## Poultry Fortune

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August 2022

Inside...

Editorial: Consumption of Eggs has many Benefits



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Nutritional benefits of chicken for the body - Suguna Foods

Novus' New breeder book aims to aid in management, performance and sustainability



Prof G. Devegowda Poultry Science Excellence Award 2022 conferred on Inayath Ulla Khan, KPFBA's Executive Secretary

Bacteriophages - The Future of Disease Prophylaxis against Menacing Bacteria in Poultry Production



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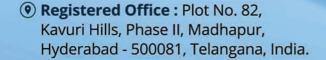
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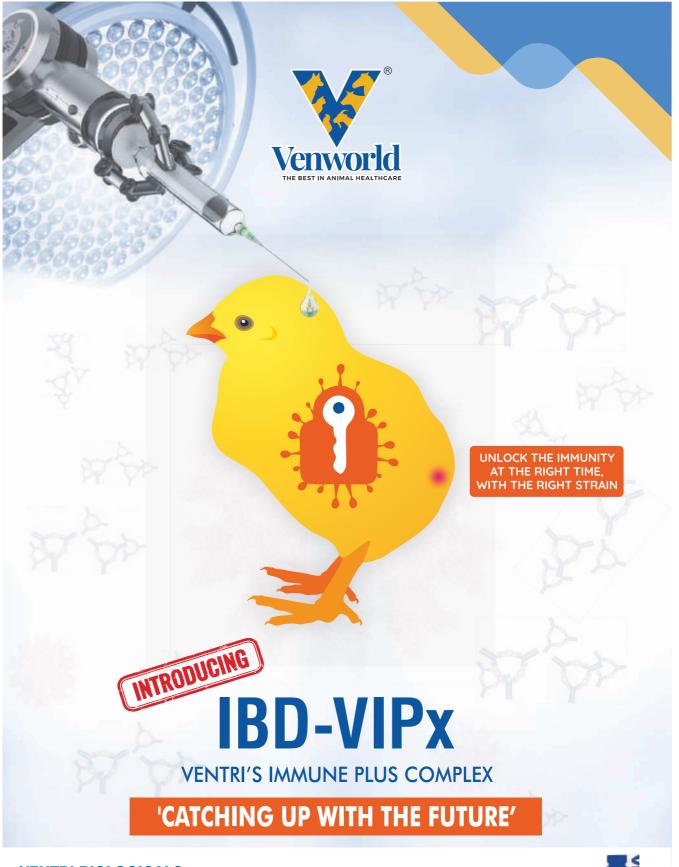
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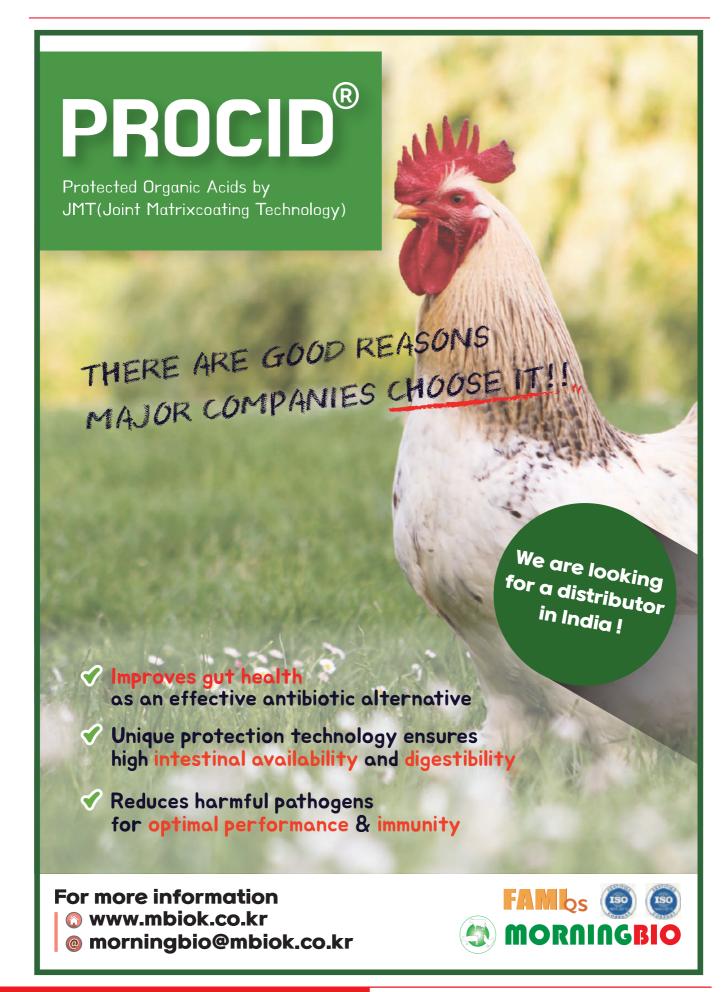
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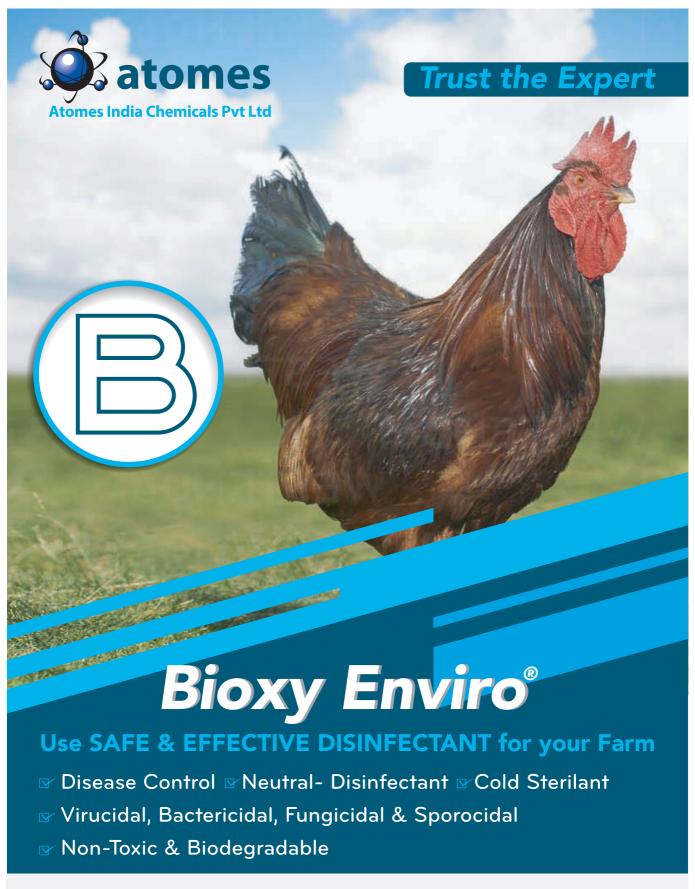
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- Editor



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## **Consumption of Eggs has many Benefits**

Dismissing the recommendation of Dr K. John Vijay Sagar, Professor and Head, Department of Child and Adolescent Psychiatry, NIMHANS, Bengaluru, IVPI and KPFBA have said that his recommendation is not based on any scientific evidence. Humans have been consuming eggs and poultry meat since the dawn of human time. The President of IVPI, Dr G. Devegowda said that on the contrary consumption of eggs has many benefits.

The effect of climate change on livestock and poultry production has been evidenced across the world. Poultry cannot tolerate a wide range of climatic variations which affects the production and reproduction. India is more vulnerable due to demographic pressure on natural resources and poor coping up mechanisms.



Dear Readers,

The August 2022 issue of *Poultry Fortune* is in your hands. In the news section, you may find news about ....

**Novus International** is releasing book launch titled *Breeder* 

Management and Nutrition: Moving the Industry Forward' on August 8 during the World's Poultry Congress 2022 in Paris. 14 chapters in the book were carefully curated to serve as a reference for current broiler breeder production best practices and considerations as well as to be a catalyst for new ideas in management, nutrition and industry sustainability. Hugo Romero - Sanchez, Novus Global Poultry Solutions Executive Manager said that the World's Poultry Congress is the perfect venue to launch this book. The goal of WPC is to contribute to solving the challenges of poultry production for the benefit of global population. This book takes that goal and focuses on the breeder sector with an emphasis on broiler breeders, which is responsible for not only maintaining the health and productivity of the parent flock, but also the success of their progeny. Novus is a gold sponsor of WPC 2022.

EW Nutrition – South Asia has organized five seminars in Hyderabad, Rajahmundry, Hospet, Coimbatore and Chandigarh from 4 to 11 July 2022 under the umbrella of its 'Partners in Progress' program. Keynote speaker Dr Duarte Diaz, Associate Professor, University of Arizona, USA, shared his knowledge and experience in managing moulds and mycotoxins in raw materials and animal feeds. During the seminar,

EW Nutrition also launched its 'Solis' range of mycotoxins solutions. To support customers with effective solutions in animal production, EW Nutrition offers the programs for Toxin Risk Management in poultry. In addition to innovative products, the program includes mycotoxin risk assessment with the help of Master Risk tool at the producer's doorstep.

Right to Protein, the nationwide public health initiative, is collaborating with over 100 restaurants to provide specially curated dishes made of high-quality poultry that is fed high protein soybean meals across 15 Indian cities restaurants. Soybean meal is a key protein source in the diets of livestock, poultry and aquaculture offering a well-balanced amino acid profile and high level of digestibility among plant-based protein sources.

Workshop on GM Crops and Animal Nutrition, a seminar was held in Bengaluru on July 11 in which Dr Lalitha Gowda, who is the Chair of the Scientific Panel of GM-Foods, FSSAI and Member of GEAC (Genetic Engineering Appraisal Committee) said any regulation that needs to be implemented has to be first safe for human and animal consumption. Dr Lalitha said that there are well laid out protocols in line with Codex Standards and they take time, not just in India, but in the developed parts of the world. While agreeing that GM crops had benefits, she said they had to go through proper appraisals before going commercial. Regarding processed GM derivatives for feed, she said that a simplified procedure is considered sufficient as they are not living modified organisms. Prof G. Devegowda, Dr Sushanth Rai, President of KPFBA, Neeraj Srivastava, Chairman of CLFMA, Dr Vibha Ahuja, Chief General Manager, Biotech Consortium India Ltd and other dignitaries took part in it.

Contd on next page



#### **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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EDITORIAL From the Editor...

**Pashudhan Praharee,** a bi-lingual magazine dedicated to animal health care and livestock development, has honoured the Executive Secretary of Karnataka Poultry Farmers and Breeders Association, Mr Inayath Ulla Khan with the *'Prof G. Devegowda Poultry Science Excellence Award 2022'* on July 11 in Bangalore. The award has been instituted in recognition of his significant and outstanding contribution in the field of poultry sciences for the year 2022.

The Institution of Veterinarians of Poultry Industry and the Karnataka Poultry Farmers and Breeders Association have vehemently opposed the recommendation of a NEP (National Education Policy) panelist from Karnataka to the NEP that 'eating eggs had ill-effects and can lead to lifestyle disorder'. Dismissing this recommendation of Dr K. John Vijay Sagar, Professor and Head, Department of Child and Adolescent Psychiatry, NIMHANS, Bengaluru, the two organisations - IVPI and KPFBA - have said that his recommendation is not based on any scientific evidence. Humans have been consuming eggs and poultry meat since the dawn of human time. The President of IVPI, Dr G. Devegowda said, on the contrary consumption of eggs has many benefits. Eggs are a nutritional powerhouse that contribute to health and wellbeing at every age and life stage, providing critical nutrients including protein, choline, riboflavin (Vitamin B2), Vitamin B12, biotin (B7), pantothenic acid (B5), iodine and selenium, which are valuable for supporting muscle and bone health, brain development and more.

In the Articles section - Need for Investment in Creation of Integrated Poultry Processing Plants for Boosting Exports, authored by Ricky Thaper, Treasurer, Poultry Federation of India, said that India's poultry industry is today one of the fastest growing poultry producers in the world with production having grown four-fold over the last two decades. The shift has been gradually to large-scale commercialization, overcoming several challenges on the way. According to the National Action Plan for egg and poultry - 2022 prepared by Department of Animal Husbandry, Dairying and Fisheries, more than 80% of poultry output, particularly in the broiler segment, is today produced by organized commercial farms. Major poultry companies have vertically integrated their operations which comprise 60 to 70% of the total poultry meat production. Thus, India has emerged as the world's third largest egg producer and sixth largest producer of broiler meat.

