioned to drive positive change throughout the global egg industry.

Do you need to modify any of IEC's policies and programs to benefit Egg Farmers in under developed & developing countries ?

The IEC is committed to supporting egg industries around the world, and with the most diverse executive board at the helm, it is well positioned to drive positive change throughout the global egg industry.

On increasing Egg

International Egg Commission represents egg producers globally human nutrition will play an increasingly important role in the work of the IEC, highlighted by launch of the International Egg Nutrition Centre and the supporting nutrition expert group, which aim to unite the global egg industry and promote the nutritional value of the egg to consumers as well as health and nutrition professionals.



Suresh Chitturi, Chairman IEC



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Welcoming new Chairman – Mr Tim Lambert & Present Chairman Mr Suresh Chitturi.

Consumption

Egg consumption varies greatly from country to country. Some developed countries examples include UK has 199 and US has 284 eggs per capita consumption.

The first step in driving egg consumption in any country across the world is to establish the fundamental nutritional benefits of the egg, and then to disseminate this through effective communication to consumers and health professionals. As an organisation we have identified the need to support this, and the development of the International Egg Nutrition Centre (IENC) will take a key leadership role in delivering this, stated Mr Suresh.

International Egg Commission represents egg producers globally human nutrition will play an increasingly important role in the work of the IEC, highlighted by launch of the International Egg Nutrition Centre and the supporting nutrition expert group, which aim to unite the global egg industry and promote the nutritional value of the egg to consumers as well as health and nutrition professionals.

Poultry Fortune wishes Mr Suresh Chitturi to make a big mark as IEC Chairman in India and internationally.



Jonathan Cade (Hy-line International) and his wife Jo Cade in the middle with Suresh



Paul Janssen, Chore - Time Egg Production Systems, Carlos Saviani, DSM Nutritional Products, Frank Lutts, Chore - Time Egg Production Systems

Poultry Fortune honours IEC Chairman Suresh Chitturi

Poultry Fortune is happy to inform you that Mr Suresh Raydu Chitturi, Managing Director of Srinivasa farms Pvt Ltd, has been elected as the Chairman of International Egg Commission at a meeting held recently in Copenhagen, Denmark. He is the first Indian and Asian to have been elected as IEC Chairman.

After taking charge of IEC as its Chief, Suresh Chitturi made his first visit in India to Poultry Fortune media house on October 1. Poultry Fortune Editor M. A. Nazeer and his team in the office received Mr Suresh with the bouquet and honoured him. IEC Chairman spent in Poultry Fortune office about an hour discussing about poultry industry in India and internationally.



M. A. Nazeer, Editor, Poultry Fortune welcoming and celebrating with Suresh Chitturi, Chairman, IEC



Suresh Chitturi discussing a point with PF Editor at PF office



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Telangana Govt to come with policy for Poultry Development in the State

Poultry Committee formed

Hyderabad: Telangana State Cabinet has decided to come out with a policy for the development of poultry farming (sector) in Telangana state. The decision was taken at the 7 - hour long cabinet meeting held at Pragathi Bhavan here on October 1.

Poultry Committee:

The cabinet meeting chaired by Chief Minister Mr K. Chandrasekhar Rao appointed a three – member official Committee headed by special Chief Secretary Mr Somesh Kumar and comprising principal secretaries Mr Ramakrishna Rao and Mr Sunil Sharma.

It also resolved to constitute cabinet sub-committees on a permanent basis to give suggestions to the departments concerned and supervise the programmes implemented by those departments.

Apart from poultry issues, the cabinet sub – committees are constituted to monitor the programmes

being implemented by the departments concerned such as: Medical and Health Committee, Rural Sanitation Committee, Resource Mobilization Committee, Greenery Committee and welfare Committee.

Poultry Committee:

Chairman - Animal Husbandry Minister, Mr Talasani Srinivas Yadav.

Note by Editor: Poultry farmers and concerned stakeholders of Telangana state should make use of this opportunity through interaction with Poultry Committee constituted by the Government of Telangana state.

The sub - committee on poultry sector will time to time report the issues of poultry farming to the three – members official committee appointed by the cabinet .

Appointment of poultry committee is the result of poultry farmers raising their voice in Hyderabad and the districts of Telangana state.

Kemin organizes seminar on Advanced Technology for Efficient Feed Milling



Chennai: Feed mills are facing major challenges. Price variation of raw materials, speculations, feedstuff supply uncertainty, energy cost, consumer demands and concerns, competition pressure, regulatory requirements, price fluctuations for livestock products, and the high complexity of the feed chain are just a few examples. All this makes it difficult to predict the final financial results. Under this scenario, controlling and saving cost is imperative.

The possibilities for improvements in feed manufacturing are endless. Changes and advances made in feed processing technology and techniques will significantly impact feed mill profitability. To address these challenges, Kemin organized a one-day seminar on Advance Technology for Efficient Feed Milling.

Dr Bayjut Bostami, Zonal Manager, inaugurated the workshop with his warm welcome note to the feed mill managers of Haryana. Dr Tom Verleyen, Global Platform Director-liqui SMART and Nutrition,

shared the mill SMART global leadership thought in feed milling.

Mr Jaiprakash Pandey, Associate Manager-mill SMART, took an explicit session on the conditioning of feed / cooking of feed. He explained about the cooking of feed / starch gelatinization leads to better digestibility.

Mr K Satish, Senior Commercial Manager has shared his thought on new application technology of mill SMART.

Further discussion was on the significance of surfactant (emulsifiers) for feed milling while unveiling Kemin's novel solution Adonflex™ the incredible emulsifier for economic benefits and quality of pellet feed-specially designed to improve the overall efficiency of feed milling like process loss recovery, improvement of PDI, improvement in productivity of plant etc. as shared by Mr Sarwar Ali, Product Manager.

Women Poultry Farmers at Singrauli of CIL

New Delhi, 25th Sept 19: CIL's sustained efforts to empower tribal women and make them self sufficient, is now reaping rich dividends. 'Singrauli Women Poultry Producers Company Pvt. Ltd. (SWPPCPL)' a local 500 tribal women startup, is a CSR initiative of Northern Coalfields Ltd. It is supported by the Singrauli District administration and is helping to turn local tribal women into entrepreneurs.

At its 4th Annual General Meeting (AGM) in Singrauli, The Women Poultry Producers Company Pvt. Ltd. declared a turnover of Rs. 10 crore for the FY 2018-19, with a profit of Rs. 1 crore.

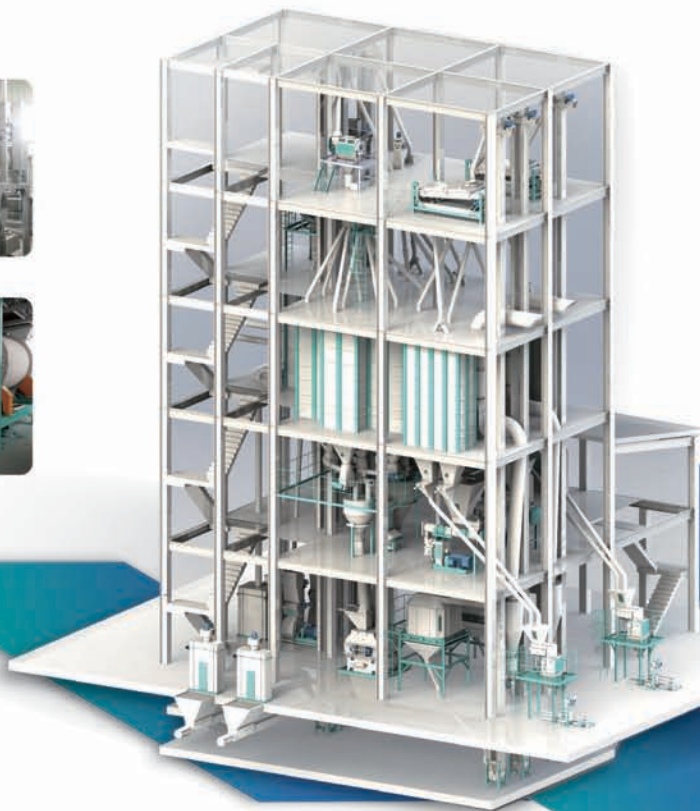
The success of this project is now encouraging the rural tribal women in Singrauli to be more confident in their belief that they can run a commercial business successfully.



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CLFMA Symposium deliberates “Indian Livestock Farming: Prospects & Role of Government Policies” for the benefit of Livestock Industry



Union Minister Giriraj Singh being greeted by CLFMA Chairman S.V. Bhawe. Divya Kumar Gulati, Secretary also seen.

CLFMA of India, the apex organization and the voice of the country's dynamic livestock sector conducted its annual flagship event, 61st National Symposium in a grand manner on 22nd - 23rd August, 2019 at Hotel Le Meridien, Windsor Place Janpath, New Delhi. The event focused on the Theme "Indian Livestock Farming: Prospects & Role of Government Policies" that will foster sustainable growth for Indian Livestock Sector.

The Chief Guest of the Seminar was Shri Giriraj Singh, Hon'ble Union Minister of Fisheries, Animal Husbandry and Dairying, Government of India. Shri Pawan Agarwal, CEO, Food Safety and Standards Authority of India (FSSAI), Government of India, presented the keynote address and Shri Atul Chaturvedi, Secretary, Department of Animal Husbandry and Dairying, Government of India gave the Thematic Address.

The Symposium started with a Special Session in the morning on Aug 22, 2019 for welcoming Shri Giriraj Singh, Hon'ble Union Minister of Fisheries, Animal Husbandry and Dairying, Government of India, as the Minister had some urgent engagement in his constituency. The Honourable Minister launched the book "Nutritional Guidelines for Animal Feeds By CLFMA". This is a pioneering effort made by CLFMA to keep the farmers, feed manufacturers and Industry abreast with latest nutrient requirements of various types of species used in animal agriculture.

The Inaugural Session started with the welcome address of Mr Divya Kumar Gulati, Secretary, CLFMA OF INDIA. Mr Gulati mentioned that the livestock sector is becoming a sunrise sector and all the stake holders including the government have to work in close co-ordination and emphasised the fact that doubling farmers income can be

achieved by focussing more on livestock farming. He said that the Symposium is being organized to build partnership with the government to take forward the agenda of doubling farmers income through livestock farming.

This was followed by the lamp lighting ceremony.

Addressing the occasion Mr S.V. Bhawe, Chairman CLFMA OF INDIA said that the Government has recognized the unexposed potential of Livestock Sector and created a separate dedicated Ministry for

Fisheries, Animal Husbandry and Dairying and since livestock sector has its own parent ministry now it will be an easy process for all the stakeholders to resolve the issues and problems. He thanked the government for taking this transformative step.

Shri Giriraj Singh in his speech appreciated CLFMA OF INDIA for conducting the event and said that the ministry is involved in making a model for the livestock sector, which will work on co-existence of all the species including the humans involved in the food chain, Promote Scientific technologies and Integrated Farming Systems. He emphasized that QPM maize, moringa, Bajra and Cassia should be promoted as animal feed as the protein percentages is more in these feeds and can be produced by Indian farmers. He also insisted in starting livelihood incubation centres for livestock. He insisted in promoting few practices that will benefit the farmer viz merino sheep which will be useful for dual purpose (meat and wool) and promotion of Goat Farming.

Delivering the Thematic Address at the Symposium Shri Atul Chaturvedi,



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Secretary, Department of Animal Husbandry and Dairying, Government of India said that Apart from the Doubling Farmers' Income the Hon'ble Prime Minister of India had the vision of 5 trillion economy and the sectoral allocations were 3 trillion to service sector, 1 trillion to manufacturing and one trillion to agriculture. Presently, Agriculture contributes to 270 to 280 billion and to take it to 1 trillion mark in near future, we need to focus on Animal Husbandry, Dairying & Fisheries. He said that breeding techniques, compound livestock feed or nutrition of fortified foods, Control of diseases especially FMD and Brucellosis play an important role to increase productivity of animals. He also emphasized the fact of promoting processing, marketing and exports of value-added products.

Shri Pawan Agarwal, CEO, Food Safety and Standards Authority of India (FSSAI), Government of India delivered the Keynote Address. He emphasised the importance of Food Safety in the Country and FSSAI will be stringent about food safety concerns so that safe food is available in our country. He said that FSSAI will be working with Ministries and Agencies, who are responsible for primary production and safety regulations will be



Union Minister Giriraj Singh started at this level itself, as it is difficult to remove the contamination occurring in the primary producing stages while processing. This was followed by the CLFMA Award Ceremony. The Life Time Achievement award was presented to Mr P. S.

