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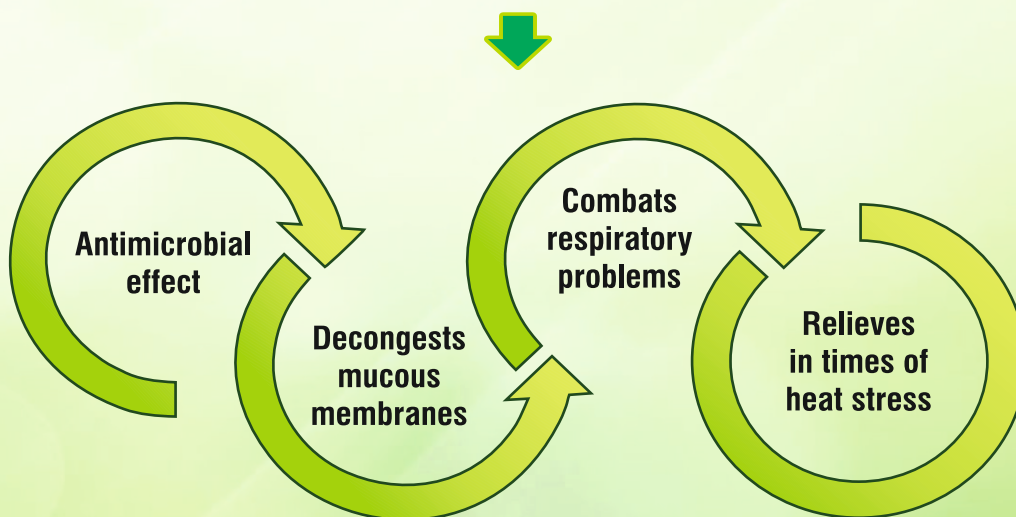
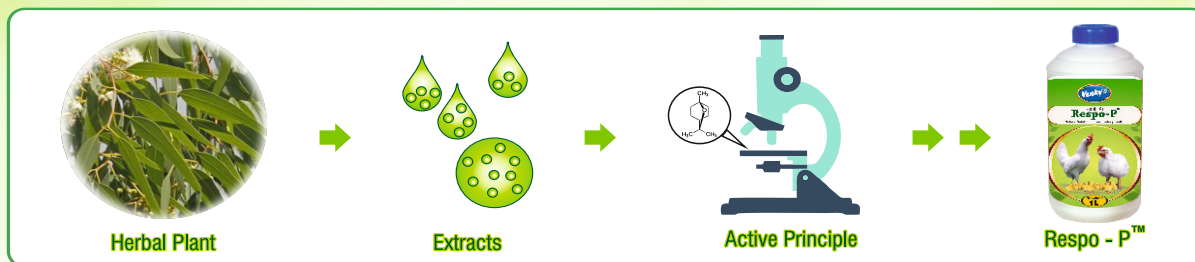
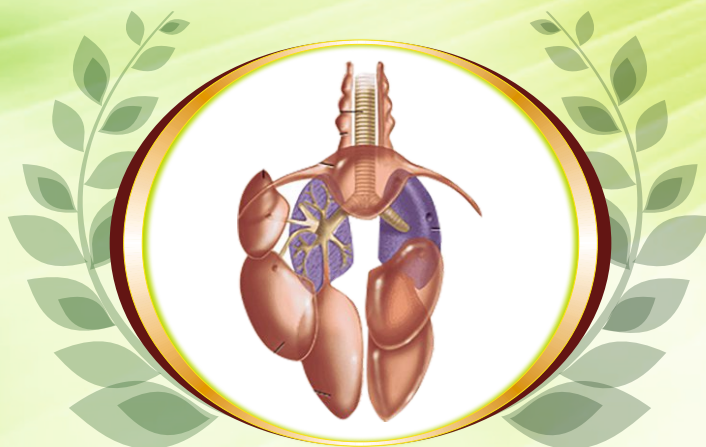
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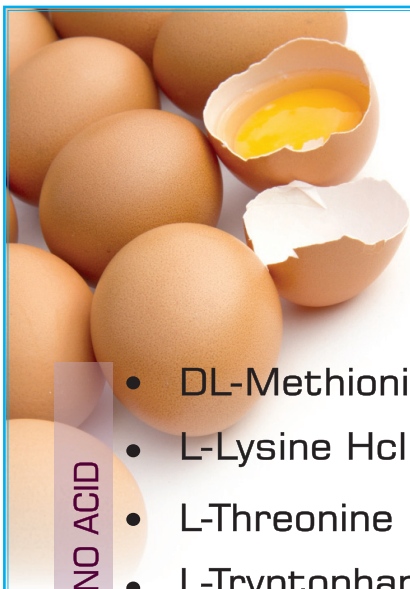
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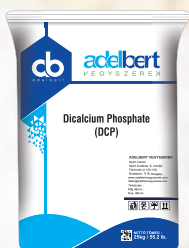
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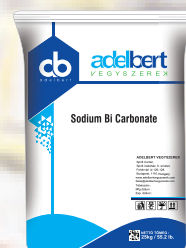
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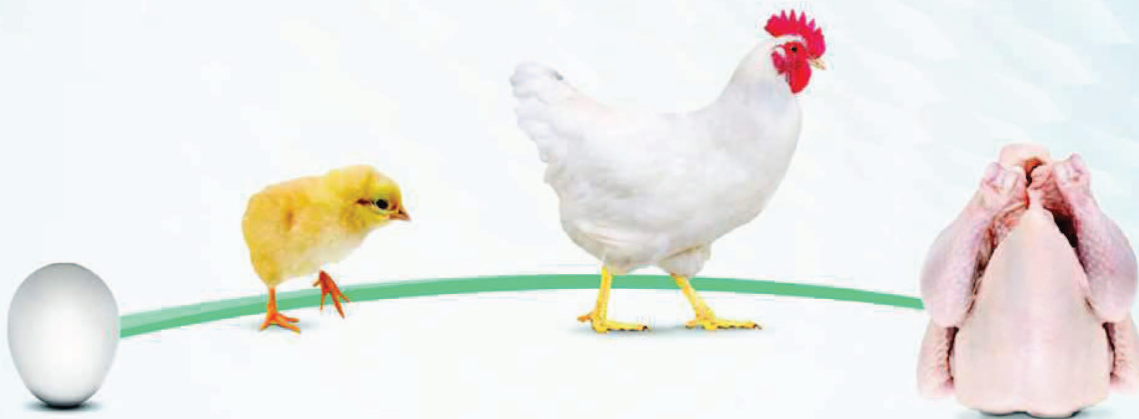