Another article titled *Coccidiosis*: *One of the Major Economically Important Diseases of Poultry & its control with CocciCare, authored by* Dr Mahesh Rajurkar and Dr Ramdas Kambale, informed that Rainy season is favourable for Coccidiosis. Coccidiosis is usually an acute invasion and destruction of intestinal mucosa by protozoa of the genera Eimeria. Clinical signs include diarrhoea, rise in temperature, inappetence, weight loss, emaciation and in extreme cases death. However, many infections are subclinical. Coccidiosis is an economically important disease of poultry. Coccidiosis is a parasitic disease of the intestinal tract of animals caused by coccidian protozoa. The disease spreads from one animal to another by contact with infected faeces or ingestion of infected tissue. Diarrhoea, which may become bloody in severe cases, is the primary symptom.

Article titled *Bacteriophages – The Future of Disease Prophylaxis against Menacing Bacteria in Poultry Production, authored by* Dr Sharad Durge, Animal Nutritionist – PAN India, Sapience Agribusiness Consulting LLP, Bengaluru, discussed

that the overuse and misuse of antibiotics in animals' production and human medicine are raising the threat of antibiotic resistance. Various infections in poultry are caused by bacteria and many of them are of serious concern which has already developed resistance to many of the available drug treatments. The precious effectiveness of antibiotics and drugs can be preserved if we control their indiscriminate use. In many countries, about 80% of the important drugs / antibiotics are used as antibiotic growth promoters (AGP) feeding healthy animals in animal production. It has been found that restrictions on the use of antibiotics in food-producing animals reduced antibiotic-resistant bacteria by up to 39%.

Another article titled *Developments in the Exim Policies for Poultry Flock Health in India, authored by,* **P. Kohila, R. Amutha and S. Udhayavel,** Veterinary College and Research Institute, Namakkal, Tamil Nadu Veterinary and Animal Sciences University, said that the evolution and dynamics of world poultry markets are mostly driven by poultry disease outbreaks and sanitary requirements, which ultimately determine international poultry trade and country's economy. Understanding the procedure for import of poultry and poultry products and also the export standards is very much essential to prevent the spread of exotic diseases. In this regard, this article briefly explains the procedure for import, guidelines and agencies involved in export of poultry and poultry products.

Article titled Climate Change Battle in Poultry Industry: Facts and Solutions, authored by, S. Udhayavel, R. Amutha and P. Kohila, Veterinary College and Research Institute, Namakkal, Tamil Nadu Veterinary and Animal Sciences University, discussed that this article briefly describes the effect of climate change on the production performance of layer, broiler and breeder chicken. It also highlights the importance of mitigation measures to be followed in poultry farms during the adverse climatic conditions. The effect of climate change on livestock and poultry production has been evidenced across the world. Poultry cannot tolerate a wide range of climatic variations which affects the production and reproduction (Menquesha, 2011). India is more vulnerable due to demographic pressure on natural resources and poor coping up mechanisms (Okere, 2013). However, fertility is related with temperature, rainfall, solar radiation and atmospheric pressure. The most potent environmental measures that affect fertility might vary depending on geographical locations. Apart from the inherited capacity, the levels of performance of poultry greatly depend upon the environment.

Results in Layer and Broiler farming can be achieved as per specifications when the breeder guidelines are followed. Farmers and Integrators have to give sufficient time and attention to farm management and check the developments there time to time to ensure results. When you invest your hard earned money into it, a little more care and attention can prevent losses and help in profitable farming all the time.

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 sector. Keep reading the magazine Poultry Fortune regularly and update yourself. Wish you all fruitful results in your efforts.

M.A.Nazeer Editor & Publisher Poultry Fortune







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## Nutritional benefits of chicken for the body - Suguna Foods

Coimbatore: Chicken, one of the rich sources of protein, contributes to the well-being of our body by promoting muscular growth and boosting immunity. Chicken contains essential nutrients, healthy fats, vitamins, and minerals that help in the proper functioning of the body. It is important to include chicken in our daily diet at least three times a week to witness good results. Some of the health benefits of chicken are listed below

#### Rich in Selenium

Chicken is an excellent source of Selenium. This nutrient aids in the prevention of infection and chronic illness, as well as the regulation of thyroid hormones.

## Chicken Is Extremely Protein-Dense

Protein is a macronutrient that is essential for the development of the human body. Chicken is a great source of lean, low-fat protein that aids muscular growth and development. This also helps with weight loss and maintaining a healthy body weight.

### Good Source of Vitamin and Minerals

The rich protein meat also has important vitamins and minerals in abundance. It contains vitamin D, which aids calcium absorption and bone health. Vitamin A helps in the development of vision and is beneficial in boosting the immune system and Vitamin B helps in energy generation and the formation of healthy red blood cells.

#### Rich in Niacin

Niacin, commonly known as vitamin B3, is a micronutrient that the body needs for healthy metabolism, nerve function, and antioxidant defense. Chicken is a good source of vitamin B3. This enables the maintenance of healthy skin and protects against cancer and other types of genetic (DNA) damage.

## Chicken Is a Creatine-Rich Food

Creatine is abundant in chicken. It is a naturally occurring molecule made up of three amino acids: arginine, glycine, and methionine. This helps in producing energy for string contractions of the muscles.

#### **About Suguna Foods:**

Suguna is one of the top ten poultry companies in the world. It operates in 18 Indian states and offers a range of poultry products and services. Broiler and layer farming, hatcheries, feed mills, manufacturing plants, vaccines, and exports are all part of the fully integrated operations. Suguna supplies live broiler chicken, chilled chicken, and value-added eggs. Suguna has developed a chain of modern retail outlets called Delfrez to provide customers with fresh, safe, and hygienic packed chicken. Hygiene being the most important USP's, these modern retail stores are aesthetically pleasing and offer chicken in different portion sizes which fits the needs of the customers.

# Uttara Impex is Continuously Expanding the Products Range



From Left to Right: A. Michaelsamy – Manager Marketing, Swapnil Ballal – Manager Marketing, Naveen Kaundal – Product Manager, Shankar Reddy – General Manager (Marketing), Praneeth Rao – Director, Uttara impex Pvt Ltd, Dr Atul Patil, Pancosma, Switzerland, Kunal Goswami – AGM (Marketing), Sharad Kumawat – General Manager (Operations), Hariom Singh Chauhan – AGM (Marketing) and Dr Abhijeet Patil – Manager

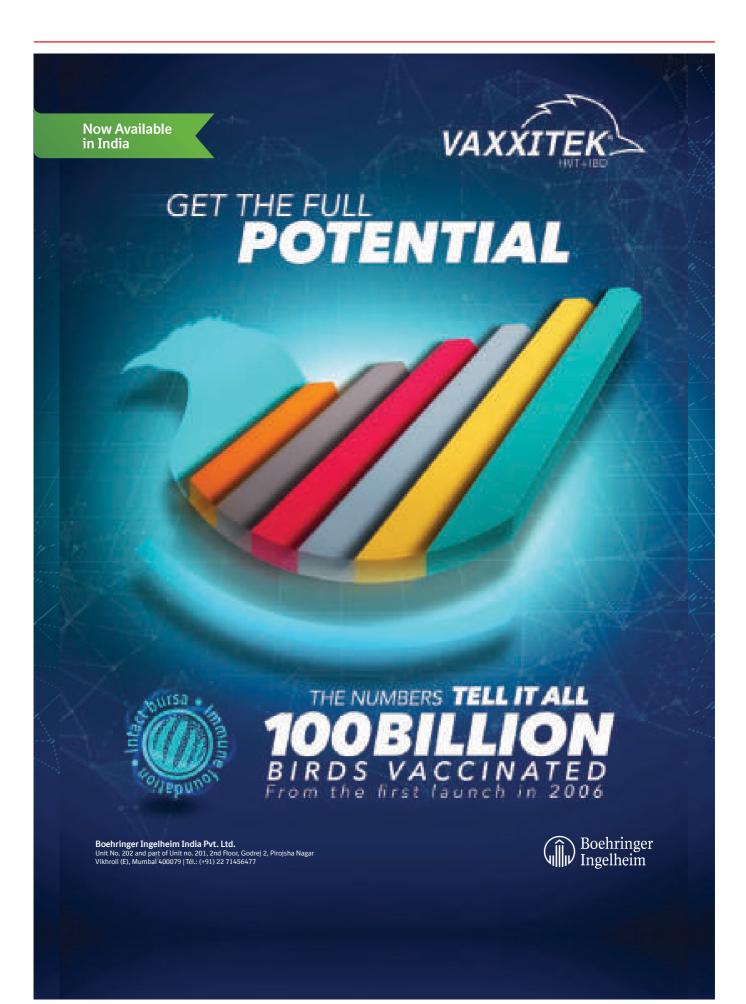
Uttara Impex Pvt Ltd is pleased to announce the release of a new product "UT-GLYSOMIN GOLD" in collaboration with Pancosma of Switzerland. A Glycinate-Based Organic Minerals Mixture for better bio- availability & absorption of minerals in poultry diet. Its having extra advantage of stability in different gut pH, fully soluble, homogeneous free flowing & prevent antagonistic relationship with other minerals.

UT-GLYSOMIN GOLD is manufactured with glycinate minerals which are highly bioavailable and it boosts Immunity & improves the meat quality & FCR in broiler birds. It Significantly improves the performance & egg shell quality in layer birds and enhance breeders immunity, hatchability and fertility. It helps birds to be more resilient in all kind

of stress. Make your birds stronger with UT Glysomin

Uttara Impex Pvt Ltd, a subsidiary of Asia's largest poultry conglomerate Venkateshwara Hatcheries. It has a diverse product portfolio and is one of the largest importers of Amino Acids, Feed Phosphate, Vitamins and a variety of other feed supplements. Since 2010 Uttara Impex has been strengthening its service network & catering to over 3000 farmers across the country.





# New breeder book aims to aid in management, performance and sustainability

Novus's latest publication showcases insights and experience of industry experts around the world

#### **SAINT CHARLES, MO:**

"This book is perhaps needed now more than ever as we see the escalating increase in meat protein production and consumption worldwide." This statement, written in the preface of a new publication on breeder production that Novus International, Inc. will release in August, highlights an industry reality - demand for safe, quality, nutritious meat protein is growing but producers face challenges.

Titled, Breeder
Management and
Nutrition: Moving the
industry forward, the
book's 14 chapters were
carefully curated to serve
as a reference for current
broiler breeder production
best practices and
considerations as well as to
be a catalyst for new ideas
in management, nutrition,
and industry sustainability.

"We know in order to meet the production goals of tomorrow, each part of the industry must work together today," said Sandrine Durox, Novus poultry solutions manager who serves as book co-curator together with Novus Executive **Regional Technical Services** Manager Silvia Peris and Professor Johan Buyse of KU Leuven, who served as scientific coordinator. "This book brings together

the knowledge and know-how of academics, researchers, industry leaders, breeding companies, nutrition companies, veterinarians, and nutritionists to consider how each part of the broiler breeder's

lifecycle can be impacted to optimize performance and positively impact the producer and the industry."

Those in the industry and academia will likely recognize the book's contributors:

Eddy Decuypere of KU Leuven, Aitor Arrazola of Perdue University, Rick van Emous and Annemarie Mens of Wageningen Livestock Research, Henk Enting of Cargill, Dinabandhu Joardar of Cargill, Edgar O. Oviedo-Rondón of North Carolina State University, Rebecca Forder of the University of Adelaide, Johan Buyse of KU Leuven, Juan Carlos Abad and Robin Jarquinof Cobb-Vantress, David Cavero Pintado and Xabier Arbe Ugalde of H&N International, and Stanislaw Budnik, Juxing Chen, Silvia Peris, Hugo Romero-Sanchez, and Mercedes Vázquez-Añón of Novus.