Director, ICAR-National Institute of Animal Nutrition and Physiology, Bengaluru for their marvellous contribution to the Indian Livestock Sector.

The vote of thanks was proposed by Mr Neeraj Kumar Srivastava, Deputy Chairman, CLFMA OF INDIA.

The Second day Symposium started with the Welcome Address by Mr Naveen Pasupathy, Treasurer, CLFMA OF INDIA.

The First session was titled "Doubling Farmers' Income: Government and Industry Partnership". Mr Balram Singh Yadav, Managing Director of Godrej Agrovet Ltd was the moderator of the 1st Session. The

Panellist from the Industry side were, Mr Daljit Singh, Chairman, Progressive Dairy Farmer's Association (PDFA), represented the Dairy Industry, Mr Ravi Kumar Yelanki, Managing Director, Vaishaki Bio Resources & Vaishaki Bio Marine, represented the Fishery Industry & Mr B. Soundararajan, Managing Director of Suguna Holdings Pvt Ltd. and immediate past chairman of CLFMA, represented the Poultry Industry. In the 1st Session, the problems faced by the Fisheries, Dairy and Poultry Industry, existing Government Schemes were discussed in detail and recommendations were drawn.

During the Second Session "Value Addition with Special Focus on Processing" was discussed in detail. The Session Moderator was Mr Narayanan, Advisor – Food and Beverage. The 2nd Session's Panellist from the Government of India were Shri J. P. Meena, IAS (Retd.) Former Secretary, Ministry of Food Processing Industries (MOFPI), Dr Amit Sharma, Director, Food Safety and Standards Authority of India (FSSAI), Shri Tarun Bajaj, General Manager at Ministry of Commerce (APEDA) & from the Industry side Mr Vishwas Chitale, Executive Director, Chitale Agro Industries Pvt. Ltd.

Contd on Page 26



Nandakumar, MD, Nanda Feeds Pvt Ltd. CLFMA Awards were presented to Dr Ashish Motiram Paturkar, Hon'ble Vice-Chancellor, Maharashtra Animal & Fishery Sciences University, Nagpur, DrAshok Kumar, ADG- ICAR and Dr Raghavendra Bhatta,

1st Session's Panellists from the Government of India, were Shri Tarun Shridhar, IAS (Retd.) Former Secretary, Department of Animal Husbandry and Dairying (AH&D), Shri Sagar Mehra, Joint Secretary, Department of Fisheries, Ministry of Fisheries &



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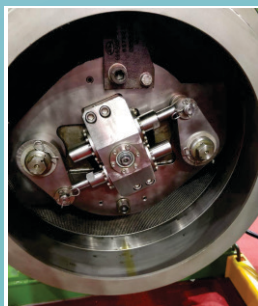


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Venkys India conducts technical seminar at Pune and Bengaluru on Broiler Breeder Nutrition



minerals in breeder diets on concentration in egg yolk, on progeny bone thickness and on eggshell quality.

Dr Douglas attracted the audience very much when he shared his rich experience and knowledge of organic mineral nutrition and suggested to use the specific ratios of usage of inorganic and organic minerals for breeders, layers and broilers which will help the farmers and feed millers in great way.

Dr Douglas stated that the broiler performance has been improved by using OTM in birds raised in areas with permanent litter problems, and birds with damages in the foot pad (dermatitis). OTM can also improve broilers with leg problems, skin scratches, cellulitis and consequently carcass quality. There is some research showing a better immune response and better performance of stressed broilers when the diet was supplemented with OTM.



A view of participants in Venkys India Seminar

Pune: Dr Douglas Zaviezo, Technical Consultant, SPECIAL NUTRIENTS Inc, Miami, USA, was the resource person at both seminars. Primary objective of the seminar was to educate and spread the awareness about the importance of organic minerals in poultry nutrition and its prejudicial use to improve the production performances

Venkys' (India) Ltd, conducted a Technical Seminar at Pune on "Advantages of organic minerals in today's situation" on 20nd August, 2019.

During the speech at Pune, Dr Douglas Zaviezo, Technical Consultant, SPECIAL NUTRIENTS Inc, Miami, USA provided the insight on the organic minerals and their effect on poultry production Worldwide. The seminar was attended by the Broiler Farmers, Layer Farmers, Broiler Breeders as well as

feed millers and technical consultant.

Dr H. G. Murade, DGM-Sales, Venkys (India) Ltd, provided outline and objective of technical seminar.

Mr Deepak Khosla General Manager -Marketing, Venkys (India) Ltd, introduced Dr Douglas Zaviezo and welcomed all the guests, poultry farmers, feed millers and technical consultants.

During presentation Douglas elaborated the detail facts about various mineral complexes and its bioavailability in breeders, layers and

broilers. He stated that, Zinc-Manganese-Copper in breeder diets used in their organic form as amino acid complex or chelate have shown a positive effect on the progeny. Also, organic trace minerals are free from heavy metals and pesticide contamination.

He stated that, the most effective OTM are the complex (mineral attached to an amino acid) and the amino acid or MHA chelates.

During his presentation he provided detailed technical information on the effect of organic trace

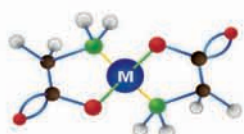




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He also discussed about on the use of OTM as full or partial replacement for Inorganic Trace Minerals. Organic Trace Minerals in Breeders improves egg quality, fertility and hatchability along with improvement in the quality of progeny and its performance. In commercial Broilers and Layers, Organic Trace Minerals improve skin, bones, foot pad quality and egg shell quality respectively.

Also he has given some tips to the audience about how to take the economical decisions of using the inorganic and organic minerals while doing the formulation

At the end, Douglas interacted with the farmers.

Dr H. G. Murade finally delivered the vote of thanks and the session concluded with the cocktail dinner.

Breeder nutrition for chick's quality and broiler performance

After the successful technical seminar of Dr. Douglas in Pune, Venky's extended similar event in Bangalore on 22nd August, 2019 on Breeder nutrition for Chicks quality and broiler performance.

In his presentation he has shown the importance of



protein and fat nutrition and its effect on the production performance and chick quality.

Douglas recommended that low protein diets during rearing period must be provided with an everyday feeding. The skip a day program is not recommendable because they use the body fat during the fasting days.

He has stated that certain amounts of body fat are necessary at the onset of lay in order to achieve maximal performance, while increasing body fat at the onset of lay decreases embryonic mortality.

B V BIO CORP introduced the poultry trace minerals new product category as BB Classic – Organic Tracemin. This is the organic trace mineral for the Broiler Breeders. The most bio-available form of the trace minerals.



CLFMA Symposium deliberates “Indian Livestock Farming: Prospects & Role of Government Policies” for the benefit of Livestock Industry

Contn from Page 22



represented Dairy Industry, Mr Ravi Kumar Yelanki, Managing Director, Vaishaki Bio Resources & Vaishaki Bio Marine represented Fishery Industry & Mr Prashant Vatkar, CEO of Godrej Tyson Foods Ltd represented Poultry Industry. The Second Session deliberated the importance of Food processing in doubling farmers income, addressing the trace ability issues, reduction of food wastage and Food safety Issues, promotion of Export Markets etc were discussed in detail.

The Third Session Moderator was Mr Bharat Tandon, Past Chairman of CLFMA & Managing Director of Healthline Pvt Ltd (Sericare Division). From the Government of India the Panellists were Shri Dr O.P. Chaudhary, Joint Secretary (NLM), Dept. of National Livestock Mission, Ministry of Fisheries, AH&D, Shri G. N. Singh, Joint Secretary – Trade, Department of

Fishery, AH&D & Shri Keshav Chandra, Joint Secretary, Department of Commerce, Ministry of Commerce and Industry and from CLFMA Team Mr S.V. Bhawe, Chairman, Mr Divya Kumar Gulati, Secretary, Mr Naveen Pasuparthi, Treasurer and Mr Suresh Deora, West Zone President. The Third Session was on Livestock Industry Interaction with Government of India. In this session, the Industry Pain Points were discussed with the Government.

Valedictory Session was proposed by Shri Tarun Shridhar, IAS (Retd.) Former Secretary, Department of Animal Husbandry and Dairying (AH & D), Ministry of Fisheries, AH&D followed by Felicitation to all Sponsors, Media, Guests and Invitees.

The vote of thanks was proposed by Mr Suresh Deora, President – West Zone.

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Alltech Laboratory adds five new mycotoxins to their panel

This brings the total number of detectable mycotoxins that can be tested for to 54! These additional mycotoxins further increase the understanding of mycotoxin occurrence and risk to animal performance.

Emerging Mycotoxins

The new mycotoxin additions fall into our category of emerging mycotoxins. The term emerging mycotoxins refers to mycotoxins that are neither routinely analyzed or legislatively regulated, but recently research has shown more evidence of their increasing incidence and potential toxicity to animals. Now, the emerging mycotoxins analyzed by Alltech 37+ include beauvericin, moniliformin, enniatins A/A1 and B/B1, phomopsin A and alternariol. Fusaric acid is also included in this emerging mycotoxin category.

Enniatins

Enniatins are a group of mycotoxins produced by several different *Fusarium* species. There are currently 29 different known forms, but the A and B forms are most common (Gruber-Dorninger et al., 2016). Enniatins have a range of biological activities including their function as ionophores and antibiotics. These mycotoxins have shown to be cytotoxic to different cell types and cause cell death. Research has shown that the intestine and liver may be primary organ systems impacted by these mycotoxins. Additionally, enniatins are lipophilic

and may bioaccumulate in animal tissues and products.

Phomopsin A

Phomopsins are a family of mycotoxins produced by fungal species that are pathogens of lupins (Battilani et al., 2011) and cause the disease lupinosis. Phomopsin is a potent microtubule inhibitor and can impact cell function and cause cell damage and death. Generally, the liver is the principle target of this mycotoxin, leading to liver failure and death of the animal. Animal sensitivity varies by species and age. Sheep appear to be significantly more sensitive than other species, although horses, pigs and other ruminants may certainly be sensitive as well. Clinical signs of intoxication can include anorexia, jaundice, ketosis, stumbling gait, liver damage and death. Phomopsin is very stable during feed processing.

Alternariol moved to emerging mycotoxins category

Alternariol was previously included in the *Penicillium* group on the 37+ report, but it is more correctly located in the emerging mycotoxins category. Alternariol is produced by *Alternaria* species of fungi. This mycotoxin can be cytotoxic, cause DNA damage and

result in cell death for many cell types, including those of the intestinal tract. Alternariol has been shown to have estrogenic potential as it can bind to estrogen receptors alpha and beta. It

is less active than estrogen or zearalenone, but it can still result in estrogenic functions as well, as it may act in a synergistic way with zearalenone to alter reproductive performance

Odisha farmers worried after dwindling egg trade

Though the egg trade has been severely affected post-cyclone Fani, poultry farmers are finding it hard to sustain their business as its price has remained stagnant.



The egg trade has been severely affected post-cyclone Fani in Odisha.

Bhubaneswar, 16th Sept 2019: Layer farm owners have expressed concern over dwindling egg trade in the State due to anti-poultry farming policies of the National Egg Coordination Committee (NECC).

Though the egg trade has been severely affected post-cyclone Fani, poultry farmers are finding it hard to sustain their business as its price has remained stagnant. On the other hand, the rate of poultry feed is on an upward spiral. They alleged that the farmers are on the verge of closing down their farms due to indifferent attitude by the NECC towards poultry farmers in the state.

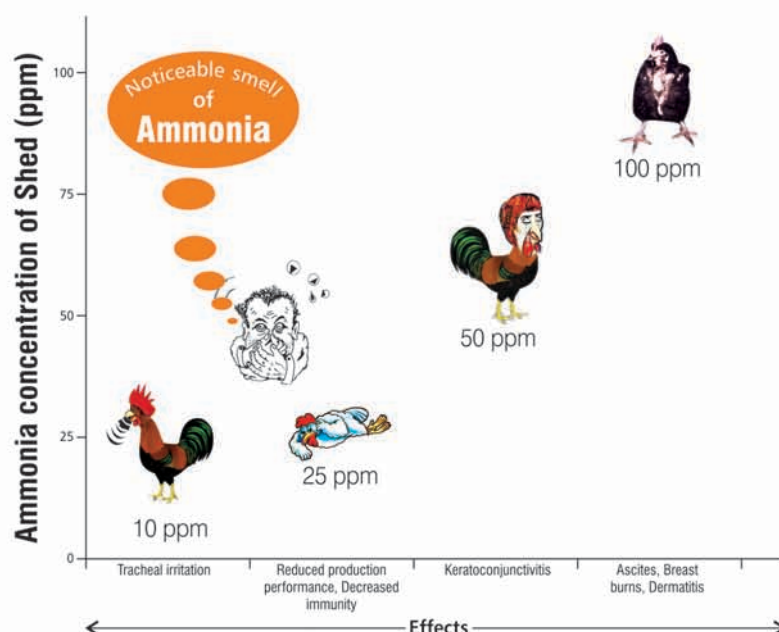
Poultry farmers from different parts of the State congregated here on Sunday and formed All-Odisha Layer Farms Association to fight for their cause.