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 the Articles published herein.**

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The image of the Indian, Prime Minister, Shri, Narendra Modi, is very tall outside the country. The true democracy practiced in India, allows opposition the freedom to exaggerate and freely express their opinion against the ruling government and Shri Narendra Modi. The Superpower asking for an autograph of Shri Narendra Modi, another President touching the feet of Shri Narendra Modi, and another developed country calling Shri Narendra Modi as the boss of the region is a matter of pride to India and Indians. The image of India flies high today in the world.

The fueling of the Russia-Ukraine war, which is not sustainable and based on falsehood, has taken its first victim - Germany in the EU has gone into recession. The price paid for supporting the wrong principles. It is a complex European Union mindset, where they take policy decisions, which surely harm their own people and the interest of their own country in the long run.

The question we need to ask ourselves is how come Luscious Market Chicken successfully to the consumers which never occurred to the veterans for the kids in our industry? Can we at least imitate and have our own local and regional Luscious?

The recent massive success in organizing G-20 in Jammu & Kashmir has clearly exposed between the friend and foe. It is surprising to note there are still countries which are unable to cross their religious barrier, and move on to higher levels of humanitarian and greater levels of cooperation.

The democracy in India is probably being abused in the name of freedom; people cross limits in the name of freedom of speech, religion and expression, they harm their own country. No one should be allowed the privilege of being anti-national and going against the common interest of people in the name of opposing a political party.

In the past media was the strongest tool to guide, mold and manipulate the people. The mature, digital media has given free access and platform to the common people to express debate and understand the facts better, which makes it difficult for the paid media to have any control or negative influence over the social psyche.

The Poultry media should come forward to organize more and more regional fairs and Expos to improve the communication and exchange of management and technical information between the farmers and companies with technical and management expertise helping farmers to grow!

National Symposium 2023

(Participants : All Poultry Sector)

Theme

**Exploring Poultry Paradigm -
A Holistic Approach By Professionals.**



: You all are cordially invited by :

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A Holistic Approach By Professionals.**



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Moderator



Mr. O. P. Singh

MD, Huvepharma SEA (Pune) Pvt Ltd.

Panelist



Dr. Abhijit Mitra

AH Commissioner, DAHD, MoFAHD,
New Delhi



Dr. O.P. Chaudhary

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New Delhi



Dr. Girish Kolwankar

MD, Premium Chick Feed Pvt Ltd
Mumbai

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Theme

**Exploring Poultry Paradigm -
A Holistic Approach By Professionals.**



Mr. K. G. Anand

GM, Venkateshwara Hatcheries Pvt Ltd, Hyderabad



TOPIC-1

Poultry Producer's Concerns vis-a-vis Government Policies

(Subtopics - FSSAI guidelines and gaps, Approvals of vaccines, RM import, Bird flu policy amendments, Regulatory affairs and welfare, Pollution, Farm Registrations & Renewals etc)

Mr. K Kishore Kumar Hegde

Chairman & MD, Life Line Feeds Pvt Ltd, Chikmangalur



TOPIC-2

Symbiotic Association between Integrators & Farmers - Interventions Needed ?

Dr. Harsha Kumar Shetty

GM, Breeder Sales & Tech Support, Venkateswara Hatcheries Pvt Ltd, Bengaluru



TOPIC-3

Current Challenges of Poultry Sector & Possible Solutions

(Subtopics - Diseases, Nutritional Aspects, Raw Material Volatility, Over Production, Vaccines Concern, Waste Disposals, Safety, Marketing, Pricing of Poultry Products, Economics, Market and Marketing dynamics, Labour shortage, Poor Implementations of Biosecurity etc)

Mr. Balram Singh Yadav

MD, Godrej Agrovet Ltd, Mumbai



TOPIC-4

Future of Poultry Sector - Sustainability, Opportunities & Modernisation

(Subtopics- Artificial Intelligence (AI), AMR, EC Houses, RM Alternatives, New Food Chain Guidelines, Changing Customer Preferences, Scientific Marketing of Poultry Produce, Changing world Scenario, Export, etc.)



Vets In Poultry (VIP)

National Symposium 2023

(Participants : All Poultry Sector)



Theme

**Exploring Poultry Paradigm -
A Holistic Approach By Professionals.**

Date & Time

*28th June 2023, Wednesday
From 1.30 pm to 7.30 pm*

Venue

*Radisson Blu Plaza Hotel,
Banjara Hills, Hyderabad*

● : **Guest of Honour** : ●



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Hon'ble MP, Chevalla, Telangana



**Event Moderator
Prof. Dr. Ajit Ranade**

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WELTEC BIOPOWER and FT BIOPOWER at the environmental fair N-Expo in Tokyo

From May 24 to 26, WELTEC BIOPOWER and its Japanese partner FT BIOPOWER will exhibit at the environmental trade fair N-Expo in Tokyo. The experienced manufacturer will present its proven plant technologies, services and processes for the energetic utilization of biogas from sewage sludge, waste and agricultural residues.