Novus will host the official book launch on August 8 during the World's Poultry Congress 2022 in Paris.

Presented by the
France branch of The
World's Poultry Science
Association, the 26th
annual Congress includes a
five-day scientific program
covering sustainability,
health, nutrition, genetics,
meat quality, broiler
management, and other
topics on species ranging
from chicken, turkey,
and duck to geese, quail,
pigeons, and more. The
event is expected to

attract more than 3,000 participants from 100 countries.

Novus is a gold sponsor of WPC 2022.

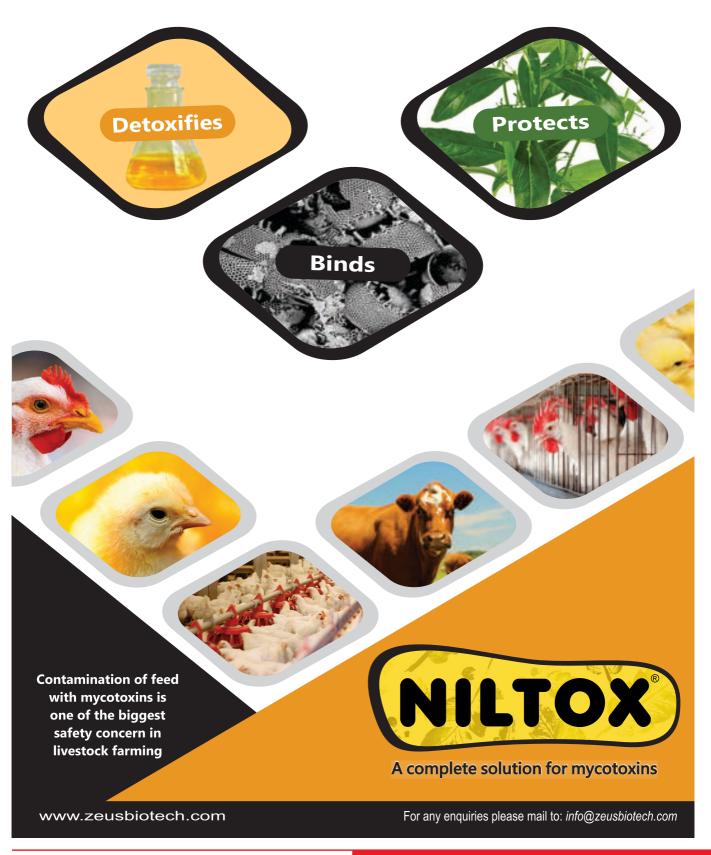
"The World's Poultry Congress is the perfect venue to launch this book," said Hugo Romero-Sanchez, Novus global poultry solutions executive manager. "The goal of WPC is to contribute to solving the challenges of poultry production for the benefit of the global population. This book takes that goal and focuses on the breeder sector with an emphasis on broiler breeders, which is responsible for not only maintaining the health and productivity of the parent flock but also the success of their progeny."

Launch activities during WPC at Le Palais des Congrés de Paris are scheduled to include a seminar on excerpts from the book and an author meet & greet. Those interested in participating should visit the Novus booth at WPC (FO2) for details and to download a free digital version of the book. Hardcover versions will be available at regional launch events that Novus will host throughout the remainder of this year.

For more information about the launch event at the World's Poultry Congress, visit www. NovusInt.com/Events.

Cutline for image
(attached): Novus
will launch its latest
publication, **Breeder**Management and
Nutrition: Moving the
industry forward, at World
Poultry Congress 2022 in
August.





# Over 100 Restaurants across India join hands to Curate Soy-Fed menus to increase awareness about High-Quality Protein



Mumbai: In pursuit ofeducating consumers about high-quality protein food sources, Right to Protein, the nationwide public health initiative, is collaborating with over 100 restaurants to provide specially curated dishes made of high-quality poultry that is fed high protein soybean meals. Launched across 15 Indian cities, restaurant chains such as Oye Kiddan, Super Bowl, Burgrill, Sardaji Londonwale, Punjabi Nawabi, Bhookemon, Wild Wild West, Farmhouse, among others, will create the customized 'Soy Fed' menu that will also be available on leading food ordering apps such as Zomato and Swiggy.

"Indian consumers are increasingly looking to make healthier choices. Most of our consumers not only believe that we

are what we eat but also agree that we are what our food is fed or made of! Therefore, we choose poultry that is soy fed to prepare high-quality protein meals. The tailored 'Soy Fed' online menu is only the next step to further enable health-conscious consumers to easily choose meals created with soymeal fed poultry," Shreh Madan, Owner, Burgrill said.

"We have always strived to offer the most nutritious food choices for all our consumers and with this menu, we go a step ahead in helping them exercise their right to high-quality protein! We're happy to have joined this awareness movement, which we hope will bring a radical change in how our consumers perceive food and are better equipped to make informed decisions," said

## Poultry Fortune editor M.A. Nazeer's elder brother M.A.K. Jilani passes away

Mr M.A.K. Jilani, elder brother of M.A. Nazeer, Editor, Poultry Fortune, passed away due to cardiac arrest on 26 July 2022 at Rajahmundry. He was 69. Mr Jilani helped in developing Poultry Fortune, from its inception in 1991. Jilani, a businessman was like the father figure in the family



**M.A.K. Jilani** after the demise of their parents.



From left: M.A. Nazeer, Editor, Poultry Fortune, M.A.K. Jilani, elder brother, mother Saberunnisa, M.A. Waheed, brother, B.V. Rao, Chairman, VHPL, father Meer Talib Ali and family members during an occasion of the publications in 1990s in Hyderabad.

## Gurmeet Kochhar, Owner, Oye Kiddan.

"It is a delight to see the Soy Fed progress from being India's first feed label to now also being a novel menu as we continue to raise awareness about the role of soy as a sustainable source of nutrition for humans as well as animals. We remain relentless in our mission to educate people about the importance of adequate protein consumption for better health and well-being and this is yet another step in that direction", stated Jaison John, Lead - India, **US Soybean Export Council** (USSEC) and Right to Protein supporter.

Soybean meal is a key protein source in the diets of livestock, poultry, and aquaculture offering a well-balanced amino acid profile, and high level of digestibility among plantbased protein sources. The complete nutritional value in soybean meals assists in maintaining the animals' wellbeing. The 'Soy Fed' menu with restaurants across the country, is therefore a radical next step by Right To Protein after the earlier launch of 'Soy Fed label' – India's first voluntary feed label for animal protein products towards making consumers identify and choose quality protein food.

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## EW Nutrition (South Asia) hosts Myco-Seminars 'Toxin Risk Management with Challenges in the Current Feed Raw Materials' in India

NOIDA: EW Nutrition (South Asia) has organized five seminars from 4th to 11th July 2022 under the umbrella of its 'Partners in Progress' program. Keynote speaker Dr Duarte Diaz, Associate Professor, University of Arizona, US, shared his knowledge & experience in managing moulds and mycotoxins in raw materials and animal feeds.



Dr Duarte Diaz, Associate Professor, University of Arizona

The EW Nutrition team travelled to five cities viz. Hyderabad, Rajahmundry, Hospet, Coimbatore and Chandigarh to conduct its



Y Karunakar Reddy, Deputy General Manager (South) along with team at Rajahmundry

series of Myco-Seminars in the month of July 2022. Dr Duarte Diaz, Key Speaker, elaborated upon various factors which affect mould growth and its consequences in the feed, including nutritional losses, losses in material-specific weight, and presence of mycotoxins.

He further explained how mycotoxins can cause a variety of adverse health effects and pose a serious health threat to both livestock and humans. He spoke at length about the correct method of sampling and how the sampling step is usually the largest source of variability associated with mycotoxin testing.

During the seminar, EW
Nutrition also launched its
'Solis' range of mycotoxins
solutions. To support
customers with effective
solutions in animal
production, EW Nutrition
offers the programs for
Toxin Risk Management
in poultry. In addition
to innovative products,
the program includes



Nishi Rana, Zonal Business Manager - North, EW Nutrition India at Chandigarh meeting

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Consultants, Breeder, Broiler, and Layer producers, Feed Millers, EW Nutrition Technical Managers, Account



Dr Duarte Diaz, Associate Professor, University of Arizona

Managers & Sales Heads also participated in the respective seminars. The seminars were followed by a cocktail dinner& discussions.



A view of participants





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# Maharashtra Poultry Farmers & Breeders Association meeting held in Pune Association Members Quarterly Meeting held on 27 June 2022 at Hotel The President, Pune.



C. Vasanth Kumar, President, MPFBA Adddressing the meeting







Dr P.G. Pedgaonkar, General Manager, Western Region, VHPL, cutting the cake on the occasion.







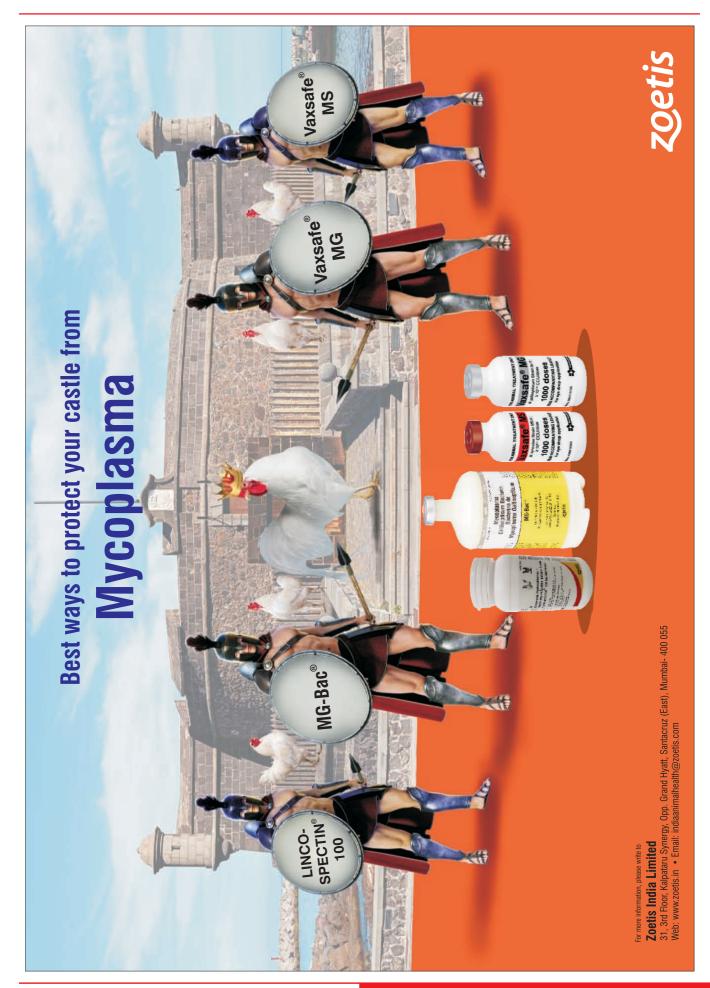








A view of participants in the MPFBA meeting



# India needs to adopt GM crops soon to increase production and lower costs, while ensuring safety: Experts

With adoption of genetically modified (GM) crops in India having hit a road block, Dr Lalitha Gowda, who is the Chair of the Scientific Panel of GM -Foods, FSSAI and member of GEAC (Genetic Engineering Appraisal Committee) said any regulation that needs to be implemented has to be first safe for human and animal consumption.

She was participating in a panel discussion on 'Making livestock industry competitive: way forward', organized jointly by the Karnataka Poultry Farmers and Breeders Association (KPFBA); the Compound Livestock Feed Manufacturers' Association of India (CLFMA); the Biotech Consortium India Ltd; and Animal Nutrition Society of India.

Thorough protocols need to be followed Dr Gowda said that there are well laid out protocols in line with Codex Standards and they take time, not just in India, but in the developed parts of the world. While agreeing that GM crops had benefits, she said they had to go through proper appraisals before going commercial. Regarding processed GM derivatives for feed, she said that a simplified procedure is considered sufficient as they are not living modified organisms.

Presently in India, only Bt Cotton is allowed as GM crop, while brinjal and mustard area waiting approvals for quite some time now.