While Mr Manas Ranjan Mangaraj has been selected as chairman of the association, Mr B. B. Choudhury was nominated president, Mr Debadutta Biswal vice-president, Mr L. Saroj Kumar Patra general secretary, Mr Bandhan Mohanty joint secretary and Mr Santosh Patra treasurer.

The association members will soon meet Agriculture Minister Mr Arun Sahoo over the issue.

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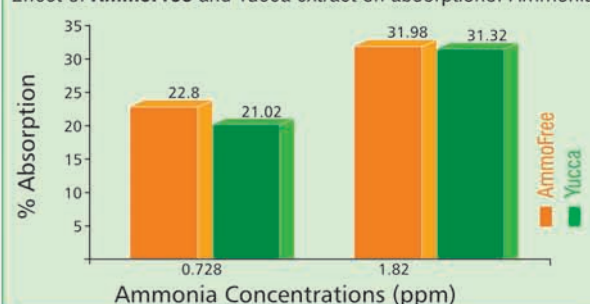


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Effect of AmmoFree* at broiler farm in winter (14° - 15°C) with noticeable ammonia smell

Group	Body Weight (g)	FCR	Livability (%)	Birds showing respiratory discomfort	Faecal NH ₃ (g/kg dry faeces)	
					Day 21	Day 42
Control	1921	1.85	95.00	7	3.86	3.92 (+1.55%)
AmmoFree 100g/ton	1927	1.82	96.67	X	3.95	2.71 (-45.75%)

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

* AmmoFree supplementation started on day 21

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Giriraj's formula for double farm income: Get egg free with meat and milk

The animal husbandry and fisheries minister said that his department is started integrating animal husbandry with agriculture to double farmers' income



NEW DELHI: After the announcement of zero budget farming – the low-cost natural alternative to fertilizer-based agriculture – the government is now planning to introduce zero cost poultry for production of no-cost protein-rich egg and meat.

Animal husbandry and fisheries minister Giriraj Singh told ET that he is working on a novel idea of integrating animal husbandry and poultry where country fowl and cows or goats are bred in common area feeding on each other's organic refuse and yield rich eggs and rich meat.

"In 2010, when I was animal husbandry minister of Bihar, I had done this experiment successfully in my own backyard where I reared around 300 goats and 200

hens simultaneously," said Singh. "Hen fed on the organic refuse of goats and their leftover feed. Surviving on goats' feed and organic refuse, each hen would lay 150 eggs a year and gained two kg weight - perfect to be a boiler for meat. That way we were able to get a no-cost egg with chicken meat as bonus.

The minister said the government has commissioned the Indian Council of Agricultural Research's two research institutes at Bengaluru and Izzatnagar (Uttar Pradesh) to study and analyse this innovative model, which can bring revolution to more than Rs 1 lakh crore poultry industry.

"We will implement this model after getting certification from these institutes. This model will

help farmers increase their income levels several times without incurring any extra cost," said Singh.

The animal husbandry and fisheries minister said that his department is started integrating animal husbandry with agriculture to double farmers' income. He said a pilot project has been started in a small village in Anand district of Gujarat where biogas plant has been installed at 463 milk farmers, 70% of whom also own around one acre of land each.

"The average income of the village is Rs 66 lakh per year by selling milk. We can increase the income to Rs 1.63 crore by integrating milk production with agriculture," said Singh.

"Besides the gas used as energy source, every biogas plant releases dung-slurry as a by-product, which we buy from farmers at Rs 2 a kg and sell them back at the same price by adding more nutrients.

The treated dung (manure) increases the productivity of the soil. Farmers will get at least 2 kg more produce than what they have been getting by using chemical fertilisers."

The minister said the definitive result of this pilot project would come after October. "If we get the desired result, we will implement this model in one village of each district of Gujarat and then subsequently across the country," he said.

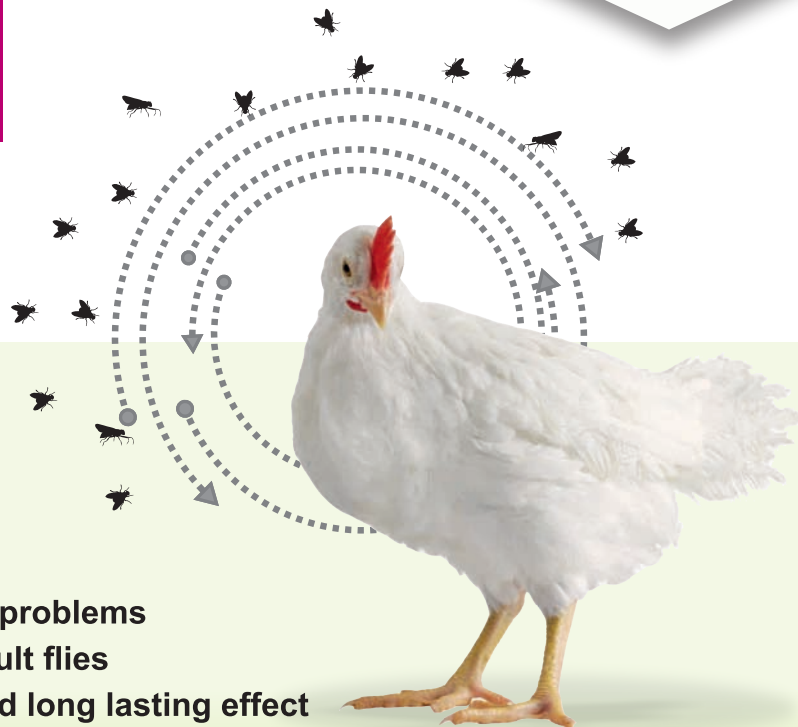
Zero Cost Poultry: Get Egg Free of Cost With Milk and Meat

Gujarat 14th Sept 2019: After Zero Budget farming, the government is planning to introduce a zero cost poultry for the production of no cost protein rich egg and meat. Animal Husbandry and Fisheries Minister, Mr Giriraj Singh

said that he is working on an idea of expanding animal husbandry and poultry where country fowl and cows or goats are bred in the area feeding on each other's organic refuse and yield rich eggs and rich meat.



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He added that "In 2010, when I was animal husbandry minister of Bihar state, I had done this experiment successfully in my own backyard where I reared around 300 goats and 200 hens, hens fed on the organic refuse of goats and their leftover feed. Surviving on goats feed and organic refuse, each hen would lay around 150 eggs a year and gained around two kg weight, perfect to be a boiler for meat. That's the way we were able to get a no-cost egg with chicken meat as bonus."

The minister said the government has commissioned two research institutes of Indian Council of Agricultural Research's which are at Bengaluru and Uttar Pradesh (Izzatnagar) to study and analyse this innovation model, which can bring a big change to more than Rs 1 lakh crore poultry industry.

Mr Singh further added that "We will implement this model after getting certification from these two institutes. This model will help farmers to increase their income levels several times without incurring any extra cost".

The animal husbandry and fisheries minister said that his department has

started integrating animal husbandry with agriculture to double the income of farmers. He added that a pilot project has been started in a small village of Gujarat named as Anand where biogas plant has been installed at 463 milk farmers, around 70% of them also own around one acre of land each. The average income of the village is somewhere around Rs 66 lakh per year by only selling milk. We can increase this income to Rs 1.63 crore by integrating milk production with agriculture. As gas is used as energy source, every biogas plant releases by-product (dung slurry), which we will buy at Rs 2 per kg and will sell them back at same price by adding some more nutrients and minerals. The manure (treated dung) increases the productivity of soil. Farmers will get minimum of 2 kg more produce than what they have been getting by using chemical fertilisers.

The minister ended by saying that the definitive result of this pilot project would come after October. If we get the desired result which we have thought, then we will implement this model in one village of each district of Gujarat and then across the country.



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India is a key priority market and a focus for Nutreco and Trouw Nutrition

Nutreco was acquired by SHV Group in 2015 based in Utrecht, The Netherlands which was founded in 1896. SHV has a wide range of operations and presence in 52 countries with more than 60,000 employees and a net sales of € 20.1 billion.

Trouw Nutrition founded in 1931 as a family business by Adolf Trouw and Johannes Siemons in The Netherlands to import fishmeal and animal meal for cattle feed became a part of one of the world's largest feed concerns Nutreco in 1944.

Nutreco was acquired by SHV Group in 2015 based in Utrecht, which was founded in 1896.

Trouw Nutrition has been in India through their representative for the past 15 years and is now constructing their own state-of-the-art production facilities at Jadcherla, around 70 kms from Hyderabad, with their office located at Hyderabad. In India Trouw Nutrition business is headed by Dr Saurabh Shekhar, its Managing Director.

Poultry Fortune Editor M. A. Nazeer had an exclusive interview with Dr Saurabh Shekhar, Managing Director, Trouw Nutrition India Pvt Ltd. Excerpts:



Dr Saurabh Shekhar,
Managing Director, Trouw Nutrition India Pvt Ltd

About Trouw Nutrition and its Promoters

Trouw Nutrition was founded in 1931 as a family business by Adolf Trouw and Johannes Siemons, near Rotterdam in the Netherlands to import fishmeal and animal meal for cattle feed. It focused on two important pillars: the quality of its employees and a strong involvement in research and development. Since 1944, Trouw Nutrition is part of one of the world's largest feed concerns: Nutreco.

Nutreco was acquired by SHV group in 2015. SHV based in Utrecht, The

Netherlands was founded in 1896. It has a wide range of operations and presence in 52 countries with more than 60,000 employees and a net sales of € 20.1 billion, informed Dr Saurabh Shekhar, Managing Director, Trouw Nutrition India Pvt Ltd.

Our global Headquarter "The Hub" is located in Amersfoort, the Netherlands. Globally we have a presence in more than 175 locations and have 70+ manufacturing plants. In India, the office is located in Hyderabad. We will have our state-of-the-art production facility at Jadcherla, around 70kms from Hyderabad, he stated.

Key persons of the company

In India the business is headed by Dr Saurabh Shekhar.

He joined Trouw Nutrition India as Managing Director in 2017.

Dr Chandani Parihar is the Marketing Manager.

Trouw Nutrition 15 years old in India

In India, Dr Saurabh Shekhar said, we have had a presence through our sales representative for the past 15 years. However, we understand the huge opportunities that Indian market provides and our investment plans are in line with the opportunities.

The team has grown over the past 3 years and the upcoming factory further shows our dedication to this market.

Category of products

We believe that research and innovation are the key to sustainable development. All our products and services are aligned with this concept. Realizing the need of animal nutrition industry, we have following key focus areas for innovation:

Life start: Includes products for young animal feed, young animal vitality and later performance, and specific hatchery and nursery nutrition.

Health & welfare: Includes products to promote reduction of antibiotic use, support intestinal health, provide nutritional solutions for specific challenges and feed to food safety.

Precision Nutrition: Includes feed additives for production efficiency, reduce emissions, high performance feeds for maximum growth and feed efficiency potential.

Our services are also in sync with the above mentioned focus areas. Services like **NutriOpt** for accurate nutrient analysis helps in achieving precision



Dr Saurabh Shekhar

nutrition goals of farmers and feed millers. Another innovative technology, **MycoMaster** which provides quick analysis of mycotoxins supports health and welfare.

Further in line with the current need of industry, we have developed programs which combine products, services and technical know-how to support customers overcome the challenges of production. We have optimised the following programs for our customers:

Antimicrobial Resistance Programme: This programme is an integrated

approach for reduction in the use of antibiotics, efficient microbial control, enhanced gut integrity and efficient animal production.

Feed Safety Programme: The programme helps to ensure safe feed by preserving nutritional value, integrated management of moulds and mycotoxins, optimising moisture retention in final feed and improving feed mill efficiency.