WELTEC and FT BIOPOWER have already been working together successfully since 2019 (see press release 08/2022). Until recently, FT BIOPOWER was still operating under the name „Katonoki“. Now that the company has evolved and experienced higher demand on the topic of biogas, the change of name was only a logical conclusion. One of the joint projects was the construction of a plant in Urahoro on Hokkaido, the northernmost of Japan's main islands.

In earthquake areas, such as the Japanese plant site, the design challenge lies in the specific statics of the stainless steel tanks, which are adapted to the tectonic location. With the experience of the manufacturer WELTEC BIOPOWER, the plant was specifically designed with the geological conditions in mind.

„The plant was completed in 2022, and today we can draw a first conclusion: January and February are the coldest time of the year in Hokkaido. At night, temperatures can drop to -20°C. Normally, the digester temperature in our competitor's plant decreases and the power generation drops. However, the output of the Urahoro plant remains at almost 100 percent,“ explains Vladimir Bogatov, Area Sales Manager for the Asia-Pacific region.

Visitors to the N-Expo in Tokyo from May 24 to May 26, 2023, can get more information about all energy plants from WELTEC BIOPOWER and its Japanese partner FT BIOPOWER at booth U503.

Pictures/Captions



January and February are the coldest time of the year in Hokkaido. At night, temperatures can drop to -20°C.



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Company Portrait

Since its foundation in 2001, the **WELTEC** group of companies from Vechta in Lower Saxony has developed into one of the world's leading specialists for the construction and operation of biogas and biomethane plants. The Group covers the entire biogas value chain with the design, planning, and construction of energy plants, permanent and temporary plant operation, 24/7 service, and sustainable utilization concepts for output streams.

One of **WELTEC BIOPOWER's** strengths is the construction of individual, technically sophisticated solutions up to a plant size of ten megawatts. A central element here is the high proportion of components developed in-house. Stainless steel technologies also ensure flexible substrate use, fast assembly with low effort, and a consistently high-quality standard regardless of location. After commissioning, **WELTEC's** mechanical and biological service significantly ensures economic efficiency.

The company has just as much experience in the field of biogas production and utilization. At ten of its sites and five sites operated for a fund, the plants produce around 165 million standard cubic meters of biogas annually. Some of this is processed into biomethane and made available to energy suppliers and filling station operators throughout Germany via the public gas network. Furthermore, at 16 locations, municipalities and companies, such as those in the gardening, housing, and healthcare sectors, are supplied with decentralized heat as part of **WELTEC's** energy contracting.

Proximity to customers and investors is an important concern for the biogas specialist, which is why the Group is represented worldwide with its sales and service network. Customers include companies from the waste and food industries, agriculture, and the wastewater sector. The **WELTEC** Group and its 164 employees have implemented over 350 energy plants in more than 25 countries on five continents. The biogas specialist thus ensures annual savings of around 600,000 tons of CO₂eq.

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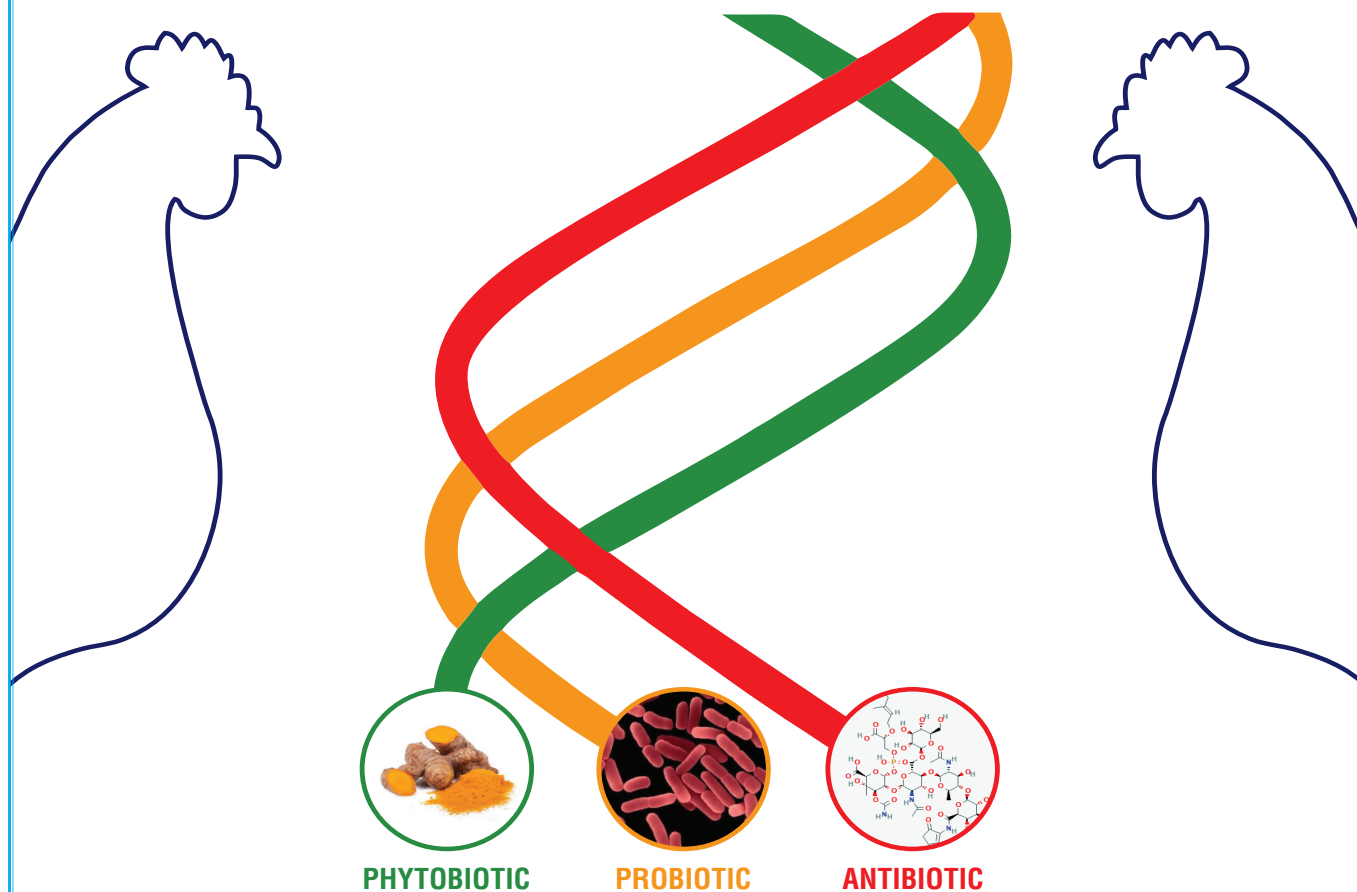