## Demand for protein will increase exponentially

Mr Neeraj Kumar Srivastava, Chairman of Compound Livestock Feed Manufacturers Association of India (CLFMA) said India would be at the centre of increased meat demand and close to 50% meat is going to be produced in Asia, thus opening up enormous opportunities for the livestock sector. India is number one in milk production and millets, number two in wheat and number four in broiler production, however, the protein demandand supply to the growing population is inadequate.

India, he said, needs 25 to 30 million metric tonnes of protein of which only about 47% is supplied through internal sources. As there are limitation in increasing yield of agricultural crops, he stressed for need for GM crops to increase productivity and meet demand. India's per capita availability of livestock is low and it has one of the lowest protein consuming population.

The demand for protein will continue to increase in view of the expanding

middle class, with changing lifestyle patterns, urbanization and other consumer driven market trends. Though poultry numbers have grown more than 500 per cent in the last couple of years, there is need to increase output.

The input cost for livestock has significantly gone up and this, he said, is a matter of concern. While stating that there is urgent need to reduce input costs, he added that in 2020 feed production saw a degrowth of 6% and there was movement towards regaining volumes this year. Demand for feed is going to go up considerably. India added 4.5 mmt last year with feed production between 39 and 43 mmt, highest in the world. It is hoped to touch 55 mmt by 2026 and to meet this demand India needed new technologies. To meet the increased protein demand there was need to increase productivity per acre and that GM crops was the best bet. "There are so many myths about GM crops which needs to be dispelled. The bottlenecks should be removed as GM crops will be of help to both farmers and the sector. The Government of India, he said, has been very supportive.

GM crops can overcome shortage of feed

Dr K.C. Veeranna, Vice Chancellor, Karnataka Veterinary, Animal and Fisheries Sciences University said cost of production of livestock is going up every day as the major contributor is feed. The biggest challenge is to reduce cost of production and make products which are rich in protein easily available. In this background, only GM crops and derivatives could help overcome shortage of feed. Stating that fodder resources were limited as land available for fodder is decreasing, there was need to utilize technologies to meet animal nutrition needs.

Dr S. Rajendra Prasad, Vice Chancellor, University of Agricultural Science, Bangalore, said with India's population growing at a fast pace, it was urgent to focus on nutritional security of both human beings and animals. India produces 308 million metric tons of food grains and 329 mmt of vegetables and fruits, but this is going to be highly insufficient to meet the demands of growing nation.

## Dispelling myths about safety of GM crops

Dr Vibha Ahuja, Chief General Manager, Biotech Consortium India Limited, said it was necessary to permit the use of GM crops and its derivatives as it would help in increasing the availability of feed and feed ingredients in India. It is imperative to make available sufficient low cost and good quality feed for sustainable growth of poultry, dairy, aqua and other livestock sectors.



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Aivlosin and Valosin are registered trademarks of ECO Animal Health Ltd, London, United Kingdom Registered claims and packaging may vary from country to country



# No. 11, Second Floor, Sneha Nagar, First Cross, Amruthahalli, Bangalore - 560092 For Suggestions & Feedback: E-mail: feelings@timoeva.com | Ph: +91 9902071269 / +91 80 48663242 On the many myths that surrounded GM crops, Ms Ahuja reiterated that reviews by major scientific bodies and regulatory agencies have confirmed that GM crops and the food derived from them are safe. The only difference between the GM crops and their non-GM counter parts is the proteins expressed by inserted genes. The safety of the consumption of these proteins is established based on biological properties and tests of digestibility, acutetoxicity and allergencity. Once this is done and safety established then the compositional equivalence confirms that the GM crop / food is similar to corresponding non-GM which has been used / consumed traditionally for generations and hence no long term effects are expected to be seen based on this history of safe human use.

Ms Ahuja said that many countries were using GM crops and she wondered what the problem was to get it approved. The initial resistance came from Europe, both political and corporate. Scientists, regulators are constantly working on improving biosafety. India has a good regulatory system. Inspite of all the good technologies in the country, there is polarized debate, driven by some activists, leading to delay in approval of GM crops.

Ms Ahuja said that farmers urgently need technologies and India needs to act with regard to streamlining the approval process. "We need to approach the government for tax exemption on GM products.

#### 'More from less', not less from more' is going to be the mantra

Dr Mahesh. P.S., Commissioner, Government of India and Director of Central Poultry **Development Organisation** & Training Institute said the due to climate changes, the planet is challenged by demand of protein, demand of energy, demand of population etc. and that the era of less from more is over now and that we need to work on 'more from less', referring to land availability.

Talking about GM, he wondered how people accepted milk from the cow which was eating BT cottonseed, a GM derivative, but were not ready to accept any other GM products, calling for severe extension work.

## India can export to Gulf having logistical location advantage

Mr Naveen Pasuparthy, Treasurer, CLFMA of India, said presently corn and soya have major inputs controlling poultry costs. Yield per acre of both crops is too low and GM is the only solution to increase yield as well as income for farmers. Excessive usage of pesticides, herbicides etc have been affecting genetic capabilities of animals which feed on such crops.

He said that there was enormous potential for exports if we could get sufficient and cost effective inputs made available through GM technology. He talked about how India was just four hours away

from Gulf and could supply easily, being logistically located hub, unlike Brazil and other South American countries which were supplying livestock to the Gulf and would be challenged by high fuel prices in the years to come.

Dr M.S. Sheshshayee, Professor and Head, Department of Crop Physiology, University of Agricultural Sciences, Bengaluru, said the mantra has been to produce more from less, more crop per drop, more grain per rain and use of GM Technologies can help in achieving the same. Talking about proteins, he said Indians get nearly 70% proteins from cereals but that is not sufficient and contribution of livestock is immense.

## Need to convince NGOs and educate farmers

Dr Devegowda, President, Institution of Veterinarians of Poultry Industry (IVPI), said that there was urgent need to convince non-governmental organizations which are opposing GM crops and also educate the farmers on the benefits of GM. India needs GM to feed the growing population, both human and livestock.

## Trade has to happen for quicker adoption of GM

Amit Sachdev, Regional Consultant, South Asia, US Grains Council, said trade needs to happen and mentioned that US and India had signed an agreement in 2021, allowing import of Alfalfa for the dairy industry. Underscoring the importance of GM crops, he said there was no other

go, but to adopt as they were safe, cheaper and was going to be easily available in the world market.

## Calculating nutrient value leads to improved productivity

Susil Silva, Head, Animal Utilization, South Asia, US Soybean Export Council talked about "Nutrient Value Calculator" and explained key features of the tool and how it can be used for calculating nutritional value of feed and can contribute to improved productivity.

Dr N.K.S. Gowda, Principal Scientist, ICAR - National Institute of Animal Nutrition and Physiology also spoke about nutritional value of animal feed.

Dr Sushanth Rai, President, Karnataka Poultry Farmers & Breeders Association said the demand for animal feed for poultry, dairy etc is growing and that soaring prices affected the sector. India needs to import soybean by September to tide over feed crisis, while there is urgency to produce more and GM was the only answer.

## Prof. G. Devegowda Poultry Science Excellence Award to Inayath Ulla Khan

On the occasion, Mr Inayath Ulla Khan, Executive Secretary, KPFBA was conferred with the Prof. G. Devegowda Poultry Science Excellence Award 2022 instituted by Pashudhan Praharee. Mr Khan was honored for the yeomen service he has rendered to the poultry sector in general and KPFBA in particular. Mr Khan proposed a vote of thanks.





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## Prof G. Devegowda Poultry Science Excellence Award 2022 conferred on Inayath Ulla Khan, KPFBA's Executive Secretary



Inayath Ulla Khan receives Prof G. Devegowda Poultry Science Excellence Award 2022. Left to Right: Niraj Srivastava, Chairman, CLFMA of India, Dr G. Devegowda, President, IVPI, Inayath Ulla Khan (seated), Mrs Shabreen Begum Khan, Dr Vibha Ahuja, Chief General Manager, Biotech Consortium India Ltd and Dr B Sushanth Rai, President, KPFBA.

Bangaluru: Pashudhan
Praharee, a bi-lingual
magazine dedicated to
animal health care and
livestock development, has
honoured the Executive
Secretary of the Karnataka
Poultry Farmers and
Breeders Association
(KPFBA), Mr Inayath Ulla
Khan with the "Prof.
G. Devegowda Poultry
Science Excellence Award
2022" on 11 July 2022 at
Hilton Hotel, Bangalore.

The award has been instituted in recognition of his significant and outstanding contribution in the field of poultry sciences for the year 2022.

Mr Inayath Ulla Khan was presented the award at a recent seminar on 'GM Crops and Animal **Nutrition'** in the presence of Prof. G. Devegowda who is considered as the 'Pitamaha' of poultry sciences, the President of KPFBA, Dr Sushanth Rai, the Chairman of Compound Livestock Feed Manufacturers Association of India (CLFMA), Mr Neeraj Srivastava, Dr Vibha Ahuja, Chief General Manager, Biotech Consortium India Limited and other dignitaries.

The citation read out by **Dr G. Gopal Reddy**, Vice President, IVPI listed out

the relentless efforts Mr Khan has been contributing to the sustainable growth of poultry sector, by networking with various institutions and experts; by organizing various sector related events through KPFBA; and connecting with government and government agencies for bringing about policy changes.

In his thanks giving address, Mr Khan acknowledged the role played by different President's and Committee Members of KPFBA in shaping his career, learning from each President the new skills. He recalled how during the Covid-19 lockdown and restrictions that followed, the KPFBA rallied to connect with government authorities to ensure that the poultry sector image was not tarnished as all kinds of rumours were floating at the onset of the pandemic. 'The poultry sector has many challenges and they can be resolved only through collective efforts, collaborative approach and that KPFBA is one of the platforms to bring about growth of the sector', Mr Khan said.



Inayath Ulla Khan receiving Certificate from Dr Vibha Ahuja



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# Grand Opening of Numega Malaysia Factory



Dr Theerawit, Johan, Madam Gan, Dr Kasen Zhai, Dr Phon & Samir Patel

Gujarat: NUMEGA is an international company specializing in the research, development, production and sales of green, safe and healthy feed and feed additives. Aims to promote the healthy and sustainable development of the animal husbandry and strict value standards, and adhere to the "sustainable development" strategy of green, safety and health.

NUMEGA has established complete R&D, production and sales in Spain, the United States, China, Vietnam, Thailand and now in INDIA with their channel partner Qper India Pvt Ltd said by Mr Nisarg Patel, Director Sales. The company has obtained four global invention patents, which has obtained ISO9001, FDA and FAMIQS certifications, and has followed the HACCP food safety assurance system. "Megacid F" and "NTPB", as the company's star products, play an important role in replacing antibiotics and promoting the healthy growth of livestock.

Numega Nutrition is an international technology enterprise specializing in

investment and production in the livestock industry. At present, the business involves feed additives, feed raw material trading and producing, and the business covers more than 20 countries and regions around the world including Asia, Australia, and central and South America.



Samir Patel, Dr Kasen Zhai & Nisarg Patel

The new Numega factory was built with all of NUMEGA's industrial prospects and technological innovation value, environmentally sustainable with fully automated process, and is placed in the heart of NUSAYAJA Tech Park, a world class science and technology park. **QPER INDIA PRIVATE** LIMITED is channel partner for India, said by Managing Director Mr Samir Patel. Product efficiency was extensively tested in last 10 months at various farms in India.

## \$5bn investment to become selfsufficient in poultry meat production



This move follows a jump in self-sufficiency in poultry meat from 45 percent in 2016 to 68 percent in 2022

Riyadh: Saudi Arabia plans SR17 billion (\$5 billion) investment to boost poultry production as the Kingdom aims to achieve a poultry meat self-sufficiency rate of 80 percent by 2025, Saudi Press Agency reported.

By targeting 1.3 million tons of broiler chickens per year, the ministry will ensure national food security, increase local content, and create employment opportunities, the Saudi Minister of Environment, Water and Agriculture Abdulrahman Al-Fadley said.

This move follows a jump in self-sufficiency in poultry meat from 45 percent in 2016 to 68 percent in 2022.

The financing provided by the Agricultural Development Fund for companies seeking to expand the poultry production industry reaches 70 percent when top-notch technologies are used, Al-Fadley said.