Mycotoxin Risk Management Programme: The programme is an integrated approach for mycotoxin risk

“
Need of the hour is innovations in feeding solution, genetics, farm management, biosecurity, anti-microbial resistance management in order to ensure that food and feed provided is safe.
”



Upcoming factory in Jadcherla

assessment, monitoring and control. We also provide a customized quality control program in order to deliver performance and profitability on farm.

Trace Mineral Programme: The programme helps to ensure optimum trace mineral supply in order to enhance growth and performance.

Alliance with United Nations' Sustainability Programme

We are proud to have alliance with United Nations' Sustainability Programme. As part of this alliance, we have developed Nuterra, our comprehensive sustainability programme that contributes to eight of the United Nations' Sustainable Development Goals (SDGs).

In India, we have an alliance with Baramati Agro Ltd. for sustainable dairy development by training and education of farmers. We are also a part of Dutch Dairy Cluster which envisions to improve quality and availability of feed, concentrate in order to improve the average yield and quality of milk produced by smallholder farmers.

We recently signed a global research and development collaboration agreement with Bayer Animal Health to drive the development of novel technologies and applications for the animal health and nutrition industries.

€ 47 million global Annual investment on Research and innovation

Innovation is in our DNA and our innovation / R&D activities are driven by the belief that we must bring knowledge and technology to the market faster and more effectively. We do this by

Ruminant Research Centre in the Netherlands



translating world-class research and innovation into practical, sustainable nutritional solutions. Our commitment to research and innovation is reflected in annual investment of € 47 million globally. We have five major research centres in Canada, Spain and The Netherlands. This in-house research is complemented with over 50 long-term

for the animal nutrition industry by collaborating with various prominent research institutions to develop practical solutions. Our in-house laboratory facility, **MasterLab**, at Hyderabad also helps us to achieve the objective of being an innovative complete solution providers for the animal nutrition industry.

Sales & Technical Services network in India

Dr Saurabh Shekhar said that we at Trouw Nutrition strongly believe in the "customer-first" approach. An integral part of this approach is having people on board with skills to bring effective, across-the-board solutions that result in efficient gains, improved growth, and enhanced profits.

In line with that approach, we have a well-established team of subject matter specialists. We are a team of 24 people with teams dedicated to species (poultry and dairy) and

“
**Globally, Trouw Nutrition
has approximately 5,000
employees**
”

research collaborations with scientific institutes across the globe.

Master Lab, at Hyderabad

In India, we are just as committed to ensuring innovative solutions



Trouw team at office in Hyderabad

regions. However, with plans of factory we expect this number to grow substantially. Globally, Trouw Nutrition has approximately 5000 employees.

Our business partners are just as critical and we have a network of well-established business partners all over India.

Acceptance of products

We have always had a customer first approach which is also reflected in how we cater to our customers. Trouw Nutrition offers an integrated approach by innovative products, models and services. The acceptance of our products as a result of this approach has been very encouraging.

Our models accurately predict farm performance, while our services aim to optimise customer's operations. Animal nutrition, nutritional technology and models & services enable fine-tuning of feeding strategies. Laboratory services improve complex decision making by integrating physiology, genetics, nutrition, health management and ingredient selection.



Agresearch Farm in Canada

Farm management tools are tailored as per location to optimise production yields in flocks and herds.

Quality of products and services

Trouw Nutrition is committed to providing safe products and services that suit the customer service provisions and regulations.

HACCP process that is carried out to control the quality of material supply, product manufacturing, storage and distribution are key to the management of feed and food safety. Our Quality Management System is continuously

evolving and adapting to meet the challenges of food and feed safety. Quality accreditation include CPOHB certificate, ISO 22000 and FAMI QS.

Further, we have always been proud of the fact that we ensure the best services to our customers. A part of that is MasterLab, the largest professional network of laboratory service globally, we also ensure quality at customer end.

Best aspects of Trouw Nutrition

Need of the hour is innovations in feeding solution, genetics, farm management, biosecurity, anti-



Global Headquarters in the Netherlands



Trouw Nutrition India Factory work in progress at Jadcherla, near Hyderabad



MasterLab in Hyderabad

microbial resistance management in order to ensure that food and feed provided is safe. Our team of highly skilled professionals turn science-based expertise in animal nutrition into practical solutions. Innovations are tailored to match the needs of each species through each phase of an animal's life.

Further, we strongly believe that our USP lies in our approach and our values. We believe in being innovative, caring, collaborative and capable. The objective is to be seen as a partner that brings value-addition rather than just products.

Size of market globally

Globally we had a turnover of approx. € 6.5 billion, said Dr Saurabh.

On use of chemicals and antibiotics in the products

We strongly believe that responsible usage of antibiotics is critical. There can be no alternatives to antibiotics, only measures to improve health and immunity of birds to promote responsible use of antibiotics. Hence, we have programmes like Antibiotic Reduction Programme which through an integrated approach improves bird's overall immunity and health to limit the use of antibiotics.

Dr Saurabh told, Trouw Nutrition is the global leader in animal nutrition that has been providing innovative feed specialties, premixes and nutritional services to the animal nutrition industry for more than 80 years.

Indian animal protein market has seen a substantial growth over the past few years and the overall industry is expected to grow at a CAGR of 6-8%.

The rise in animal protein demand is because of various factors like growing urban population, changing preferences and consumption patterns, awareness about requirement of protein and a balanced diet. While this demand will continue to surge, the challenge we all face is of limited resources. Under such circumstances, we aim to become the link between the struggling supplies and surging demand to best support the performance of animals, fish and shrimp.

Future plans and targets

India is a key priority market and is a focus for Nutreco and Trouw. This is also reflected in the recent investment by Nutreco in a company called Eruvaka. Eruvaka is an India-based Internet of Things (IoT) that develops connected devices and mobile-based decision tools to help aquaculture farmers reduce risk and increase productivity. Our sister company, Skretting entered into a Joint Venture with the West Coast Group to boost Indian aquaculture, he stated.

Do you have any message to your targeted customers (farmers/breeders

/Integrators) and other stakeholders in the industry:

Dr Saurabh Shekhar said, we believe that sustainable production is the need of the hour, which also forms the basis of our mission "Feeding the Future". Hence, all our solutions and services are committed to providing sustainable solutions. Whether it is feed safety programme for safe feed and food production or mycotoxin management programme to control mould growth, the intention is to ensure less wastage, long term storage at feed miller's end and eventually safe meat, milk, and egg production that has better shelf life at consumer's end. The solutions thus aim to cover the entire value chain. Diffusion of innovative concepts is always a time-taking process. However, with our strong focus on customers we like to gradually take them through this process. Education and training forms a major part in bridging the gap between scientific manufacturing and professional marketing. Additionally, as and when desired by the customer we also conduct on-site trials to support our scientific claims with practical data.

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Egg quality and safety

Dispelling the myth about plastic eggs

SUMMARY

In recent months, the issue of quality and safety of eggs has been raised several times creating doubts in the minds of consumers and traders alike. In addition, consumers have also shown concern regarding fake or plastic eggs. Plastic eggs or artificial eggs are a myth mainly due to the fact that there is no technology available to produce a plastic/artificial egg that would perfectly resemble a natural egg.

Consumers need to remember that the quality and appearance of the egg mostly depend on the way they are stored and for how long they are stored. Egg quality is best maintained when they are stored in cold temperatures preferably inside refrigerators and consumed within a period of 2 to 3 days. When kept in room temperature, several changes take place in an egg that bring about differences in the smell, texture and appearance of the egg.

This guidance note seeks to bust the myth about fake/plastic eggs and explain to various stakeholders, what to look for when assessing the freshness of eggs and how best to store them to maintain the quality and ensure safety.

KEY TAKEAWAYS

- Consumers need to know that there are no available techniques to make an egg artificially.
- The way eggs are stored is as important as for how long they are stored. Eggs can lose as much quality in one day at room temperature as in 4 to 5 days in the refrigerator.
- Eggs kept at room temperature can maintain their freshness for up to 10 - 12 days after being laid, but the shelf-life reduces with increase in storage temperatures.
- Consumers should store eggs in refrigerators in designated shelves or inside egg crates.
- In most cases, eggs that are clean, free of visible defects or cracks and maintained under cooler temperatures will remain fresh for 4 to 5 weeks from the time they are laid.

- Retailers/traders should source eggs from credible sources and store them in refrigerators.
- Do not use dirty or cracked eggs. Cracked egg shells are a perfect foil for bacterial infections and the dirty eggs may also contaminate other food stuffs.
- Appropriate temperature and relative humidity (RH) need to be maintained for storing eggs in the cold store, the lack of which can result in mixing up of the yolk and albumin.
- Consumers can make use of this guidance note to check the freshness and quality of eggs easily as home with the help of simple tests.

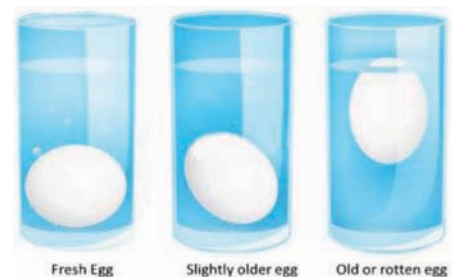
I. Maintaining the freshness of eggs

- Eggs maintain their freshness for up to 10 - 12 days, after they are laid, at room temperature of about (28±2°C), but the shelf life will be shorter at higher temperatures. The important factor in maintaining egg freshness is mainly temperature while humidity also affects the same to some extent. Storing the eggs, in refrigerator, in designated shelves or egg cases is the best way to maintain their freshness.
- To maintain egg freshness and performance, buy the eggs from stores that keep the eggs at cooler temperatures (air-conditioned stores or supermarkets) or stores that keep the eggs in well ventilated covered places and maintain ambient temperature.
- In most cases, eggs that are clean, free of visible defects or cracks and bought from a place that stores eggs under cooler temperatures will remain fresh for 4 to 5 weeks from the time they are laid provided that the eggs are stored in their carton in refrigerators. Beyond this period, the egg quality starts to deteriorate.
- Consumers should strictly avoid handling eggs roughly and leaving them in hot vehicles or places where temperatures are very high. Refrigerate the eggs once you reach home.

- Do not use dirty or cracked eggs. Cracked egg shells are a perfect foil for bacterial infections and the dirty eggs may also contaminate other food stuffs. Dirty eggs may be contaminated but may not still smell bad. Avoid washing dirty eggs, as they would become more porous when wet, thus making an easy entry for bacteria inside eggs.
- If an egg is cracked or too dirty, dispose it off.
- Always wash your hands thoroughly with soap and water after handling eggs.
- Feed quality is also an important factor affecting the overall quality of eggs. Eggs produced by farmers who used castor seed cakes as source of protein were reported to have rubbery textures. Therefore, poultry feed used in poultry farms should be approved by concerned regulatory bodies like BIS, etc.

II. Testing eggs for freshness

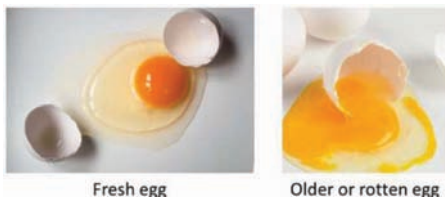
- Fresh egg, when held against a very bright light in a dark room, will display a small air gap usually at the broader (blunt) end of the egg. As the egg ages, the air cell expands in volume. Upon hard boiling a fresh egg, you can clearly see the indentation left behind at the top of the egg once the shell is peeled off.
- In case of fresh eggs, the yolk normally stays in the centre and is not very mobile because of the chalaza (the strings of tissue) that hold it in place. These strings break down as the egg ages (during storage or transportation). When hard boiled eggs are cut length wise, one can see that the yolk has moved off the centre.
- A quick test to check the freshness of an egg is to immerse it in a mug or basin of water. Fresh eggs would remain at the bottom width wise, older eggs would remain at the bottom on one end while the stale/rotten ones would float because of



This guidance note, prepared by Dr. Bhaskar N., Advisor, FSSAI is based on information collected and compiled by the author from various sources. It does not have any force of law. FSSAI does not take responsibility for any inadvertent errors or omissions in this note.

the larger air cell. It is to be noted that sometimes weak shell and fine cracks can also cause the egg to float.

- When broken out of the shell, good quality, fresh eggs display certain characteristics as mentioned below:
- The yolk (yellow portion) would be rounded, small and stands high in a thick and gel like egg white. The gel like mass of egg white does not spread over a wide area but tends to stay compact. As the egg ages (with storage and temperature associated with storage), the egg white becomes thin and runny and finally egg yolk and white dissolve into each other in
- older or rotten eggs (or the alleged plastic/fake eggs). The older eggs may also develop rotten odour and would have lost the typical egg odour.