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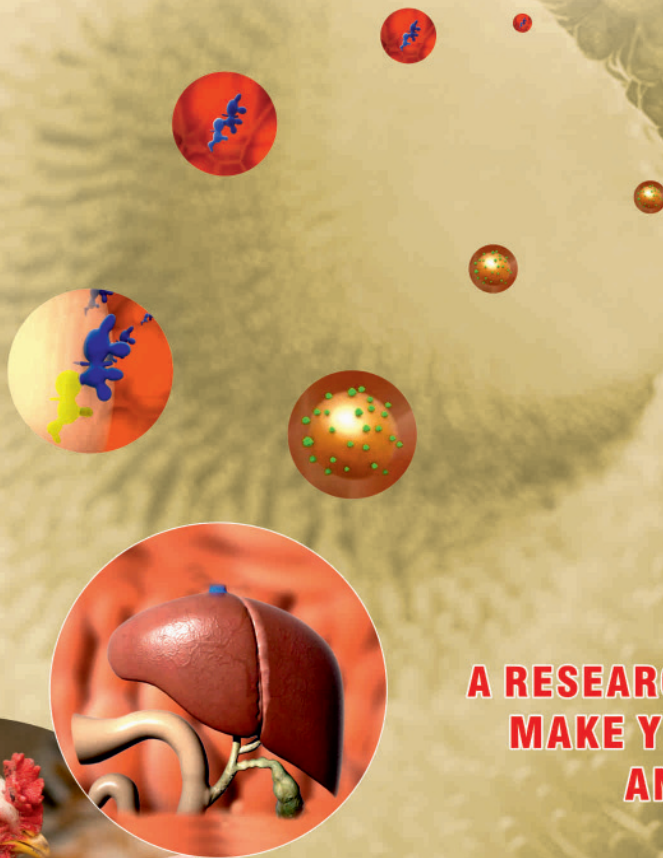


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Control of Early Chick Mortality & Stress Management during summer with **GROX**



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WHAT IS STRESS???

In simple terms, any deviation from normal routine is called the stress. There are several reasons for stress and poultry always exposed to stress conditions which are due to various causes listed below.

1. Seasonal impact
2. Management causes.
3. Nutritional causes.
4. Disease causes.

Seasonal impact: The summer is the worst season which causes heat stress and early chick mortality. Stress management during summer is always challenging. Global warming impact is clearly seen and every year farmers suffers heavy losses especially during summer.

Management Causes: High brooding temperature, low brooding temperature, starvation, inadequate feeders and drinkers, high relative humidity; **poor brooding conditions:** All those listed reasons cause severe stress and cause heavy mortality in chicks and even in adult birds

Nutritional Causes: Water: Water is one of the essential elements for maintaining the health and performance of the birds. It not only acts as a transport medium for nutrients and metabolic end products but also it helps in maintaining body temperature during hot weather. Besides, water balances the minor deficiency of minerals like Na, Cl, K, etc. Unhygienic water causes high mortality.

Vitamins deficiencies: Vitamins are very essential parts of poultry diets. They take part in vital body processes like metabolism, growth and development, reproduction, repair of worn-out tissues; they serve as antioxidants, take part in enzymatic actions, etc.

Diseases: As the immune system is not fully developed at hatch, chicks are particularly susceptible to several viral, bacterial, and parasitic infections. High mortality rates during the first week tend to be very common in poultry productions because of omphalitis, respiratory tract infections, airsacculitis, and septicemia etc.

Probiotics, prebiotics, symbiotic, and postbiotics

Currently, different microorganisms are being used to reduce mortality during first week and protect the gastrointestinal tract. Positive effects of these products have been described in the performance and gut health of chickens. Beta Glucan is known to enhance immunity and bioactivity by promoting secretion of cytokines, activating macrophages, natural killer cells and neutrophils, and have antitumor, antibacterial and antiviral effects (Brown and Gordon, 2005).

Role of MSM (Methyl Sulphonyl Methane): MSM is the buzz word in stress management in not only poultry but in human beings too. It's one of the super foods as antioxidant and

typical stress controlling factor especially in young chicks and even in adult birds.