In a related development, Ibrahim Qassem, the director-general of the Animal Resources Services at MEWA, told CNBC Arabia that the volume of livestock projects exceeded 980 across all regions of the Kingdom.

However, the feed prices soared by more than 90 percent due to the prevalent global factors, which are reflected in the prices of livestock, Qassem said.

He added that the ARS had developed an initiative to investigate and combat animal diseases, reducing losses by 25 percent.

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## IVPI and KPFBA oppose recommendation of NEP on eating Eggs

Karnataka: The Institution of Veterinarians of Poultry Industry (IVPI) and the Karnataka Poultry Farmer's and Breeder's Association (KPFBA) have vehemently opposed the recommendation of a NEP (National Education Policy) panellist from Karnataka to the NEP that 'eating eggs had ill-effects and can lead to lifestyle disorder'.

Dismissing this recommendation of Dr K. John Vijay Sagar, Professor and Head, Department of Child and Adolescent Psychiatry, NIMHANS, Bengaluru, the two organisations (IVPI and KPFBA) have said that his recommendation is not based on any scientific evidence. Humans have been consuming eggs and poultry meat since the dawn of human time.

The President of IVPI, Dr G. Devegowda said on the contrary consumption of eggs has many benefits. "Eggs are a nutritional powerhouse that contribute to health and well-being at every age and life stage, providing critical nutrients including protein, choline, riboflavin (vitamin B2), vitamin B12, biotin (B<sub>7</sub>), pantothenic acid (B<sub>5</sub>), iodine and selenium, which are valuable for supporting muscle and bone health, brain development and more."

### NITI Aayog recommendations

Dr Devegowda who is considered the fountainhead of knowledge about the poultry sector said "As consumption of eggs has several benefits, the apex government think tank of the country, NITI Aayog, is working on a proposal aimed at

improving India's low nutrition ranking and centered on the idea that the government subsidizes protein-rich food, including eggs, fish, chicken and meat, possibly through its system. This is likely to be part of Niti Aayog's 15- year Vision Document."

He further added that the entire veterinarian community, many of whom have done and are doing pioneering research work in the field of poultry sciences, disapproved these recommendations and urge the government to take strict action to such motivated statements which may lead to unfound misconceptions.

Dr B. Sushanth Rai, President, KPFBA, terming the recommendation by the NIMHANS expert as 'complete falsehood' said chicken, eggs and fish are eaten the world over as it is excellent lowcalorie and low-fat source of high quality protein that provides important nutrients throughout ones lives – from pregnancy through later years. "It is affordable, easily digestible and good for diabetic patients too. Chicken is the most consumed meat worldwide. Eggs produced in our country are exported too."

Regarding Cholesterol, Dr Devegowda said that egg contains 185 mg of cholesterol and it is found mainly in animal products such as milk, butter, ghee, meat, shrimp and so on. Breast milk (mother's milk) is also a rich source of cholesterol.

"Cholesterol Limit was removed from 2015-2020 Dietary Guidelines. The US government has accepted that 'cholesterol' is not a nutrient of concern. 'Doing a U-turn' on their warnings to stay away from high-cholesterol foods since the 1970s to avoid heart disease and clogged arteries. The main causes of heart diseases are stress, sugar, trans-fats, obesity, and inflammation.

## Why the cholesterol limit was removed?

Only 20% comes from food. When we eat more foods rich in cholesterol, our bodies make less. The majority of the cholesterol is produced by liver. Our brain is primarily made up from cholesterol. It is essential for nerve cells to function. Cholesterol is the basis for the production of all the steroid hormones, including oestrogen, testosterone, and corticosteroids and also required for vitamin D synthesis and fat digestion through production of bile salts."

Dr Devegowda added that an analysis of the national health data revealed that 80% of Indian men and 70% of Indian women have non-vegetarian food. "Considering the current scenario in the country, one would easily be misled to believe that India is dominated by vegetarians. However, that is not the case. Only a portion of the country - the Northern states make up for most of the vegetarians of the country, while the Southern and North-eastern states are predominantly nonvegetarian, with people consuming different types of meat, fish, and eggs."

Protein insufficiency in India: Using eggs in

## fight against hunger and malnutrition

Dr Devegowda further added "In India today, reports indicate that 68% of the population are protein deficient. Protein deficiency starts at a very young age and is seen at alarming rate in school going children. As per Govt of India statistics: 36% children below 5 years are underweight and 38% are stunted. Children and adults with protein deficiency succumb more easily to infections. Every meal should have adequate amount of protein, vitamins, minerals and other nutrients. Eggs are good for all age groups, especially for children and nourishing mother. According to the Indian Dietician Association eating only vegetarian diet will not meet our daily protein requirements."

Dr Sushant Rai said,
'This Unscientific and biased reports led to the drop in chicken and egg consumption, which had a cascading effect leading to huge losses to the small and marginal farmers. According to the information more than 30% of the poultry farmers have stopped poultry farming owing to these malicious reports & rumours.'

#### Prof. G. Devegowda,

President, Institution of Veterinarians of Poultry Industry (IVPI),

Emeritus Professor and Head, Dept. of Poultry Science, UAS, GKVK, Bengaluru

M: 98453 24750, Email devegowgag@gmail.com

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## Kemin Industries South Asia Celebrates "61 Since '61 – A Celebration of Partnership"



Opening remarks - Chris Nelson, President & CEO, Kemin Industries Inc., USA

Chennai, Tamil Nadu, India (9th July 2022): Kemin Industries, a global ingredient manufacturer that strives to sustainably transform the quality of life every day for 80 percent of the world with its products and services, celebrated the "61 Since '61 –Celebrating Partnership" - themed anniversary, to acknowledge the essence of partnerships along with its key stakeholders in South Asia. The event took place on 9 July 2022 in The Leela Palace, Chennai, Tamil Nadu.

Kemin crafted the theme 'Celebrating Partnership' to acknowledge the essence ofpartnerships, innovations, and care for communities, which they have been practicing in association with their partners across the globe, for the past 61 years.

The invitees of the event included key customers, distributors, and media representatives from across the business units of Kemin. As keynote speakers, quite unconventionally, Kemin invited the top two business professionals, R Gopalakrishnan

and Suresh Mahalingam who had served in leading capacities in the TATA group, which is the most respected organization the Indian subcontinent for upkeeping the business values and business partnership. In addition, partnered with a group of design thinking enthusiastswho conducted a workshop in which the participants along with the Kemin team engaged in building up the Partnership Wall in a unique storytelling pattern. The participants were divided into teams and were given separate pieces of puzzle boards to color with their own creativity. At the end of the session, those pieces were assembled to build the Wall of Partnership. Thus, the workshop gave the opportunities for the attendees to create a cohesive experience, reinforce the importance of partnership, and connect the participants of the event.

The celebration evening kick-started with a Kemin 'formulated' special mocktail, named **Shirly'61** which was tossed with all the participants in the

event. The evening was also graced by well-themed performing artists and musicians. They epitomized Kemin's innovation, multinational footprints, and partnership with the confluence of hip hop, flamenco, Chinese lion, Irish Folk, Bharatnatyam fusion, and Brazilian carnival styles. The audience was enthralled by the performances and the celebration.

To acknowledge the role of media in the industry, Kemin invited top media representatives from the livestock and food industries, and a press conference was organized with the panel comprising Chris Nelson, President & CEO, Kemin Industries Inc., USA, Ramesh GS, Group President Animal Nutrition & Health, R Sureshkumar, President, Kemin Industries - South Asia, C Sugumar, Commercial Director – Aquasciences, Michelle Lim, President, Kemin Food Technologies. Around 20 questions were deliberated in this session which was moderated by Tanweer Alam, Director, Marketing.





From left - R Gopalakrishnan, Chris Nelson and Suresh Mahalingam



The Wall of Partnership



Partnership Workshop



Fusion dance Cultural Program



The celebration



**Bharatnatyam Fusion** 















**Tossing Shirly '61** 



**Press Meet session** 

Kemin took this opportunity to convey gratitude to all its customers and business partners for the mutual trust and confidence bestowed upon the organization for the past 61 years and is confident that this will further strengthen a strong foundation of trust with the partners in the coming decades as well.

#### **About Kemin Industries**

Kemin Industries (www.kemin.com) is a global ingredient manufacturer that strives to sustainably transform the quality of life every day for 80 percent of the world with its products and services. The company supplies over 500 specialty ingredients for human and animal health and nutrition, pet food, aquaculture, nutraceutical, food technologies, crop technologies, textile, biofuel, and animal vaccine industries.

For over half a century, Kemin has been dedicated to using applied science to address industry challenges and offer product solutions to customers

in more than 120 countries. Kemin provides ingredients to feed a growing population with its commitment to the quality, safety, and efficacy of food, feed, and health-related products.

Established in 1961, Kemin is a privately held, family-owned-and-operated company with more than 3,000 global employees and operations in 90 countries, including manufacturing facilities in Belgium, Brazil, China, Egypt, India, Italy, San Marino, Singapore, South Africa, and the United States.



## Kemin's growth from 1961

Advancing science, expanding to six continents, creating community around the globe — Kemin has done a lot in just over six decades. Follow the timeline to see just how far we've come since 1961.

- 1961 R.W. and Mary Nelson founded Kemin Industries—then known as Chemical Industries—to provide feed additives to the Midwest agriculture and animal production markets, later expanding to provide animal nutrition and health products on six continents.
- 1965 Launched two of the U.S. agriculture industry's first feed antioxidants.
- 1967 Established worldwide headquarters in Des Moines, Iowa, U.S.
- 1970 Established regional headquarters for Europe, Middle East and North Africa in Belgium.
- 1983 Developed natural pigmenter extracted from marigolds to replace artificial yellow coloring in egg yolks.
- 1983 Developed world's most widely sold mold inhibitor for animal feed.
- 1988 Established regional headquarters for Asia-Pacific region in Singapore.
- 1992 Developed a liquid antimicrobial that transformed how bakery and tortilla products are kept fresh.
- 1995 Discovered the benefits of lutein, found in marigolds, for human eye health and began producing the first-of-its-kind natural ingredient for vision supplements in the global market.
- 1995 Formed Kemin Human Nutrition and Health business unit to provide ingredients for dietary and nutritional supplements.
- 1996 Established regional headquarters for South Asia in India.
- 1997 Began growing proprietary rosemary with high level of carnosic acid, extracted to use in pet food products to protect against flavor and color loss.
- 2000 Formed Kemin Nutrisurance, the pet food and rendering technologies business unit, to serve the fast-growing pet food industry.
- **2000** Established regional headquarters in China.
- 2004 Formed Kemin Food Ingredients, which became three regional Kemin Food Technologies business units, to serve the food and beverage markets.
- 2004 Established regional headquarters for South America in Brazil.

- 2014 Established regional headquarters for Sub-Saharan Africa in South Africa.
- 2014 Became first company and largest producer in the world to have its proprietary rosemary Certified Sustainably Grown by SCS Global Services.
- 2015 Formed the Kemin Crop Technologies initiative, which grew into a business unit serving commercial specialty crop growers in the U.S.
- 2017 Achieved global vision to touch half the world's population (3.8 billion people) every day with Kemin products and services by 2019—two years earlier than planned.
- 2018 Acquired Garmon Chemicals, a chemical solutions company for the denim and apparel industry, and formed Kemin Textile Auxiliaries business unit, based in San Marino.
- 2018 Formed Kemin AquaScience™ business unit to serve the aquaculture industry.
- 2019 Launched new company logo and vision to sustainably transform the quality of life every day for 80% of the world with our products and services by 2042.
- 2020 Continued partnership with the United Nations' World Food Programme, Nobel Peace Prize recipient and the world's largest humanitarian organization, which impacted more than 115 million lives in 84 countries in 2020.
- 2021 Announced global sustainability vision to achieve net zero greenhouse gas emissions by 2050.
- 2021 Became majority shareholder in Egyptbased animal vaccine manufacturer MEVAC to expand its global reach and form the Kemin Biologics business unit.
- 2021 Acquired antimicrobial technology company Bio-Cide International to form the Kemin Bio Solutions business unit, which encompasses Kemin's key enzymes and antioxidants for biofuels and Bio-Cide's solutions to disinfect and sanitize equipment for food processing and water treatment applications.