- With the aging of egg and the white becoming thinner, one can clearly notice that it will take a longer time to whip into foam, and when whipped the foam is less stable or collapses faster. However, it is also important to note that very fresh eggs also do not foam well and take longer time; but, once beaten the foam is very stable as compared to older eggs. The maximum and better foam volume/stability can be obtained from three or four day old eggs.

III. If not stored properly, eggs become plastic-like

The way eggs are stored is as important as for how long they are stored. Eggs can lose as much quality in one day at outside high temperature as in 4 to 5 days in the refrigerator. Eggs kept at room temperature can maintain their freshness for up to 10 - 12 days after being laid, but the shelf-life reduces with increase in storage temperatures.

The following changes happen in an egg as a function of storage. These changes in egg quality as the egg ages are summarised in the figure below. To slow down these changes, freshly laid eggs should be put in cold storage, and/

or the shells can be covered with a thin layer of an approved oil, particularly over the air cells.

While transporting and storing eggs undergo different temperatures. Due to this, the air cell in the egg increases in volume, loses water content (through more than 20000 pores in the egg shell) from the yolk and albumen due to evaporation through (more than 20000 pores) the shell. The chalaza, a funnel shaped proteinaceous matter connecting the yolk and albumen starts disappearing and finally the egg loses its weight (a normal fresh egg weighs around 50-65 g, while older or rotting eggs would lose about 15-20 g of their weight). The increase in air cell volume can be easily detected by piercing the broader end of the egg with a pin. A normal (fresh) egg does not give away easily while an older egg simply gives in due to increased air cell.

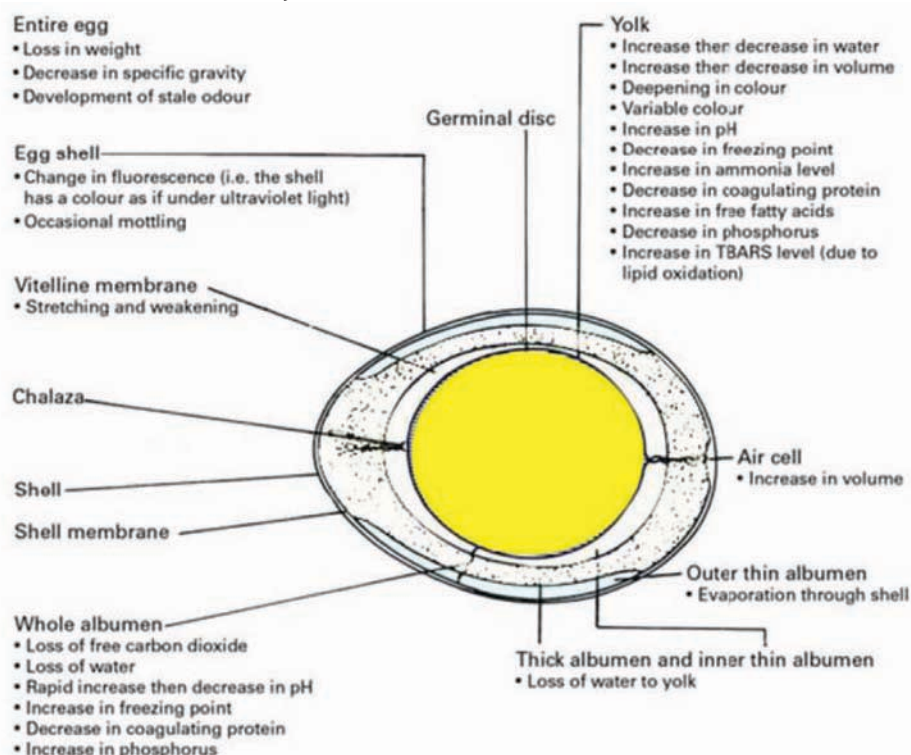
As a consequence of water loss in eggs, the egg white and yolk portions shrink followed by mixing of these two portions. Both these portions dissolve into each other, and when such an egg is broken it does not give a separate egg yolk or white giving the impression of a fake (or plastic) egg. Further, the smell of mixed yolk will not have the typical odour one associates with a fresh egg. Moreover, the shell membrane in a normal (fresh) egg is slimy and appears smooth. With the loss of moisture this membrane becomes dry and has a

paper like appearance and texture. This again creates the impression that the egg could be plastic or fake. One should note that the membrane of a fresh egg would take time to burn when held against a flame, while the membrane of the older (fake or plastic) egg would burn quickly due to its dryness; but, both would produce the same kind of ash without a hint of smell that is normally associated with burning plastic.

Consumers can find out if the egg is genuine by simply dipping the shell pieces of suspected fake (or plastic) egg in strong acids (like 2N hydrochloric acid). Calcium carbonate, being the major component of egg shells, will dissolve the shells in the acid. Alternatively, egg or eggshells when placed in vinegar (~which has 3-4 percent of acetic acid) will dissolve the shells slowly but will start giving out bubbles (and sometimes make the eggshells float, in case of pieces). The membrane of such acid treated shells will have no adhesion to the shells but will almost have the texture of a paper or thin plastic.

IV. Plastic eggs - a myth

Before addressing the issue of fake eggs or plastic eggs, one should understand the economics of egg production and sales. The total egg production in our country during 2016-17 was reported at 88.1 billion and the growth in production has been >12 percent compared to



the previous year. Such increase in egg production is due to the fact that they are sold at wafer thin margins. As against this, consider the fact that there are no techniques available to make an egg that resembles a natural egg perfectly. It is also important to note that there are techniques to make artificial eggs using chemical ingredients like calcium chloride, alginate and/or gelatin apart from dyes/colours. This technique is usually employed for encapsulating several ingredients, molecules or nutrients. One of the best example could be the soft encapsulation of fish oils. This technology is widely used to mimic roes (fish eggs are called roes) and more so to mimic caviar (eggs of sturgeon fish). Such roes are mainly made to serve vegetarian sushi, especially for people who cannot eat fish eggs. The process of making such eggs is labour intensive, apart from being expensive. Fish eggs are normally 50-100 times smaller than chicken eggs.

But, in any case, it is difficult and almost impossible to make an egg that smells and tastes like fish or chicken eggs. Now, consider the scenario where the retail cost of an egg is around Rs 5. Even if the retailer buys it at Rs 4 and makes a profit of Rs 1 per egg, they would prefer to purchase an artificial egg only if it is available at cost lesser than ? 4. One of the reports states that printing a 3D print of an egg costs Rs 5,000, if it is printed in excess of 100 pieces. Would someone go to the extent of selling a product worth Rs 5,000 for Rs 5? Taking into consideration, the cost of ingredients and labour intensiveness of the process, it is hard to believe that one can produce a fake egg at almost 4-5 times the price of a natural egg. Making a fake egg is not anybody's cup of tea as it would require professional skills to handle the encapsulators that would make fake eggs. It is to simply say that the motivation to create a fake product (egg in this case) for sale is that fakes can be produced at a fraction of the cost of the genuine product, in order to generate more profit. In this case it seems unlikely.

Moreover, eggs being riskier product are always subjected to testing in accredited laboratories in case of imports at the point of entry. Therefore, it is highly unlikely that fake eggs (which are expensive to make) would find their way into our country and be available for sale at cheaper rates.

V. Other myths about egg quality

• **Plastic or fake eggs are for real**

No. The plastic or fake eggs are a myth mainly due to (a) economics involved in preparing

a plastic or fake egg, and (b) inability for anybody to make a composition similar to natural egg.

• **Bad or rotten eggs always smell bad**

Eggs can smell and taste fine and still have Salmonella. Also, bacteria on the shell can get inside if the eggs are cracked, and, can also find their way into other foods if kept in

contact. However, if an egg does smell bad, never use it.

• **Dirt or chicken shit on eggs indicates that eggs are organic and natural.**

Certainly, the dirt is an organic material but it is neither safe nor good for health. Chicken shit may contain harmful bacteria, mainly Salmonella. It is advisable that such dirty eggs be discarded.

• **If eggs are dirty, wash them to remove the dirt**

No. Eggs become porous when washed, hence never wash eggs. Washing normal or dirty eggs may allow the harmful bacteria (from the dirt or from the water) to enter into the eggs.

• **Eggs remain fresh if stored at room temperature and need not be refrigerated**

Refrigerating eggs keeps them fresh for longer duration as compared to storing them at room temperature and also minimises the risk of any bacterial growth.

• Egg is a better source of protein, minerals and vitamins than milk; and, hence providing raw egg to someone sick will provide them protein and minerals

No. Never give raw eggs to anyone including pregnant woman, infants or older people as eating raw eggs enhances the risk of Salmonella infection. It should never be given in raw form to those who are seriously ill, especially when they are sick. It is preferably better to consume cooked eggs in which egg white is firm and yolk is completely thickened.

• Uncooked (raw) eggs are a better source of proteins and nutrients

No. Drinking eggs in their raw form or in the form of milkshakes with raw egg whites is the riskier way of consuming eggs. Cooking eggs does not reduce the

protein content or nutrients present in them to an unavailable form.

• The egg float test can clearly differentiate good and bad eggs

The float test can differentiate fresh and older eggs. But, it never differentiates the goodness of the egg in terms of Salmonella contamination.

VI. For traders and retailers

• Source eggs from credible sources only. Traders and retailers can minimise the decline in egg quality by observing the following basic guidelines: -

• Have adequate and cool holding places to store eggs (preferably refrigerated)

• Avoid storing eggs close to strong smelling food or food products -

• Store or display eggs away from sunlight

• Strictly rotate the egg stocks on FiFo (First in First out) basis i.e. keep older stock in front of fresh stocks so that all eggs sold are as fresh as possible

• Avoid transporting eggs in hot vehicles or hotter temperatures

• Advise the consumers to store the eggs in cooler temperatures or refrigerators

• Immediately discard any cracked or dirty egg

• Do not sell dirty eggs to consumers

VII. For regulatory staff and laboratories

• Sample condition: Egg samples collected for analysis should preferably be transported under cooler temperatures without subjecting them to higher temperatures. It is advisable to transport the eggs in cartons or egg cases if being sent for analysis.

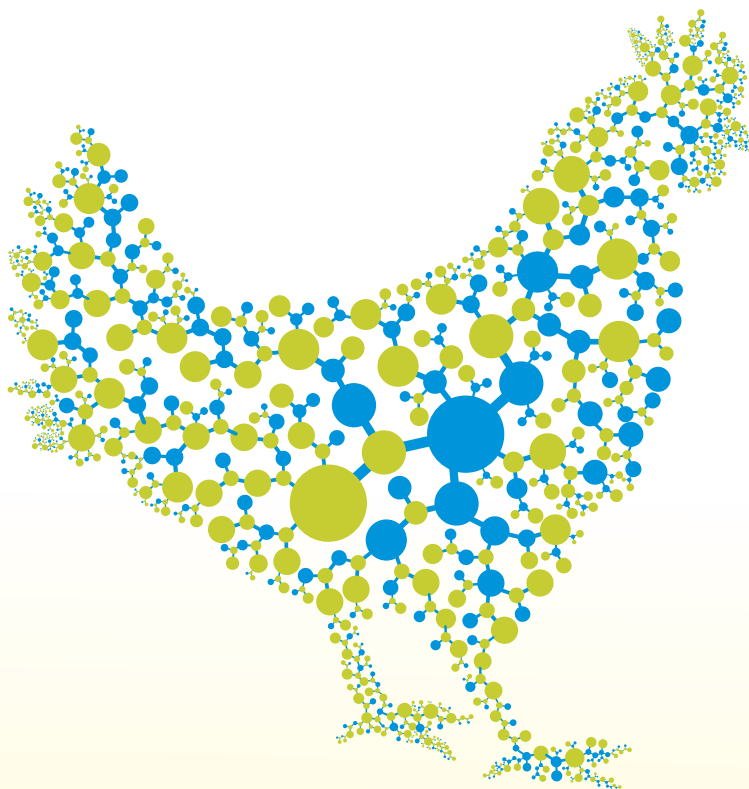
• Screening and confirmation: Screen any suspected fake egg samples for true protein by Biuret's/Lowry's as well as Kjeldahl methods. Natural chicken eggs (whole egg), would generally have a protein content between 11.5 to 12.5 percent, lipid content of 11.5 - 12 percent and almost no carbohydrate (<0.5 percent, if any). Since egg is known to have the most desirable amino acid composition, next only to milk; amino acid composition will also help distinguish the normal eggs from allegedly fake eggs.