CONTROL OF EARLY CHICK MORTALITY & STRESS with:



Birds have limited body resources for growth, reproduction, response to environmental changes & defense mechanism. Birds are subjected to frequent stress factors listed above. Therefore, stress management plays a crucial role to get optimum performance. To address these critical issues, GLOCREST introduced its flagship product to control EARLY CHICK MORTALITY & STRESS named with following composition

is complete product to address all the stress factors and help to control early chick mortality. During summer it could be a 'Ramban' solution. Pl use it to know it. Basically, it is considered as **ORS – Oral Rehydration Solution**.

In some of the trial reports (can be provided on demand), it has been observed that there was 0.25-0.5% saving in mortality & there was 15-20g extra body weight in first 10 days against their normal routine products which could result approximate 100g extra body weight at the time of culling. In nut shell, is complete package to manage summer stress and controlling early chick mortality and stress conditions in chicks and adult birds too. It can be given 1g/lit water or can be also added in 1kg/ton of feed. However, drinking water application can give instant results.

COMPOSITION :

Each Kg contains

Vitamin A	30,00,000 IU
Vitamin D3	6,00,000 IU
Vitamin E	1,200 IU
Vitamin C	5,00,000 IU
Vitamin K3	1.2 g
Vitamin B2	1 g
Vitamin B3	14 g
Vitamin B5	4 g
Vitamin B6	600 mg
Vitamin B12	2.5 mg
Methyl Sulphonyl Methane (MSM)	10 g
Mannan Oligo Saccharide (MOS)	5 g
Protein Hydrolysate	30 g
Beta glucan	5 g
Lactobacillus acidophilus	50 x 10 ⁹ CFU
Saccharomyces boulardi	10 x 10 ⁹ CFU
Bacillus subtilis	10 x 10 ⁹ CFU
Sodium sulphate	100 g
Potassium sulphate	100 g





FOR IMMEDIATE RELEASE

NOVUS to Host Nutrition Symposium on Improving Broiler Performance and Sustainability at ESPN

This free pre-conference symposium will take place June 21

SAINT CHARLES, MO (May 24, 2023) – Novus International, Inc., is gathering poultry experts to share how broiler producers in the European Union and the Americas can use nutrition to bolster both performance and sustainability during a special event at the 23rd European Symposium on Poultry Nutrition (ESPN).

NOVUS presents its own symposium called **Improving Performance and Sustainability through Nutrition** on Wednesday, June 21 held in conjunction with ESPN.

"We are very excited to bring this broiler-focused symposium to ESPN," says NOVUS Executive Regional Technical Services Manager Silvia Peris, DVM, Ph.D., who will serve as the event's moderator and host. "The speakers joining us are experts in the field and really understand the concerns weighing on producers' minds. Drs. Tillman and Davin both work with top integrators, feeding millions of broilers. Their experience is vast, and I know they're eager to share how the broiler industry can get the most from birds through nutrition."

The NOVUS symposium features presentations from three industry experts, sharing their perspectives and answering audience questions during this interactive event.

Nutritional Strategies for Broilers in the Americas

Paul B. Tillman, Ph.D., PTNS - Poultry Technical Nutrition Services, LLC.

Dr. Tillman will share how the broiler industry in the U.S. has changed due to the increase in broilers raised without antibiotics. He'll discuss how nutrition can optimize performance, specifically relating to amino acid formulation to reduced C/P (energy/protein) formulas and considerations in trace mineral supplementation, as well as the environmental impact of broiler production.

NOVUS International, Inc.
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Nutritional Strategies for Broilers in EMEA

Roger Davin, DVM, Poultry Consultant and Product Manager at Schothorst Feed Research

Dr. Davin will provide an overview of European poultry production trends and the consequences these trends have on nutrition. He'll discuss sustainability measures like low protein diets, reduced soybean meal usage, mineral utilization, and slow-growing broiler chickens, and the impact these actions have on gut health and bird performance.

Trace Mineral Nutrition: Scale Up™ Program to Expand Broiler Potential

Hugo Romero-Sanchez, Ph.D., Executive Manager, Global Poultry Technology Lead at NOVUS

Dr. Romero will provide an overview of mineral supplementation recommendations from various organizations, explaining the practicality of these recommendations in current poultry production systems and with modern husbandry practices. His presentation will address different trace mineral sources and their efficacy in optimizing bird growth and performance.

"Producers are being asked to grow robust, healthy broilers with less pharmaceutical intervention and less impact on the environment, while also managing high feed costs and pathogens that may affect their flocks," Romero says. "This symposium offers insight and actionable suggestions on how producers can improve the flock and financial outcomes on the farm."

Romero will also discuss how NOVUS's Scale Up™ Program for broilers uses intelligent nutrition to address customer challenges and help meet production goals.

The NOVUS Symposium is free to attend for all those registered for ESPN. The program begins at 16:00 on Wednesday, June 21, in Tempio 1 Room at Palacongressi di Rimini, the site of ESPN.

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For the full program and more information about the presenters, visit
<https://ni.novusint.com/espn-symposium>

ESPN attendees can visit NOVUS booth #36 to speak with representatives about the company's intelligent nutrition solutions that are made of more.