# Coccidiosis: One of the Major **Economically Important** Diseases of Poultry & its control with CocciCare





Dr Mahesh Rajurkar

shed in feces

Dr Ramdas Kambale mahesh@glocrestpharma.com ramdas@glocrestpharma.com

Eimeria Life Cycle

(infectious)

sporulated oocyst

oocyst

enters gut

when swallowed

oocyst

releases

sporocysts

sporocyst

releases

Rainy season is favourable for Coccidiosis. Coccidiosis is usually an acute invasion and destruction of intestinal

> unsporulated oocyst (non-infectious)

However, many infections are subclinical. Coccidiosis is an economically important disease of poultry.

Coccidiosis is a parasitic disease of the intestinal tract of animals caused by coccidian protozoa. The disease spreads from one animal to another by contact with infected faeces or ingestion of infected tissue. Diarrhoea, which may become bloody in severe cases, is the primary symptom.

Prevention and control of disease require a careful evaluation of the entire farm and establishment of a series of biosecurity measures that allow assessing

> the possible challenges and their impact on the production system. Once established, all factors determining disease can be better recognized and corrected. In general, the recommended approach is to perform a risk assessment and establish the Hazard analysis and critical control point (HACCP) principles on the poultry farm, determining the points where potential hazards could occur and biosecurity measures have to be implemented. Biosecurity involves measures at the level of environmental control and management, including elaboration of vaccination and medication programs also application effective cleansers,

developing sporozoites Asexual oocyst gametogony schizogony sporozoites invade gut cells syngamy (sexual) male and trophozoite female reinfective cycle gametes merozoites schizogony released from (asexual reproduction) schizont mucosa by protozoa of the genera Eimeria. Clinical signs include diarrhoea, rise in temperature, inappetence, weight loss, emaciation, and in extreme cases, death.

sporulation occurs outside host

(requires several days and oxygen)

Environment sporogony

> sanitizer, and disinfectants. These biosecurity measures are essential to control the diseases and reduce their economic and public health significance.



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#### **Prevention and Control:**

Everybody is aware that coccidiosis is self-controlling disease. However, every farmer suffers some or major economic losses due to coccidiosis. As we know Prevention is better than treatment.

Now a days Monensin – 8 % + Nicarbazin + 8% is regular control measure used by most of the farmers. However, if those novel solution fortified with Vit K3 and Curcumin extract as feed additive could have tremendous impact on control of coccidiosis.

After thorough research by GLOCREST team – the novel combo of Monensin: 8 % + Nicarbazin: 8%, Vit K3 and Curcumin has been developed a satisfying solution to address this burning issue and launched a product called **Coccicare**. In Coccicare, Vit K<sub>3</sub> is added. It prevents internal bleeding in intestine which occurs due to coccidiosis. Monensin along with Nicarbazin acts synergistically.

Explanation for the mechanism of action CocciCare is that the product is able to interrupt host cell invasion by sporozoites. The outer membrane of the sporozoite contains lipid rafts and a protein, flotillin-1, was identified in sporozoites of E. tenella at the apex of the cell, a region that mediates cell invasion. Monensin was found to disrupt the localization of flotillin-1 within raft structures, resulting in the loss of ability to invade host cells.

lonophores have generally been found to be safe in target animals receiving an approved dosage.

CocciCare @ Importance of Curcumin extract - One of the natural compounds is curcumin, the extract from herbal plant Curcuma longa, known for its antioxidant and antimicrobial properties which may be effective in reducing coccidia infection in poultry.

The effects of different doses of curcumin compound on growth performance, antioxidant status, and gut health of broiler chickens challenged with Eimeria species. "Curcumin addition in diet of laying hens under cold stress has antioxidant and antimicrobial effects and improves bird health and egg quality".

We recommend to use 'Coccicare' for prevention of Coccidiosis in your flocks and have peace of mind to reduce your economical losses due to coccidiosis.

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#### ARTICLE

# **Bacteriophages** – The Future of Disease Prophylaxis against Menacing Bacteria in **Poultry Production**

#### Email: sharad.durge@sapienceagri.com



**Dr Sharad Durge** M.V.Sc., M.B.A., Ph.D. Animal Nutritionist - PAN India, Sapience Agribusiness Consulting LLP, Bengaluru, Karnataka

The overuse and misuse of antibiotics in animals' production and human medicine are raising the threat of antibiotic resistance. Various infections in poultry are caused by bacteria and many of them are of serious concern which has already developed resistance to many of the available drug treatments. The precious effectiveness of antibiotics and drugs can be preserved if we control their indiscriminate use. In many countries, about 80% of the important drugs/ antibiotics are used as antibiotic growth promoters (AGP) feeding healthy animals in animal production. It has been found that restrictions on the use of antibiotics in foodproducing animals reduced antibiotic-resistant bacteria by up to 39%. WHO strongly supports and recommends the complete ban on the use of antibiotics as a growth promoter and in the prevention of disease without proper diagnosis. Many countries have already taken the initiative to ban the use of AGP in food animals. The European Union has aggressively taken steps to ban the use of AGP in food animals and food produce since 2006. Consumers are also getting aware of their food and driving the demand for meat raised without AGP. Many food chains campaign and adopt "antibiotic-free" policies for their animal produce supply. The natural and most effective alternatives are the only way to a sustainable solution.

Nature has developed its own produce and check system. Bacteriophages are the part of natural check system.





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Bacteriophages are amongst the most ubiquitous organisms on planet earth. It plays a significant role in maintaining microbial balance on the planet earth. Bacteriophages are small viruses with the ability to kill bacteria without affecting cell lines from other organisms. Because of the accurate specificity to target cells, the application of bacteriophages has been used in therapy to treat acute and chronic infections described in the disciplines of dermatology, ophthalmology, urology, stomatology, paediatrics, otolaryngology, and surgery (d'Herelle, 1931; Abedon et al., 2011; Chanishvili 2012). Scientists were passionate about phage therapy as a treatment for bacterial diseases in the pre-antibiotic era.

The roots of phase technology are lies in India. A British bacteriologist Ernest Hanbury Hankin observed that a biological principal present in the water of Ganga and Yamuna kills cholera-inducing bacteria in their bacterial culture. He also observed that this principal substance could pass through millipore filters (Hankin, 1896). During experiments with the vaccinia virus, Frederick Twort observed that the pure cultures of bacteria were associated with some kind of filter-passing transparent material (Twort, 1915). He found that this filterable material isolated from micrococci could not be sub-cultured but able to infect a fresh growth of micrococcus. He assumed that as that filterable transparent material was unable to grow in the absence of bacteria hence must be some part of the bacterial and called it a ferment secreted by the bacteria by Twort, at that time.

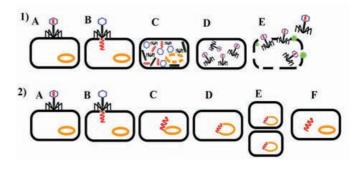
Bacteriophages are in abundance and mostly associated with the environment where there is bacterial cells exist. The population number in aquatic systems lies within the range of 104 to 108 virions per ml; whereas in the soil it is about 109 virions per g (Weinbauer, 2004). The estimated total types of bacteriophages present on the planet are 1032 (Hanlon, 2007).

Bacteriophages are the obligatory parasites to bacteria. They use the bacterial cell as machinery to replicate. The life cycle of bacteriophages is divided into two types 1. lytic (virulent, productive), 2. lysogenic (temperate, dormant). Some bacteriophages can perform both lytic and lysogenic cycles depending on environmental situations.

In the lytic cycle, a bacteriophage infects a live bacterial target cell, replicates therein, kills the bacterium by lysis and releases multiple or hundreds to thousands of phages. The phage protein (holin) enables the phage-encoded endolysin to gain access and hydrolyze the peptidoglycan layer and produce pores within the cytoplasmic membrane. This results in cell lysis and release of the progeny phages, which can infect other bacterial cells, thereby repeating the cycle. Most works have indicated that bacteriophages targeting Gram-positive bacteria are not simultaneously effective against the Gram-negatives, it clearly indicates that they are species-specific.

In contrast, the lysogenic cycle does not lyse host cells. Instead, it leads to the integration of phage genetic material into the bacterial genome and then its transmission into

new cells. The dormant phages are known as a prophages or endogenous phages. Under abnormal environmental conditions, the phage can become active and enter the lytic stage.

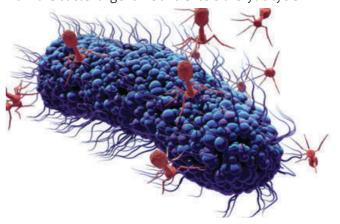


Source: (Wittebole et al, 2014)

#### The life cycle of bacteriophage:

- 1) Lytic cycle. (A) Attachment (B) Penetration (C) DNA replication and protein synthesis (D) Assembly packaging (E) Lysis of host cell. Progeny phages can infect further bacterial cells and the cycle starts again.
- 2) Lysogenic cycle. (A) Attachment (B) Penetration (C) Integration of phage DNA (D) Prophage stage (E) The prophage is replicated along with the bacterial genome.

The bacterial cell divides and prophage DNA is transferred into daughter cells. (F) Sometimes the prophage can be induced to become active. The prophage DNA is excised from the bacterial genome and enters the lytic cycle.



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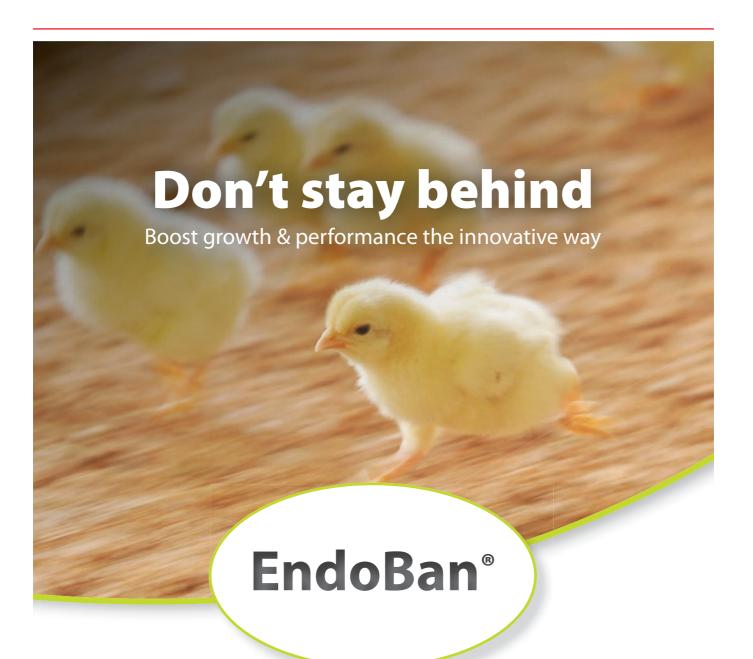
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# Need for Investment in creation of Integrated Poultry Processing Plants for Boosting Exports

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**Ricky Thaper** Treasurer Poultry Federation of India

India's poultry industry is today one of the fastest growing poultry producers in the world with production having grown four-fold over the last two decades. The shift has been gradually to large-scale commercialization, overcoming several challenges on the way. According to the National Action Plan for egg and poultry – 2022 prepared by Department of Animal Husbandry, Dairying and Fisheries, more than 80% of poultry output, particularly in the broiler segment, is today produced by organized commercial farms. Major poultry companies have vertically integrated operations which comprise 60-70% of the total poultry meat production. Thus, India has emerged as the world's third largest egg producer and sixth largest producer of broiler meat.