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- Feed & Nutrition, Bio-security & Management.
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Note: Knowledgeable Speakers on the subject with good communication skills are invited to contact us to make presentation in "UPDATE" on the above topics on or before 30 November 2019.

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Organic Poultry Production in India

Bornalee Handique and Yengkhom Rojita Devi

Ph.D. Scholar ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh.

Introduction

At present poultry farm has emerged as the most dynamic and fastest expanding segment in animal husbandry sector. The use of antibiotic based growth promoters is presently facing serious problem and has raised global concern as some reports revealed their ill effects among which are development of microbial resistance to the products and their potential harmful effects on human health. Now a day, consumers are becoming more aware of safety and quality of food products consumed by them. On the other hand, emerging importance of animal (poultry) welfare started showing its adverse implications for trade at international level, as there is growing argument that intensive cage rearing, forced moulting etc are unethical and against the animal welfare. Therefore organic poultry farming can help us to produce safer poultry products. Organic farming is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs. The main aim of organic farming is to establish and maintain soil - plant, plant-animal and animal-soil interdependence and to produce a sustainable agro-ecological system based on the local resources. The establishment of organic animal / poultry husbandry requires a specific period called as “**conversion period**”. This period is the time taken between the start of the organic management on farm and certification of livestock farm and its product.

Important points for organic poultry farming Poultry breeding

Breeds which are adaptable to local conditions should be chosen. Breeding should be directed towards good health. The use of genetically engineered species or breeds is not allowed. Reproduction technique should be natural. Artificial insemination is allowed only upon veterinary necessity. Hormonal treatment for more egg production should be prohibited.

Poultry housing and

Behavior of the birds

The housing of the birds should provide an opportunity for poultry bird to exhibit all its normal behavior so that it will minimize the stress of the birds. For organic poultry production in European and American countries mobile houses are very popular as compare to fixed housing system. The main advantage of mobile housing is that the birds can be moved to fresh grass areas so that the risk of soil-borne parasites in the outside area can be kept low. Housing should be designed and constructed in such a way that birds can be protected from predators. Good sanitation with regular cleaning of poultry sheds is important. For organic poultry production birds should not be caged and reared under deep litter system. Artificial light can be used according to the time prescribed by the certification agencies. In the organic meat sector birds must be grown for usually a period of 81 days of age. Poultry must have easy access to an outside grazing area, fresh air, clean water, balanced ration, dust-bathing facilities and an area for scratching.

For the normal expression of the bird behavior there should be ample space for wing flapping and stretching and areas suitable for sand, dust and sun bathing. More specifically, sand and dust-bathing are important for the maintenance of hygiene and help to reduce the number of external parasite considerably. The major behavioral problem faced by the poultry is feather pecking and cannibalism. They usually feed at the same time with the acoustic signals of pecking and scratching acting as a stimulant for other hens.

Feeding and watering

All ingredients must be certified as organic except vitamin and mineral supplements. The diet should be offered to the poultry in a form that permit the birds to execute their natural feeding behavior and digestive needs. The largest component of any organic poultry diet is the cereal (maize). Home grown protein sources like peas, beans and rape seed can be utilized. Oily fish meal can be used in organic rations and it had higher essential amino acid content as compared to full

Highlight Points

Poultry farm has emerged as the most dynamic and fastest expanding segment in animal husbandry sector and chicken is becoming one of the most widely consumed meats in India. The use of antibiotic based growth promoters is presently facing serious problem and has raised global concern, which are development of microbial resistance to the products and their potential harmful effects on human health. Based on local resources, organic farming aims at creating a sustainable agro-ecological production system by considering animal health and welfare. Organic standards are designed to allow the use of naturally occurring substances while prohibiting use of synthetic substances.

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fat Soya. Its use in poultry rations is limited because it is costly as well as organic products were found fishy taints. Sprouted grains are a good source of vitamins and can be used to replace synthetic amino acids. Limestone and phosphate rock can be employed as mineral source for organic ration. For layers, limestone grit and oyster shell will provide needed calcium for egg production. Hence, a balance ration is the key factor for sound and healthy birds. Requirement of essential amino acids can be fulfilled through feeding of organic soya bean, skim milk powder, potato protein, maize gluten etc. The birds must have continuous access and supply of quality water without any antibiotic and bacteriological residues. The water should be regularly tested for ground water contamination.

Health care of the birds

If all management practices are directed to the well-being of the birds, they will achieve maximum resistance against disease and prevent many infections. Sick and injured birds should be given prompt and adequate treatment. Use of antibiotic should be avoided. Vaccinations should be used only when diseases are known or expected to be a problem in the region of the farm and where these diseases cannot be controlled by other management techniques. Use of natural medicines and methods including Homeopathy and Ayurvedic should be emphasized.

Record keeping in organic farming

Important records to be kept in organic farm are breeding records, register for source of animals purchased, formulated organic feed ration record, purchased organic feed record, feed supplements and additives inventory, organic poultry pasture record, health care products inventory, sanitation products inventory, organic egg layers monthly flock record, organic meat poultry flock record, organic poultry slaughter/sales summary and monthly organic egg packing/ sales record.

Conclusion

India has tremendous potential in organic poultry production and ill effects of conventional farming are compelling the consumers to shift to the organic products. So, the organic poultry is poised to transform poultry sector in particular and animal-agriculture in general if regulations, infrastructure facilities, transfer of technology and sectoral cum target oriented development programmes are brought in practice with basic thrust towards 'food safety and poultry welfare'.

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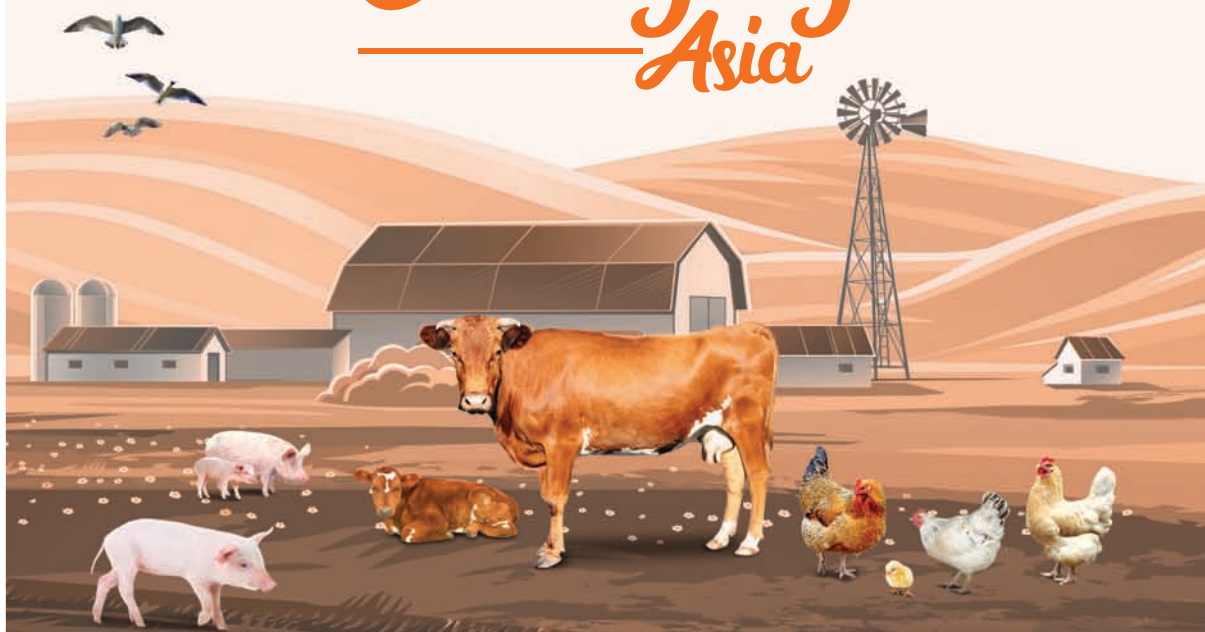
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Probiotics as an alternative to antibiotics in poultry

Meena Kumari. P

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Introduction:

With the increase in regulations regarding the use of antibiotic growth promoters and the rise in consumer demand for poultry products from 'Raised Without Antibiotics' or 'No Antibiotics Ever' flocks, the quest for alternative products or approaches has intensified in recent years. A great deal of research has focused on the development of antibiotic alternatives to maintain or improve poultry health and performance. There are potential alternatives for antibiotics for poultry. It includes,

Alternatives for antibiotics:

1. Probiotics
2. Prebiotics
3. Synbiotics
4. Organic acids
5. Enzymes
6. Phytochemicals
7. Antimicrobial peptides
8. Hyperimmune egg antibodies
9. Bacteriophages

Optimal combinations of various alternatives coupled with proper management and farming practices will be the key to maximize performance and maintain animal productivity, while we move forward with the ultimate goal of reducing antibiotic use in the animal industry. This review describes the potential of the probiotics as an alternative available to increase animal productivity and help poultry perform to their genetic potential under existing financial conditions.

Why "NO" for antibiotics?

Since the discovery of antibiotics in the 1920s, they have played a substantial role in the advancement and prosperity of the poultry industry. Antibiotics have been supplemented in animal feed at sub-therapeutic doses to improve growth and feed conversion efficiency and to prevent infections for more than 60 years. In-feed antibiotic (IFA) use soon became a familiar and well-established practice in the animal industry and rose with the intensification of livestock production. Inclusion of antibiotics in the diets gave a positive response 72% of the time and 3–5% increase in growth and feed conversion efficiency was noted. Thus, it can be noted that IFA played a crucial role in contributing to the economic effectiveness of livestock production. Despite the well-demonstrated beneficial effects of IFA in improving the growth rate, reducing

the mortality and increasing resistance to disease challenge, their use was also known to be associated with some disadvantages and challenges. Concerns exist that the use of IFA leads to the development of antimicrobial resistance, posing a potential threat to human health. However, mixed opinions still exist on the transfer of antibiotic resistance genes from animal to human pathogens. Several studies showed that there might be a link between the practice of using sub-therapeutic antibiotics, the development of antimicrobial resistance amongst the microflora. Despite these debates on the role of IFA use in conferring antimicrobial resistance to human pathogens, the European Union issued a ban on the approval for antibiotics as growth promoters since 1 January 2006 on precautionary grounds. In the USA, antibiotic use in livestock and poultry feeds is under great scrutiny as a result of increasing consumer awareness and the demand for livestock products from antibiotic-free production systems. In late 2015, the state of California passed a bill (Senate Bill 27) enforcing a strict ban on using medically essential antimicrobials in animal feeds for both growth promotion and disease prevention. The decline in the use of antibiotic growth promoters (AGPs) in the future seems inevitable, and the practice of using antimicrobials may prove economically impractical because of market limitations and export restrictions. In view of the increasing concerns over AGP use, the quest for novel alternate replacements to mitigate antibiotic use in animal agriculture has grown over the years. In the past two decades, a great deal of research has focused on the development of antibiotic alternatives to maintain or improve poultry health and performance. This review, therefore, is focused on current knowledge pertaining to probiotics being employed to enhance poultry growth performance and provides a brief overview of along with a description of their efficacy and modes of action.