###

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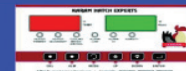
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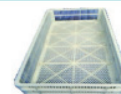
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Recent Advances in nanoparticle vaccines in Poultry

Chaitanya S., Sukirti Sharma, P. M. Sonkusale and B.M. Khati

Nagpur Veterinary College

Maharashtra Animal and Fishery Sciences University (MAFSU), Nagpur

Corresponding author, Chaitanya S., chaitanyasgowda@gmail.com

Introduction:

Nanotechnology is a branch of science that deals with understanding and control of matter less than 100 nanometers. It is a very rapidly growing and upcoming field that has developed many nano particles size ranging from 1-100 nm. Currently nanotechnology is used in various fields such as in agriculture, disease control, biomedicine etc. Nanoscience and nanotechnology have been implicated in Veterinary Medicine as a tool for improving animal nutrition, breeding and reproduction (Sagadevan and Periasamy, 2014), for diseases diagnosis, prevention and therapy (Muktar et al., 2015). Nanoparticles has a capacity in penetrating into the cells, tissues, and organs, which brings the property as drug delivering tool. Different medicines or drugs can be attached to the surface of nanoparticle and can be administered into the body for effective action of drug. Not only as drug delivering tool, Nanotechnology has shown its potential in delivering of vaccines.

They are characterized based on features such as morphology, particle size, surface hydrophobicity and surface charge. Features such as particle size, its distribution and morphology are measured using transmission electron microscopy (TEM), atomic force microscopy (AFM) and scanning electron microscopy (SEM). Nanoparticles are prepared by synthetic polymers, polysaccharides, and proteins. Factors to be considered in selection of polymers are nanoparticle size, its toxicity, antigenicity of the final product, surface charge, hydrophobicity, biocompatibility and biodegradability. Nanoparticles are prepared using methods such as emulsion, ionic gelation, and polymerization

In most of the countries, major part of economy depends on animal husbandry. Emerging diseases and its outbreak hamper the economy by causing significant mortality in animal and poultry farms. The overall production also decreases. Therefore, prime importance to be given in the control and prevention of diseases. Vaccines are a critical tool for preventing and controlling poultry diseases. Delivery of vaccine antigens in their native form have several limitations such as poorly immunogenic, easily degradable in the body, immune tolerance and toxic (Fowler et al., 2012; Sridhar et al., 2015). Therefore nanoparticle vaccines are emerging as a promising solution to these challenges. It enhances the immune response and improve the efficacy of the vaccine by response by improving antigen uptake, processing, and presentation, leading to increased antibody and cellular responses.

Mechanism of Action:

The mode of action of nanoparticles depends mainly on factor such as particle size wherein size lesser than 300 nm spread in the blood, but particles smaller than 100 nm reach tissues (Hett, 2004). Nanoparticle vaccines work by delivering antigens to the immune system in a highly efficient and targeted manner. The nanoparticles themselves are designed to mimic pathogens and are coated with antigens that are recognized by the immune system. When the nanoparticles are injected into the bird, they are taken up by immune cells called dendritic cells. These cells process the antigens and present them to other immune cells, including T cells and B cells. This triggers an immune response that results in the production of antibodies against the targeted pathogen.

Application of nanoparticles in poultry vaccines:

Nanoparticles using nanotechnology are used in vaccine preparation and control of disease in poultry-

- In Avian influenza virus (AIV) infection, H5 mosaic (H5M) vaccine antigen conjugated with polyanhydride nanoparticles (PAN) shown both humoral and cellular immunity in specific pathogen free (SPF) and commercial chicks.
- In Newcastle disease (ND) infection, polyrhodanine nanoparticles shown to have anti-NDV activity in ovo and is non-toxic. Therefore it could be used in control of NDV in poultry. Also microalgae mediated silver nanoparticles (AgNPs) has shown in vitro antiviral activity against NDV infection in Huh7 cells. AgNPs interacts with virus envelope glycoprotein thereby inhibiting it. Intranasal vaccination of chickens with Ag@SiO₂ hollow Nanoparticles (pFDNA-Ag@SiO₂-NPs) elicits higher anti-NDV IgG levels, high serum IgA levels, lymphocyte proliferation and promotes IL-2, IL-4, and IFN- α expression. Complete protection is also noticed when live NDV vaccine (LaSota strain) encapsulated with chitosan nanoparticles.
- In Infectious bursal disease (IBD) infection, injection of vaccine conjugated with a PLGA nanoparticle has shown significant increase in both humoral and cellular immune responses in broiler chickens. One more study recorded that graphene oxide (GO) sheets and silver nanoparticle anchored graphene oxide (GO-Ag) sheets, have antiviral effects against a non-enveloped IBDV. Another study shown that AgNPs at the dose 20ppm has preventive and therapeutic effect on IBDV in vivo.
- For Salmonella infection, chitosan-based and poly (methyl vinyl ether-co-maleic anhydride) (PVM/MA)-based polymeric nanoparticle vaccine used. This vaccine is capable of eliciting a substantial and antigen-specific cellular and humoral immune response in broilers and layers.
- In Campylobacter jejuni infection, use of Chitosan NPs encapsulated with recombinant hemolysin co-regulated protein increased secretory IgA and IgY antibody, enhanced cytokine gene expression and enhanced bacterial clearance from caecum.
- Chitosan nanoparticle vaccine also used for Avian pathogenic Escherichia coli, Avian influenza virus, Avian infectious bronchitis virus and Newcastle disease virus which results in induction of robust secretory and systemic antibodies or cell mediated immune response which provides protection against infections.
- Studies are recorded wherein aluminum-magnesium silicate (AMS) nanoparticles have high in vitro antiviral activity against AIV, NDV, egg drop syndrome 76 virus, IBDV and Fowl pox virus.

Conclusion:

Nanoparticle vaccines are an emerging technology with the potential to revolutionize poultry vaccination. Nanoparticle vaccines are promising in preventing diseases of poultry. They offer several advantages over traditional vaccines, including improved efficacy, targeted delivery, and reduced side effects.