The poultry sector is growing at a compounded annual growth rate (CAGR) of 10.5% and playing a critical role in promoting livelihood options in rural India. Instead of rearing country birds, farmers are now increasingly rearing hybrids which yield better operating parameters and sustainable profits. Rising urban population, changing eating habits and growing penetration of quick service restaurants have all played a big role in sustaining growing demand for poultry meat. According to Basic Animal Husbandry Statistics, 2020, India's poultry meat production was 4.34 million tons, contributing more than 50% of the total meat production in 2019-20. The egg production stood at 114.38 billion in 2019-20. The global poultry market is expected to grow at a compounded annual growth rate (CAGR) of 10.1% to touch \$350.87 billion in 2022 from \$318.58 billion in 2021. By 2026, it is expected to touch \$493.21 billion, growing at a CAGR

Poultry consumption is expected to grow maximum in

the coming years. However we need to acknowledge that poultry processing and value addition is still at a very nascent stage in India. The share of processed chicken meat industry is only around 10% of the overall industry. This is due to the consumer preference for the live bird. This dominance of wet or live bird market limits geographical movement of output given the perishable nature of the product and limited cold storage and transportation infrastructure. The impact of our limited processing capacity is also reflected in our poultry meat exports.

As per Agricultural and Processed Food Products Development Authority (APEDA) data, in 2020-21, India exported 2,55,686 tons of poultry products valued at Rs 435 crore (\$ 58.7 million). Traditional export destinations have been Oman, Maldives, Indonesia and Vietnam. Though both the quantity and value of the exported processed poultry products have increased during the last few years and efforts have been made to increase poultry exports from India, the trade is very small in comparison to the global trade. The global poultry market is expected to grow to \$493.21 billion in 2026 at a CAGR of 8.9%. Exports are not equitable across the globe and are concentrated in certain clusters like Middle-East and South-East Asia.

Recently rise in demand for chicken from Singapore following the ban on exports by Malaysia could not be utilized for promotion of exports from India. Given that Singapore imports 34% was met by Malaysia alone, this can be a godsend opportunity to make further inroads into the Singapore market. Frozen chicken from the South American nation accounts for 48% of the total imports by Singapore. The US supplies 8%, while a few smaller exporting nations make up the rest 10%.

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While there is a good scope of export of dressed chicken to Singapore from India and a few companies from South India which have poultry processing plants, are already in the process of exports to the island nation, we need to step up our export capacity. Value-wise, our current chicken exports are much lower compared with exports from Brazil and the US.

To do this, Indian exports need to be competitive in terms of costs as well as quality. Export viability depends on competitive cost of production and proximity to international markets. Indian chicken exports have faced difficulty in the international market because there is no low pathogenic avian influenza (LPA) vaccination. Only in December last year, the United Arab Emirates lifted a ban on importing eggs and other poultry products from India after the Indian government gave an assurance that Indian poultry meat exports would adhere to bio-safety norms prescribed by the World Organization for Animal Health to prevent infection from bird flu.

We need to create infrastructure for slaughter house for boosting out exports. We need to have adequate processing facilities which meet international standards. The cost of the production for poultry bird is expensive compared to other countries such as Indonesia, Philippines and China. The high input costs are a major reason for this. Cost of production of our feed is higher compared to other countries such as the US, China or Brazil. Feed price constitutes around 70% of the total production cost. This apart, the seasonal nature of consumption leads to volatile demand supply trends across regions, making all calculations go awry.

Developing efficient distribution with large investments in cold chain infrastructure and proper high-capacity processing plants of international standards is the need of the hour. Integrated production, market transition from live birds to chilled and frozen products and policies that ensure supplies of competitively priced corn and soybean are keys to future poultry industry growth in India. Within the processed poultry segment, the share of frozen products is minimal compared to chilled products. Integrated poultry processing plants have hatcheries, feed mills, and primary processing facilities. This integration model ensures that farms with 5000-10,000 broilers capacity are insulated against fluctuations in market prices as they are assured of getting predetermined fixed prices as per the contracts.

There are a number of small poultry dressing plants in the country. These plants are producing dressed chickens. In addition to these plants, there are a handful of modern integrated poultry processing plants producing dressed chicken, chicken cut parts and other chicken products. Therefore, industry-wide, a shift towards integrated processing plants would be advantageous. Farming technologies such as climate-controlled farm houses and automated feeding lines can help improve farm productivity. Feeding, water supply, temperature and humidity control are some of the variables that require automation in poultry farming. Automatic feeding systems could reduce labour

cost and improve farming level and Feed Conversion Ratio (FCR) efficiency, thus reducing overall production costs. The environmentally controlled (EC) sheds ensure bigger harvests, better feed conversion and economy both on capital and revenue investments.

The government had announced Special Livestock sector package. The poultry meat as well as egg sectors must take advantage of this financial assistance to boost infrastructure. A capital subsidy should be there on setting up EC sheds with improvement in infrastructure in the wet market that would boost demand as well as consumption.

The domestic demand for poultry and processed poultry products has shot up since the middle of 2020. There has been a huge increase in e-commerce with expansion of home delivery as a response to the Covid-19 lockdowns and change in consumer buying behavior. The Russia-Ukraine war and supply chain turmoil since the pandemic have upset many old trade links and thrown up new export opportunities. Hence, there is an urgent need for setting up of modern poultry processing plants to cater to both domestic as well as export markets.

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# DEVELOPMENTS IN THE EXIM POLICIES FOR POULTRY FLOCK HEALTH IN INDIA

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#### P. Kohila, R. Amutha and S. Udhayavel

Veterinary College and Research Institute, Namakkal Tamil Nadu Veterinary and Animal Sciences University

#### **Highlight Points**

The evolution and dynamics of world poultry markets are mostly driven by poultry disease outbreaks and sanitary requirements, which ultimately determine international poultry trade and country's economy. Understanding the procedure for import of poultry and poultry products and also the export standards is very much essential to prevent the spread of exotic diseases. In this regard, this article briefly explains the procedure for import, guidelines and agencies involved in export of poultry and poultry products.

Poultry is one of the fastest growing segments of the agricultural sector in India today. The production of eggs and broilers has been rising at a rate of 8 to 10 percent per annum. The potential in the sector is due to growth in per capita income and growing urban population. Poultry meat is the fastest growing component of global meat demand, and India, the world's second largest developing country, is experiencing rapid growth in its poultry sector. In India, poultry sector growth is being driven by rising income and a rapidly expanding middle class, together with the emergence of vertically integrated poultry producers that have reduced consumer prices by lowering production and marketing costs.

The export of poultry products from India during the year 2020-21 is2,28,126.35 MT to the value of 37,649.50 lakh rupees (DGCIS Annual Export, APEDA Agri. exchange, 2021) to the countries including Japan, Indonesia, Maldives, Philippines, Russia, Vietnam Soc Rep, Bhutan, Nigeria, Oman and Saudi Arabia.

#### Exim policy:

Exim Policy is also known as Export Import Policy, is a set of guidelines and instructions related to the import and

export of goods. The Government of India notifies the Exim Policy under Section 5 of the Foreign Trade (Development and Regulation Act, 1992).

#### Objectives of Exim policy:

- To establish the framework for globalization
- To encourage the attainment of high, internationally accepted standards of quality.
- > To promote the productivity and competitiveness of Indian industry

### Regulation of export and import of poultry and poultry products in India:

- Import and export of livestock, poultry and livestock products are regulated as per the Foreign Trade Policy (FTP) of Government of India which is implemented by Department of Commerce.
- The Department of Animal Husbandry and Dairying, GOI regulates import of livestock and livestock products in accordance with provision of Section 3 and Section 3A of the Livestock Importation Act., 1898 so as to prevent ingress of exotic diseases through import of such livestock and livestock products.
- ➤ Import of poultry falls under the category of restricted listas per EXIM Policy for which importer has to obtain license from Director General of Foreign Trade(DGFT).

#### A) Import policies:

#### 1. Import of poultry:

- The DGFT issues license for import of poultry based on the recommendation of the Department of Animal Husbandry and Dairying after examining the proposal and conducting risk analysis.
- Apart from the EXIM policy, the Central Government is empowered to regulate, restrict and prohibit import of live animals in accordance with Section 3 of the Livestock Importation Act, 1898.

#### 2. Import of poultry products:

• The livestock and poultry products are categorized under Open General License (OGL) as per EXIM policy.







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- Apart from the EXIM Policy, the Central Government is empowered to regulate, restrict and prohibit import of livestock and poultry products in accordance with Section 3A of the Livestock Importation Act, 1898.
- Sanitary Import Permit: The import of livestockand poultry products is allowed after obtaining Sanitary Import Permit which is issued by the Department of Animal Husbandry, Dairying and Fisheries (DAHDF) after examining import risk analysis. Sanitary Import Permits (SIPs) must be obtained prior to shipping from the country of origin. The Regional Authority will be issuing advance authorization before getting SIP from the Department.
- Cases requiring Sanitary Import Permit: Import of meat and meat products including fresh, chilled and frozen meat, tissue or organs of poultry, egg and egg powder requires Sanitary Import Permit.
- Permits are valid for one year or six months depending upon the nature of product and may be used for multiple consignments. A Sanitary Import Permit is not a license, but a certificate certifying India's sanitary requirements.

## Procedure for applying and getting license for import of live poultry and poultry products:

The importer of live poultry requires pre-import no objection certificate from the Department of Animal Husbandry, Dairying and Fisheries and need to fulfill the quarantine and animal health certificate requirement at the time of import.

- 1. The importer of such items, need to file an application as per prescribed format to DGFT (http://dgft.gov.in).
- 2. The DGFT in turn will forward the application to Department of Animal Husbandry, Dairying and Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying for comments.
- 3. The technical committee on Trade and Investment Matters (TIM) takes decision on the applications received.
- 4. The recommendation of the trade committee will be communicated to DGFT for their further processing of application for license.
- 5. The import of live poultry is allowed only through air port and sea port of Delhi, Mumbai, Chennai and Kolkata where the quarantine facilities are available.
- The testing for diseases as prescribed in the health certificate should be conducted in the exporting country and all the test report need to be accompanied with the animals.
- 7. Before embarkment of the birds from the foreign port, the importer should obtain permission from the Regional Officer/Quarantine Officer after showing a copy of import license issued by the DGFT and a copy of health certificate (as required by DGFT) issued by the official Veterinarian. This permission needs to be obtained from the Regional Officer/ Quarantine Officer seven days before embarkment (relaxable up to three days depending on the pressing circumstances).

- 8. The birds will be quarantined in the government quarantine station of the above mentioned ports for a period stipulated in the health certificate enclosed with the license.
- **9.** On arrival at the port of entry: The poultry will be taken to the premises approved by DAHD for in house quarantine and will remain under quarantine for 30 days.
- **10.During Quarantine Period** the poultry will be examined for infectious diseases including HPAI and the test reports will be updated online.
- 11. Final NOC will be issued in case, negative test reports are obtained for the live poultry under quarantine.
- 12. If the poultry develop signs of an infectious disease and confirmed by laboratory reports, the poultry will be scientifically destructed at the cost of importer.

#### B) Export policies:

## General guidelines in export of poultry and poultry products:

- Most of the poultry meat available on the global market comes from large-scale specialized commercial poultry production systems. Poultry meat products are usually exported as frozen. Carcasses or cut-up pieces must remain frozen throughout the marketing chain. When the refrigeration chain is interrupted, infectious agents start to multiply on the meat. The consumption of contaminated meat can cause diseases, especially if the meat is not well cooked. Appropriate control of the refrigeration chain is therefore required, from port, to market, to consumer.
- In countries, where H5N1 highly pathogenic avian influenza(HPAI)isreported, poultry meat can be exported only as processed products (cooked, pasteurized) to avoid spread of the virus to other countries. In frozen poultry meat products, Influenza viruses are not killed by refrigeration or freezing.
- Bacteria, such as Salmonellae, which cause Salmonellosis in people, also survive in frozen products, and can become harmful when they start multiplying after defrosting. Antimicrobial-resistant bacteria can also be disseminated through trade of poultry meat products.

#### Export of Egg and Poultry / products from India:

Major items exported from India are table eggs, egg powder, hatching eggs, SPF eggs, poultry meat, and to a small extent the live poultry. The strength of exports mainly lies in the competitive cost of production, proximity to international markets and successful regaining of freedom from Highly Pathogenic Avian Influenza (HPAI).