Probiotics as an alternative to antibiotics:

Probiotics, sometimes used interchangeably with the term direct fed microbial (DFMs), are gaining acceptance as potential alternatives to antibiotics to improve production efficiency. They are defined as "live microbial feed supplements which beneficially affect the host animal by improving its intestinal microbial balance." A recent definition adopted by FAO/WHO (2001) states that "Probiotics are mono or mixed cultures of live organisms which when applied in adequate

Highlight Points

- Probiotics can speed up the maturation of day-old chicks' developing immune systems and can be applied throughout a bird's life to support gut health
- Increases the feed efficiency ratio of poultry
- Maintains the healthy microbiota by competitive inhibition of pathogens and by the production of antimicrobial compounds
- Improves the immunity function
- Overall, it's a key driver of good flock health and performance



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amounts confer a health benefit to the host.” Probiotics may contain one or more strains of microorganisms and may be given either alone or in combination with other additives in feed or water. Novel application strategies such as spraying on chicks or embryonated eggs are also practiced and potential methods such as in-ovo application are being explored. A variety of bacteria (*Bacillus*, *Bifidobacterium*, *Enterococcus*, *Lactobacillus*, *Streptococcus*, and *Lactococcus* spp.) and in some cases yeast (*Saccharomyces* spp.) have been tested as probiotics in poultry. The majority of the conducted research was explicitly aimed at investigating the effects of probiotics in reducing the numbers of pathogenic microorganisms in the gastrointestinal tract. However, a considerable amount of research also examined the effects of probiotics on improving growth and performance in poultry without apparent disease. Supplementation of diets with a single strain of *Lactobacillus* sp. (*L. casei*, *L. fermentum*, *L. bulgaricus*, *L. reuteri*) was shown to improve the body weight and feed efficiency in broilers. Similar results were demonstrated when broilers were given multiple strains of *Lactobacillus* sp. *Bacillus* sp.-based probiotics (*B. coagulans*, *B. subtilis*, *B. licheniformis*, and *B. amyloliquefaciens*) were also successfully employed in poultry diets and were shown to have growth-promoting effects. The application of several other probiotic bacteria such as *Enterococcus faecium*, *Clostridium butyricum*, *Rhodopseudomonas palustris* also significantly increased the daily weight gains with decreased feed conversion ratio (FCR). Research trials have also been conducted with multi-microbe probiotic mixtures composed of combinations of different beneficial bacteria and/or yeast and were shown to exhibit a growth-promoting effect. In addition to the improved growth performance, probiotics supplementation was also shown to enhance the general immune function of broilers, as evidenced by the augmented serum/plasma immunoglobulin levels, increased antibody titers to pathogens, and changes in immune cell numbers. The intestines of broilers that were given probiotics showed better development and an increase in villus height and crypt depth compared with controls. Probiotics supplementation also positively modulated the intestinal microbiota and increased numbers of beneficial bacteria such as *Lactobacillus* and *Bifidobacterium* spp. The beneficial effects of probiotics supplementation were also reported in laying hens. Hens fed diets supplemented with probiotics showed increased egg production compared with controls. The dietary inclusion of *B. licheniformis* improved laying performance and egg mass. Consistent with these findings, various DFM product supplementation was also shown to improve body weight and performance in turkeys. *Lactobacillus* based probiotics significantly improved market body weight and average daily gain of commercial turkeys. The modes of action by which probiotics improve performance and promote gut health are not entirely understood. The two most important mechanisms through which probiotics exert beneficial effects include

- balancing the gut microflora
- immune regulation.

Probiotics help establish a microenvironment in the gut that favors beneficial microorganisms and reduces the colonization of pathogenic bacteria (competitive exclusion) by:

1. creating a hostile environment for harmful bacterial species (through the production of lactic acid, SCFA, and reduction in pH)
2. competing for nutrients with undesired bacteria
3. production and secretion of antibacterial substances (e.g., bacteriocins by *Lactobacillus*, *Bacillus* spp.)
4. inhibition of bacterial adherence and translocation

Probiotics are also known to improve intestinal function by maintaining epithelial cell homeostasis, promoting cytoprotective responses and cell survival (through the production of cytokines that enhance epithelial cell regeneration and inhibit apoptosis), improving barrier function (modulation of cytoskeletal and epithelial tight junctions), and increasing mucin synthesis. They also play an essential role in digestion and nutrient retention by increasing digestive enzyme activity and improving the breakdown of indigestible nutrients. Probiotics also exert their action by reducing toxic amine production and ammonia levels in the gut. Another important mechanism of probiotics activity includes modulating and regulating intestinal immune responses by alleviating pro-inflammatory cytokines, increasing secretory IgA production, and promoting specific and non-specific immune responses against pathogens (activation of macrophages, increase cytokine production by intraepithelial lymphocytes). Thus, an ideal probiotic organism should be able to withstand processing and storage, survive in the gastric acidic environment, adhere to epithelium or mucus in the intestines, produce antimicrobial compounds, and modulate immune responses. However, not all strains exhibit all of the above properties, and care must be taken to select the strains or their combinations that will achieve maximum beneficial effect in vivo. Measures to protect the organisms during their passage through the upper digestive tract such as microencapsulation should be considered to ensure viability and colonization in the intestine. Overall, it can be said that probiotics can serve as potential alternatives to antibiotics for increasing poultry performance.

Conclusion:

Owing to the rise in customer need for livestock products from antibiotic-free production systems, there exists a high need for the development of antibiotic alternatives that can help improve performance and maintain the optimal health of food animals. Overall, it can be said that probiotics can serve as potential alternatives to antibiotics for increasing poultry performance.

Table 1. Main species of probiotics bacteria used in poultry

Genus	Major species used
<i>Bacillus</i>	<i>B. subtilis</i> , <i>B. licheniformis</i>
<i>Lactobacillus</i>	<i>L. acidophilus</i> , <i>L. bulgaricus</i> , <i>L. reuteri</i> , <i>L. salivarius</i> , <i>L. sobrius</i>
<i>Enterococcus</i>	<i>E. faecium</i>
<i>Bifidobacterium</i>	<i>B. animalis</i> , <i>B. bifidum</i>
<i>Pediococcus</i>	<i>P. acidilactici</i>
<i>Clostridium</i>	<i>C. butyricum</i>
<i>Streptococcus</i>	<i>S. thermophilus</i>

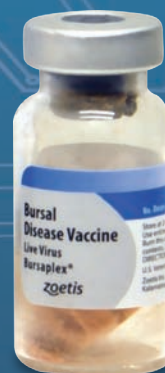
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Dietary factors triggering wet litter in Poultry

Venket M Shelke, Kemin Industries South Asia Pvt. Ltd.

Introduction

Management of poultry house environment is vital to achieve maximum broiler production. An important measure for suitable environment is proper maintenance of poultry litter through management and nutrition. Litter is composed of bedding material mixed with feed, feather and excreta. Litter conditions considerably influence broiler performance and ultimately profits of growers and integrators. Litter cushions the bird from hard floor, provides insulation to absorb and facilitate evaporation of faecal, urinary and spilled water. Several types of litter commonly used in poultry houses are pine and wood products (shavings, sawdust bark, stump chips, and chopped pine needles), rice and peanut hulls, ground corn cobs, sand, straw (wheat, barley, grasses), sugarcane (tops and bagasse), shredded newspaper and clay as per the local availability and economical value. These materials are used at the rates ranging from 2-5 kg per square meter. Above certain litter moisture content, "wet litter" can produce more ammonia and emit into air, which can negatively affect animal production and welfare. Litter moisture content in poultry production ranges from 15-45% and vary according to season. As the litter moisture increases, litter quality deteriorates. Factors that affects litter moisture include management, housing, diseases, diet, gut health and litter type. Wet litter can serve as a growth factor for potential pathogen and an initial stage for intestinal stress leading to gut health problems. Increased wet litter problem raise the ammonia levels in barn which is detrimental to bird health.

Preventing wet litter is important to avoid production loss and, maintain animal health and welfare. Apart from common causes due to disease, ventilation, management and water problems; nutrition plays a vital role. Nutrition which might create wet litter, can offer solutions to the same. Often excess water in droppings leads to wet litter. This indicates that either the birds drink more water than the need or birds do not absorb water as much as it should from hindgut. This is due to the excess nutrient load of digesta that may include protein, minerals, salts, soluble NSP's, etc., which require extra water to be removed from body (Figure-1).

Dietary Factors

Feed composition and chemical properties (crude protein, acid and neutral

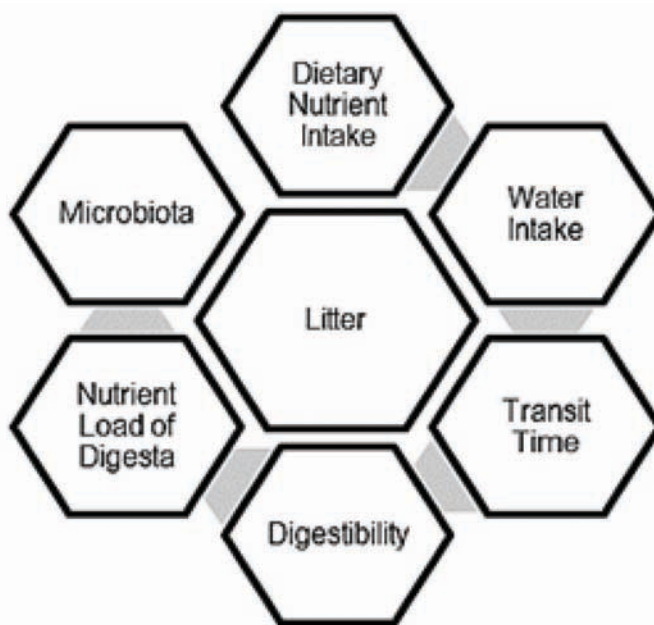


Figure-1: Schematic overview of dietary factors contributing wet litter

detergent fiber, lignin, non-fiber carbohydrate, fat, ash and total minerals) determines the digestibility of nutrient and amount of surplus nutrients excreted through droppings. The intrinsic factors that effects on feed utilization are nutrient digestibility and solubility, protein content, protein / energy ratio, mineral level/ratio, diet specification, exogenous enzyme inclusion and anti-nutritional factors. Whereas, extrinsic characteristics like rate of feed passage, endogenous enzyme secretion and pH contributes an outcome in utilization of feed. Along with dietary feed composition characteristics, mycotoxins contaminated feed also plays vital role in wet litter.

Dietary Fiber

In poultry, dietary fibers are considered as anti-nutritional factors, because it impairs the digestibility of nutrients. Antinutritive effect of non-starch polysaccharides (NSP), like arabinoxylans is manifested by growth depression, reduced nutrient digestibility (especially fat), physiological and morphological changes in digestive system, increased digesta viscosity and modifying intestinal microflora that frequently

Highlight Points

- An important factor to maintain suitable environment in poultry farm is to take care of litter moisture through proper management and nutrition.
- Litter cushions the bird from hard floor, provides insulation to absorb and facilitate evaporation of faecal, urinary and spilled water.
- Higher litter moisture content causes "wet litter" which produce more ammonia and emit into air, and negatively affect animal production and welfare.
- Nutrition which might create wet litter, can offer solutions to the same.
- Nutritional manipulation can be linked to digestibility of nutrient, and considered vital for determining excreta moisture output

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results in wet litter (Figure-2). Dietary fibers consist of NSP and non-carbohydrate substance. Soluble NSP are viscous fiber and have antinutritive effect on broiler performance. Viscous fibers reduce ileal and fecal digestibility, either by reducing excess of digestive enzymes through nutrients and hydrolyze them into smaller absorbable substance, or by forming gel matrixes and increasing the transit time of gastro-intestinal (GI) content. It also increases the gut viscosity, which results in softer feces and may lead to wet droppings. Cereals rich in soluble NSP's like rye, barley, triticale and wheat have been associated with litter problem with increase in amount of excreta/ excreta stickiness and wateriness. It was studied that barley diets caused more wet litter problem than the cereals, sorghum, wheat and triticale (77.5% vs. 74.5% on average), on excreta moisture content in laying hens.

Dietary Protein

High protein content or imbalanced amino acid profile can cause wet litter in birds. Excessive dietary protein must be catabolized and used as energy source, with nitrogen in amino acid excreted via kidneys in the form of uric acid. This high dietary protein is associated with increased water consumption, resulting in wet litter. Wet litter cake formation due to poor management in poultry is shown in Figure-2. It was reported that 1% increase in protein level leads to 3% increased water consumption. Feeding birds



Figure-2: Picture showing the litter cake formation & poor wet litter management.

with protein content from 17% to 26% by increasing soybean at the expense of maize, observed a permanent increase of water consumption and higher water feed ratios. In addition, soybean meal contains anti-nutritional factors such as trypsin inhibitor, saponin, pectin and indigestible oligosaccharide, which increase water intake and litter moisture. Inadequate heat treatment of soybean meal or high levels of inclusion can lead to enteritis and wet litter. Apart from poor digestibility or rapid feed passage, undigested proteins (high molecular weight) reaching the caeca are strongly inflammatory and thus reduce feed efficiency. Specially, in the case of soluble protein, liquids pass through the digestive tract 15% faster than do solids.

Dietary Lipid

Fats and oils have the potential to become oxidized, and the resulting rancid fats compromise digestibility resulting in gastrointestinal disturbance and wet litter, either directly or indirectly by affecting gut flora (oxidative). Unprotected fatty acids are very susceptible to oxidative rancidity, released during oil seed processing (grinding or chemical extraction).

Dietary Electrolyte Balance

Dietary mineral levels affect the osmolarity of intestinal content and water reabsorption. Hence, high levels of minerals in diet can lead to diarrhea (Figure-3). Sodium (Na), chloride (Cl) and potassium (K) are essential for all animals to maintain osmotic pressure regulation, acid-base and fluid balance in body tissues. Excess consumption of Na/K in relation to chloride leads to alkalosis and, acidosis in case of excessive chloride intake. However, water intake and litter moisture increase linearly with dietary electrolyte balance (DEB). Increasing DEB increases the dropping moisture due to higher Na⁺ or K⁺ intake. Excess of Na⁺, K⁺ and Cl⁻ causes



Figure-3: Picture showing vent pasting due to diarrhea in poultry birds.

and wet litter.