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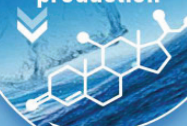
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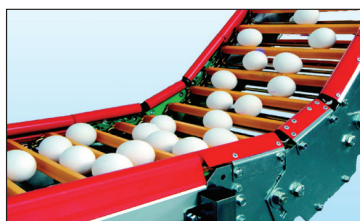
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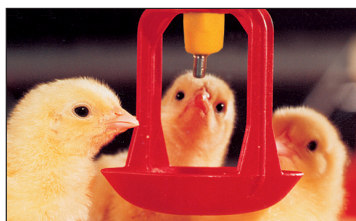
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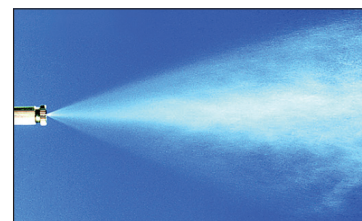


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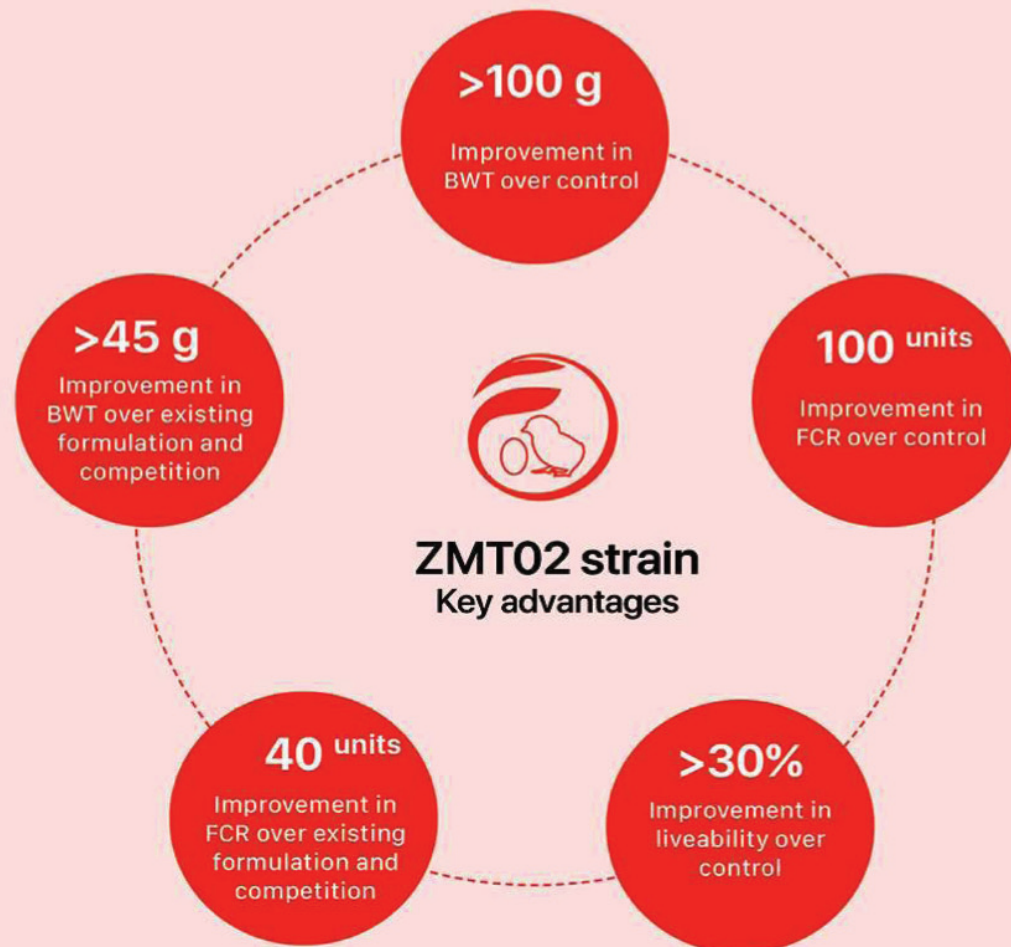
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Jahnvi P F	Andhra Pradesh	24	Akkamamba P F	Andhra Pradesh	
Sri Surya Narayana P F	Karnataka		Yash P F	Maharashtra	
Ashok Poultries	Telangana		Kaliyannan P F	Tamil Nadu	
Autocraft Towers Pvt. Ltd.	Uttar Pradesh		Anitha P F	Tamil Nadu	
Mahida P F	Gujarat	25	SMN P F	Tamil Nadu	
Sree Vaishnavi P F	Karnataka		Laxmi Narasimha P F	Telangana	
Anbu P F	Tamil Nadu		HK P F	Telangana	
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★ Flock Age	: 77 Weeks (Still continuing)
★ Peak Production	: 95%
★ Weeks Above 90%	: 38
★ Hen House Eggs	: 347.60 (356.90)
★ Cumulative Feed per Egg	: 128 g
★ Feed Per Day (Laying Period)	: 110 g
★ % Achievement of Standard H.H Eggs	: 97%
★ Feed Cost Per Egg Upto 77 Weeks Age Considering Rs. 26/KG	: Rs. 3.32/-

★ Flock Age	: 31 Weeks
★ Peak Production	: 97%
★ Weeks Above 90%	: 9 (Still continuing)
★ Hen House Eggs	: 68.87 (71.20)
★ Cumulative Feed per Egg	: 119 g
★ Feed Per Day (Laying Period)	: 91 g
★ % Achievement of Standard H.H Eggs	: 97%
★ Feed Cost Per Egg Upto 31 Weeks Age Considering Rs. 26/KG	: Rs. 3.09/-