Although some efforts have been made to increase poultry exports from India, the trade is very small in comparison to the global trade. India's major markets are Middle East and Asia. Egg powder is also sent to Japan and EU. Now exports have been extended tomany African countries also. India hasinfrastructure to handle



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## Agencies governing export of products from India: 1. Agricultural and Processed Food Products Export Development Authority (APEDA)

- ➤ The Agricultural and Processed Food Products Export Development Authority (APEDA) was established in 1985, by the Government of India, under the Agricultural and Processed Food Products Export Development Authority Act passed by the Parliament.
- ➤ The primary objective of APEDA is to undertake the development and promotion of export of the agriculture and related products. Poultry and poultry products are in the first schedule to the APEDA Act.
- For prevention of spread of COVID-19, APEDA in association with ICAR-NRCM, Hyderabad prepared guidelines titled as "Handling guidelines of meat, poultry and egg production to protect spread of CORONA virus during COVID-19 pandemic" for processing traders and other stakeholders involved in supply chain.

#### 2. Export Inspection Council (EIC)

- The Export Inspection Council (EIC) was established by Government of India under Section 3 of the Export (Quality Control and Inspection) Act, 1963 to ensure sound development of export trade of India through Quality Control and pre shipment Inspection and for matters connected thereof.
- The EIC is an advisory body to the Central Government which gives advises for notification of commodities which will be subjected to quality control and/ or inspection prior to export and establish standards of quality for such notified commodities.
- Quality and safety of products as per the requirement of the importing countries is provided through either consignment-wise inspection system or quality assurance/food safety management system based certification through its field agencies and the Exports Inspection Agencies (EIAs). The EIA's are headquartered at Mumbai, Kolkata, Kochi, Chennai and Delhi with a network of 24 sub offices.
- ➤ The EIC has adopted Quality Management System and is ISO 9001:2015 certified to ensure realization of its objectives.
- ➤ The EIC provides mandatory certification for egg products, fresh poultry meat, meat products and crushed bones.
- The EIC has developed global acceptance and currently EIC certification has been recognized by several India's trading partners.

#### The major activities of the EIC are

> Approval of processing establishments based on

- Food Safety Management System to ensure safety and quality of commodities meant for export as per importing countries standards.
- Pre-shipment inspection and certification based on consignment-wise inspection to assure quality of export commodities as per laid down specification.
- Recognition of Inspection Agencies and Laboratories.
- Residue Monitoring Plans as per importing countries requirements.
- Training and capacity building of industry and other stake holders in areas of Quality and Food Safety Management System.

#### Role of EIC in Foreign Trade Policy and EXIM trade

The EIC has been playing a crucial role in promoting trade through its quality control and inspection activities by ensuring compliance of the requirements of importing countries. In line with the national and international needs, EIC enters into Memorandum of Understandings (MoUs)/ Mutual Recognition Agreements (MRAs)/ Equivalence Agreements/ Recognitions/ Cooperation Arrangements with the major trading partners. These arrangements facilitate acknowledgement of EIC's Certification System by regulatory authorities of importing countries and avoid multiple border inspections.

#### 3. International food safety standards:

- The Sanitary and Phytosanitary (SPS) Agreement defines the basic rules for food safety, animal and plant health standards for World Trade Organization (WTO) member countries. It allows countries to set their own standards, but these must be based on science.
- The Codex Alimentarius is a collection of international food safety standards that have been adopted by the Codex Alimentarius Commission (the Codex), which was jointly set up by FAO and the World Health Organization (WHO). Under the SPS Agreement, the Codex is the relevant standard - setting organization for food safety.

The Codex Alimentarius includes food safety standards related to poultry meat and eggs. As risks for food safety vary among countries, the identification of risk factors for each poultry product is a first step in risk control, as described in the CODEX.

Implementation of strict Exim policies enables international trade of poultry and poultry products and consequently improves economy of the country.

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- 5. https://www.apeda.gov.in

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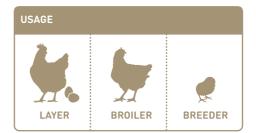


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# CLIMATE CHANGE BATTLE IN POULTRY INDUSTRY: FACTS AND SOLUTIONS

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Veterinary College and Research Institute, Namakkal. Tamil Nadu Veterinary and Animal Sciences University

#### **Highlight Points**

This article briefly describes the effect of climate change on the production performance of layer, broiler and breeder chicken. It also highlights the importance of mitigation measures to be followed in the poultry farms during the adverse climatic conditions.

The effect of climate change on livestock and poultry production has been evidenced across the world. Poultry cannot tolerate a wide range of climatic variations which affects the production and reproduction (Menquesha, 2011). India is more vulnerable due to demographic pressure on natural resources and poor coping up mechanisms (Okere, 2013). However, fertility is related with temperature, rainfall, solar radiation and atmospheric pressure. The most potent environmental measures that affect fertility might vary depending on geographical locations. Apart from the inherited capacity, the levels of performance of poultry greatly depend upon the environment.

The various factors affecting the poultry production and reproduction are disease control, feeding management, stock density, housing system, climate, breeder and hatchery management, etc. Most of these factors are being dealt with scientific techniques except the climate change in order to maximize production (Adesijiet al., 2013). However, climate change is emerging as a great challenge for poultry industries to sustain the level of production. Climate pressures affect the biosecurity protocols. In tropical countries like India, birds are raised in open sheds from which disease-carrying rodents and wild birds are hard to keep out. Temperatures in closed sheds would be uncomfortably high without environmental control. Birds of different breeds/strains and of different age, sex, stage of production, and reproduction respond differently to climatic variations (Alade and Ademola, 2013).

High ambient temperature (> 80-85° F) coupled with high humidity cause detrimental effects in poultry (Adesijiet al., 2013). Climate change suppresses the productive efficiency,

growth rate, feed conversion ratio (FCR) and live weight gain in broilers. In breeders, high ambient temperature coupled with high humidity decreases fertility rate and resulting in low hatchability.

When the birds exposed to high environmental temperature resulted in reduction in Hen-day egg production, enhanced cost of production, more mortality due to suppression of immunity and reproductive failure thereby causes heavy economic loss (Ahaotuet al., 2017).

#### Effect in layers

Egg production in layer hens is affected by climate change. During high fluctuation in environmental temperature, the bird diverts feed metabolic energy to maintain its body temperature constant, resulting in lower egg production, and lower egg quality. In layer birds, respiratory rate increases (29 cycles -100 cycles per minute) when the environmental temperature above the thermo neutral zone resulting in hyperventilation which decline the blood carbondioxide levels, thereby decrease the thickness of eggshell (Ahaotu and Agunanne, 2017). Therefore, climate change causes reduction in egg weight, eggshell percentage, egg shell weight and egg specific gravity (Onyekwereet al., 2016).

#### **Effect in broilers**

Dehydration is the major issue in most of the species during heat stress and it could affect the quality of meat by increasing the risks of heat shortening in broilers and pale-soft-exudative meat in turkeys. The concentrations of sodium and chloride ions in the blood have been increased, whereas the concentrations of potassium and phosphate is reduced when birds are exposed to extreme heat environment (Abbas *et al.*, 2012)

Climate change particularly high environmental temperature reduces the feed intake thereby decrease the growth rate and production in birds. It is learnt that the stress hormones particularly corticosteroids mediate the inhibition of growth and production in heat stressed broiler birds.

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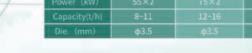
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It has been reported that chronic heat exposure negatively affects fat deposition and meat quality in broilers (Uzomaet al., 2019). Recent studies demonstrated that heat stress affects the quality of meat and meat chemical composition in broilers (Zhang et al., 2012).

#### Effect in breeders

Climate change decreased production performance, reduced eggshell thickness and increased egg breakage in breeders (Ebeidet al., 2012). Climate change affects all phases of semen production in breeder cocks (Ahaotuet al., 2018). Especially high environmental temperature suppresses the reproductive capacity as a result of decrease in seminiferous epithelial cell differentiation, which is manifested in decreased semen quality and quantity with time (Onyekwereet al., 2016). High environmental temperature due to climate change affects the fertile eggs during incubation and caused asymmetries in skeletal development during the early and late stages of embryo development (Uzomaet al., 2019).

#### Miscellaneous effects of climate change

Immunosuppression is the major effect of climate change on layer, broilerand breederbirds. Reduced weight of lymphoid organ (spleen, thymus and bone marrow) has also been reported in broilers under seasonal fluctuations (Ghazi et al., 2012). Climate change also alter migration of birds from one place to another place thereby influence the transmission cycle of diseases like Avian influenza.

#### Mitigation measures

During the adverse climatic conditions, chicken should be housed and managed to provide a comfortable environment (thermoneutral zone) so that the birds can adequately dissipate body heat to the external environment and maintain a thermalbalance. Poultry sheds must be constructed in a manner to avoid the penetration of heatfrom the outside environment. It is advisable to promotenatural air flow from the north and south sides and to shield birds frommaximum sunlight during the day; therefore the longitudinal direction of the shed should be from east to west. The roof of the poultry shed should be steep and high.Insulation of the roof is extremely important, as 60 per cent of the externalheat penetrates through the ceiling into the house. The stocking density should be adjusted according to temperature and humidity conditions. Exhaust fans can also be used for the expulsion of hotair from the poultry house.

During high temperature, the birds can be fed with chilled water. Balanced feed, proper vaccination and strict biosecurity could improve the welfare of the birds. Fat is being added to the diets of poultry, especially broiler feeds to boost the energy level. Dietary levels of protein and amino acid are being adjusted in the diets of the birds to ensure that the birds benefit from essential nutrients. Including betaine in poultry diets can significantly benefit the production performance in poultry kept under heatstress conditions. Betaine has a specific role in maintaining poultry biological processes such as osmoregulation. Vitamin C combats heat stress and improves the immune response of birds. The addition of vitamin C to drinking

water or feed helps to reduce corticosterone levels during heat stress for regulating body temperature (Attiaet al., 2016). To combat the heat stress, sodium bicarbonate is also being widely used in poultry industry.

By adopting microclimate modification the heat can be prevented from entering the poultry house. This can be done by ensuring that outside air can easily flow into and out of the house. Conditions should be created such that outside air should be made to circulate and not buildup heat within the house (Butcher and Miles, 2012).

Tree cover on the fields surrounding the poultry house will reduce the reflection of sunlight into the house. The roof should also be conditioned through ceiling to prevent heat from coming directly to the house of the roof (ROSS, 2010).

Genetic selection of birds can also be followed to avoid heat stress due to climate change (Hoffman, 2010). Selection for production traits has increased the line's susceptibility to stressors. There are a lot of genes that affect heat tolerance of birds. Some genes like the naked neck, affect the trait directly by reducing feather cover. Other heat resistant genes include dwarf frizzle which can be used to counter increasing temperature due to climate change (Cahaner and Leenstra, 1992). Early heat conditioning also appeared to be one of the promising methods to induce heat resistance and adaptation of poultry breeds to the hot-dry conditions.

Installing mist blowers is widely preferred by the farmers as it is relatively cheaper. Fogging systems, which work by using very fine droplets of water in order to increase the water surface in contact with the air thereby reducing the temperature in the room. Pad system, another method with pad cooling system, the ambient air within the building is cooled down, forcing air into the building through a wet pad (Renaudeauet al., 2012). The use of air cooling systems in the form of adaptation and mitigation techniques to climate change is what is being employed by farmers in developed countries. There is the need to employ scientific methods to ascertain the suitability of the various cooling systems that can be used in poultry production. Poultry farmers should reconsider building design to more effectively cope with new climate and weather extremes, including the installation of more/new equipment to cope with new climate extremes.

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\*More References can be provided on request

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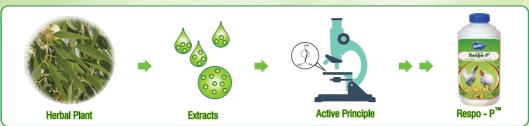
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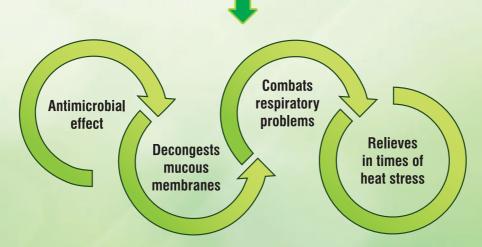




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