Conclusion

Control of litter moisture and quality is vital in poultry industry. Many factors lead to wet litter, of which some are related to management and housing, others associated with adequate ventilation systems and quality bedding material. Nutritional manipulation can be linked to digestibility of nutrient, and an important factor for determining excreta moisture output. Current feed strategy needs to aim for optimizing gastro-intestinal tract health management through feed. Beside the assessment of litter quality, monitoring excreta quality throughout the growing period is necessary for managing broiler health and environmental impact and to get better performances in poultry farming.

Immune responses of Poultry to Ranikhet (Newcastle) Disease Virus

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Introduction:

Despite the advances made in the diagnosis of and vaccination for Newcastle disease since it was first described in 1926, the disease continues to negatively impact poultry producers by infecting birds worldwide.

Newcastle disease (ND) ranked as the fourth most important disease in terms of the number of livestock units lost for poultry species behind highly pathogenic avian influenza, infectious bronchitis, and lowly pathogenic avian influenza.

While humoral immunity from vaccination is critical to ND control, another important aspect, that is not a new concept, but is often neglected, is the differences in resistance to ND due to genetic variation.

Genetic resistance to ND has been observed with various lines within the breed of chickens and turkey and among breeds of chickens and ducks. It is important to note that each Newcastle disease virus may be better adapted to grow in one species versus another, like what is seen with PPMV – 1 (Pigeon NDV) strains in chickens.

While improving genetic resistance to ND through breeding more resistant strains appears to be feasible, logistically it is very difficult due to the involvement of multi factorial components. Perhaps when the efficiency of producing transgenic birds is improved more disease resistance breeds can be used for this purpose.

Innate immune response to NDV (Newcastle disease virus) Infection in poultry.

The innate immune response comprises factors that exist prior to the advent of infection, and are capable of exclusion or rapid response to microbes. The primary components of innate immunity of poultry are (1) physical and chemical barriers, such as feathers and skin, epithelia and production of mucus; (2) phagocytic cells, including macrophages and natural killer cells; (3) Complement proteins and mediators of inflammation; and (4) cytokines. Overall, the innate immune response to virus infection is an immediate reaction designed to control and inhibit virus growth and spread, and aid in developing pathogen-specific protection through the adaptive immune response.

After the infection, the virus is first recognized by host sentinel proteins, including TLR (toll – like receptors) and NOD (nucleotide – binding oligomerization domain proteins), proteins producing rapid signaling and transcription factor activation that lead to production of soluble factors, including interferon and cytokines, the mediators of innate immune response, designed to limit and contain viral replication.

NDV of low virulence stimulates a lower innate immune

responses compared with virulent NDV (VNDV) that induces significantly higher levels.

Antibody response to infection and Vaccination with NDV

In addition to bio-security and culling of infected birds, vaccinations are critical component to control ND. International and national vaccination control policies will depend on the factors affecting the sector or poultry production, while keeping with the OIE regulations (OIE, 2012).

The goal of vaccination is always sterilizing immunity, however, that has not yet been achieved with NDV Vaccines. At best, NDV vaccines induce an immune response that reduce or completely prevents clinical disease and; mortality from ND, decreases the amount of VNDV shed into the environment, and increases the amount of virus needed to infect the vaccinated bird.

Mass application of live vaccines is often used due to the lower cost and faster application time compared to having to administer individual vaccines to each bird of a flock. The lentogenic B1, and Lasota vaccine strains of low virulence are commonly used worldwide, and can provide protection against VNDV if the vaccines are viable, administered correctly to healthy birds and time is allowed for an appropriate immune response to develop prior to the challenge virus. Unfortunately, conditions in the field are often less than optimal with mass application potentially reaching as little as 53% of the flock when the route of administration is spray and 60% when the route is through the drinking water.

Inactivated vaccines are often administered to layers and breeders to provide long lasting high antibody titers that can be passed to offspring to provide maternal immunity.

Because all NDV are in one serotype any NDV (avirulent) strain can be used as a vaccine and all vaccines should prevent clinical disease and death from ND. However, some studies have demonstrated that vaccines formulated with strains more similar to the challenge virus can decrease the amount of challenge virus shed in oropharyngeal swabs from vaccinated birds and potentially decrease the number of birds that shed virus.

In the chicken, IgM, IgY (avian IgG) and IgA antibodies are produced as part of the immune response. Antibodies are detected at the site of infection and in the blood starting at six days after infection or live virus vaccination and peaks 21-28 days after infection.

Antibodies neutralize the ND virus particles by binding and preventing attachment of the virus to the host cells.

Approximately 30% of the IgY and 1% of the IgM and IgA

antibodies present in the hen's plasma will passively transfer to the offspring to provide maternal immunity and if the NDV antibody levels are high enough can provide protection until the levels fall below a protective level.

Herd immunity is another beneficial consequence of a successful vaccination programme as it provides some protection to suboptimal – vaccinated or unvaccinated birds in an otherwise well vaccinated flock. However, this outcome is only achieved with ND when greater than 85% of the flock have haemagglutination inhibition (HI) antibody titers greater than 8 after two vaccinations. Field results suggest that only birds with HI titers greater than 16 after multiple vaccinations will survive VNDV challenge as 66% of the flock succumbed with titers less than that more commonly, HI levels of 32 or higher are what are typically thought of being protective.

Cellular immunity induced by NDV

Cell-mediated immunity (CMI) is specific adaptive immunity mediated by T lymphocytes and has been suggested to be an important factor to the development of protection in chickens vaccinated against NDV and contribute to viral clearance.

The subsets of T-lymphocytes, including cytokine – secreting CD4+ T helper cells, and CD8+ cytotoxic T lymphocytes (CTL), constitute the principle cells of the CMI response. Unlike antibody measurement via ELISA or HI, testing for CMI is more labor intensive and requires more skilled procedures.

Cell-mediated stimulation following NDV infection is detected as early as 2-3 days post infection. More recent studies also confirmed CMI responses to NDV may be detected shortly after vaccination with a live NDV vaccine.

The results of research indicate that the antibodies (HI antibodies) are the key modulators of protection, but that CMI likely continues to decrease viral shedding through target killing of NDV infected cells.

Studies have compared CMI responses between birds

receiving live versus inactivated NDV vaccines. Results indicate that CMI derived from Inactivated NDV vaccines take longer to develop and are not as robust as that from Live vaccines.

The virulence of the virus appears to play a role in CMI stimulation. It has been demonstrated that an earlier and shorter CMI induced by a less virulent NDV vaccine strain, compared to stronger and longer CMI mediated by a more virulent vaccine strain. Further the more virulent strain persisted longer in the bird and therefore was able to increase magnitude and duration of CMI.

To conclude, NDV specific antibodies remain the primary mechanism of protection against virulent NDV, the contribution of CMI are important considerations in the face of field challenge.

As New vaccine strategies are employed to protect poultry against VNDV it appears obvious that combining both arms of the adaptive immune response provide the best protection of birds and decrease the risk of transmission to susceptible birds.

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Critical Control Points in Poultry Feed Production

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India is one of the world's largest producer of broiler meat and eggs. A feat achieved since Indian poultry industry underwent a huge change in attaining operational efficiencies with better structures in place. However, the concerns over safe food production remain, especially with an increasing National and International community demand for food safety and traceability. We need to take serious note of such demands and put in place the practices that meets or exceeds the expectations.

This article aims to provide information regarding the critical control points in poultry feed production and the best practices in place.

HACCP:

Hazard Analysis and Critical Control Points (HACCP) system is a proven and internationally recognized practice for ensuring

that safety hazards are minimized in food production. The system in place brings us one step closer to demonstrating safety, traceability and confidence in the buyers of animal products. We have successfully used HACCP in some countries to keep microbes and mycotoxins in feed mills and farms at bay. Such efforts are reflected in the production of milk which fulfil the international norms of aflatoxin M1 limits. Although meat and eggs don't face such serious scrutiny as milk, the days are not too far away when there will be stringent regulations to monitor mycotoxin residues in meat and eggs. We need to remember that HACCP not only help us to export our products but also increases economic returns through improved efficiency.

The key application of HACCP can also be found in the control of pathogens, pesticides and heavy metals in the feed and

food chain. Bacteria such as Salmonella is a public health concern around the world. This pathogen can enter food chain through many routes – feed, water, rodents, faecal contamination etc. For such pathogen, control measures should be applied at all the steps of food production. Leaving any area unchecked can be a disaster not only on public health but also the economic situation of that country. HACCP has also been widely used to control Campylobacter infection in humans.

HACCP provides scientific basis for one of the most commonly used quote, “Prevention is better than cure”. The process involves having necessary tools to identify the risk, understanding how the risk enters the food chain, assigning a critical limit to the risk, establishing procedures to monitor the risk regularly, implementing corrective measures, establishing verification / validation procedures, and the most important of all, keeping up to date records of the changes made to the production process.

The whole world is looking at India for many reasons; not only to understand how it is going to feed its ever increasing human population but also to understand how it can produce food that can satisfy the developed world. In either way, quality and traceability should be in the forefront of Indian animal industry going forward. This article discusses only the critical control points that should be taken into account while developing HACCP program. Other aspects of HACCP program will be discussed in the later articles.

Critical Control Points (CCP):

Although every step in feed production requires close attention, some steps deserve more attention than others. These steps will be discussed in more detail below:

1. **Sourcing of raw materials:** The contamination of raw materials like grains can happen at the field level itself. So it is critical to test the raw materials when arrive at feed mill for parameters like moisture, water activity, moulds and mycotoxins.
 2. **Transportation of raw materials:** The length of transport and the prevailing conditions in the atmosphere while transport as well as the conditions inside the container or bags will play a crucial role in determining the quality of raw materials reaching the feed mill. India was fortunate to be self-sufficient on raw materials till last year and there was less impact of transportation conditions on raw materials quality. Going forward this can be an issue and careful considerations should be given for conditions while transport. India being a big country, within country transports also should be watched carefully.
 3. **Storage of raw materials:** Microbes that contaminated raw materials will continue to grow in storage leading to greater contamination with moulds, bacteria and mycotoxins. The conditions under storage are very much controllable and should be controlled all the times. The control of rodents, birds and unrequired personnel in the feed mill will significantly help in reducing contamination of raw materials and feeds. Simple measures such as placing the bags on wooden pallets and maintaining enough distance from side walls will go a long way in preventing
- further contamination of feeds and raw materials. Regular cleaning and removal of dust is very critical in the feed mill. If the raw materials are stored in silos, regular maintenance of silos is also very critical.
4. **Elevators in the feed mill:** Elevators play a key role in moving raw materials and feed up and down the feed mill. Elevator hygiene is very critical but accessing elevators interior is always challenging. The number of studies conducted have clearly shown the lump formation and accumulation inside elevators, particularly at the bottom. Such an effect can lead to mould and bacterial accumulation. Hence, monthly cleaning of elevators is highly recommended.
 5. **Mixer in the feed mill:** Today many liquid additives, including oil and water, are added into the mixer and hence frequent cleaning is very critical. Particular attention should be given to the cleaning of the backside of mixing blades as well as the upper inside portion of mixer.
 6. **Conditioners in the feed mill:** Due to the high temperature prevailing, pellet machines generally don't have challenges with microbial contamination. However, the same can't be said for conditioner. Depending on the type of conditioner, cleaning schedule should be made.
 7. **Coolers:** Given the higher dampness inside coolers, the chances of microbial contamination is quite high in cooler exhaust points. Frequent testing of pellets collected from coolers will help to assess the situation and take necessary action.
 8. **Other CCP:**
 - a. The storage area of raw material should be separated from complete feed.
 - b. Used gunnies should not be stored in the premises. They need to be fumigated and sold. Avoid used-gunnies to store and transport.
 - c. Remove all unused stocks from storage area, broom all the walls and the floor.
 - d. Finished pellets must not be allowed to come into contact with objects prior to falling in to the cooler.
 - e. Any animal protein used as a feed ingredient in poultry feed should be purchased from a reliable source.

To conclude, only key critical control points are covered here. To cause a disaster in feed mill and the subsequent animal performance, the hazard don't have to be very big and hence all the points of entry of microbes should be monitored, controlled and maintained.

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