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26/05/2023

পানী

ড° মৃদুল কুমাৰ বৰা

পশুচিকিৎসক (বাগিচা-পক্ষী পালন)

লখৰা, গুৱাহাটী।

৮৪৮৬০১৭৬০৭/৯৮৬৪৮২৪৭০০

পানী প্ৰাণীৰ প্ৰাণ। যিকোনো পশু-পক্ষীৰ শৰীৰৰ ওজনৰ শতকৰা ৬০ভাগ পানী। শৰীৰৰ আন অংশ বাদেই হাড়তো শতকৰা ৩১ ভাগ পানী থাকে। জীৱদেহৰ শৰীৰত পানীৰ ভূমিকা অপৰিসীম। পানীয়ে খাদ্যবস্তুক কোমল কৰি সহজ পাচ্য কৰি তোলাৰ পৰা খাদ্যনলীৰপৰা পোষক শোষণ আৰু শৰীৰৰ বিভিন্ন অংশলৈ কঢ়িয়াই নি ব্যৰ্জবোৰ শৰীৰৰ বাহিৰ কৰালৈকে প্ৰতিটো কাৰ্য্যতে সহায়কৰ ভূমিকা লয়। গতিকে সেই পানীখিনি সঠিক নহ'লে শৰীৰক্ৰিয়াৰ সেই গোটেই প্ৰক্ৰিয়াটোৱেই বাধাগ্ৰস্ত হ'ব পাৰে। তদুপৰি পামত বাচন বৰ্তন চাফ কৰা, পৰিবেশ নিয়ন্ত্ৰিত পামঘৰত শীতক বাষ্প সৃষ্টি আদিৰ বাবেও পানী ব্যৱহাৰ হয়। কঠিন পানীয়ে এই কামবোৰতো যথেষ্ট প্ৰভাৱ পেলায়। গতিকে কুকুৰা পামত ব্যৱহাৰ হ'বলগা পানীখিনিৰ যত্ন লোৱাটো অত্যন্ত জৰুৰী।

কুকুৰাজাকৰ বাবে পানীৰ গুণঃ

সাধাৰণ অৱস্থাত প্ৰায় ২১^০ছে উষ্ণতাত একোটা কুকুৰাই প্ৰতিকিলো দানাৰ বিপৰীতে ২লিটাৰমানকৈ পানী খায়। হিচাপত খোৱা খাদ্য আৰু পানীৰ অনুপাতিক হাৰ হ'ল ১:২ যদিও উষ্ণতা বাঢ়ি গৈ থাকিলে প্ৰয়োজনীয় পানীৰ পৰিমাণো বাঢ়ি গৈ থাকিব পাৰে। স্বাভাৱিক কুকুৰা এটাই প্ৰতি ১^০ছে উষ্ণতা বৃদ্ধিৰ বিপৰীতে সাধাৰণ অৱস্থাতকৈ ৪% পানী বেছিকৈ খাব লয়। খুব গৰমত (৩৫^০ছে) প্ৰয়োজনীয় পানীৰ অনুপাত দানাৰ বিপৰীতে ১:৪ পৰ্যন্ত হ'ব পাৰে।

কুকুৰাই ৭^০ছেৰপৰা ২৬^০ছে উষ্ণতাৰ ভিতৰত থকা পানী খাব পালে ভাল পায়। মনত ৰখা ভাল যে কোনো পৰিস্থিতিতেই কুকুৰাই গৰম পানী পচন্দ নকৰে। এদিনীয়া পোৱালীক বাদ দি আন সকলো কুকুৰাই পৰিবেশতকৈ কম উষ্ণতাত থকা পানীহে খাব বিচাৰে। সেয়ে গৰম দিনত বাচনত দিয়া পানীৰ ওপৰি আন এটা ডাঙৰ পাত্ৰত পানী ঠাণ্ডা কৰি ৰখাৰ ব্যৱস্থা কৰিব লাগে যাতে বাচনৰ পানীখিনি দিনটোত ৩-৪বাৰ সলনি কৰিদিব পাৰি। আনহাতে স্বয়ংক্ৰিয় পদ্ধতিৰ পানীৰ ব্যৱস্থা থকা পামত পানীৰ মূল পাত্ৰটোতে বৰফ দি পানীখিনি শীতল কৰি ৰখাৰ ব্যৱস্থা কৰিব পাৰি।

খোৱাৰ বাবে যোগান ধৰা পানীত থাকিব পৰা উপাদানৰ পৰিসৰঃ

উপাদান	গড় পৰিমাণ	সৰ্বোচ্চ অনুমোদিত পৰিমাণ	মন্তব্য
বেক্টেৰীয়া	০	৫০-১০০	Coliform বেক্টেৰীয়া ৫০ৰ বেছি হ'ব নেলাগে। পৰাপক্ষত পানী বেক্টেৰীয়া শূন্য হোৱা উচিত।
নাইট্ৰেট	০.১%	০.২৫%	০.০৩-০.২% পামৰ ফলাফল বেয়া হ'ব ধৰে।
নাইট্ৰাইট	০.০০৪%	০.৪%	
অম্লতা (pH)	৬.৮-৭.৫	৮	৬তকৈ কম হ'ব নেলাগে। ৬.৩ৰ তলত ফলাফল

			বেয়া হ'ব ধৰে।
কঠিনতা	৬০-১৮০		
কেলচিয়াম	০.৬%	৫%	
ক্লৰাইড	০.১৪%	২.৫%	চদিয়াম ০.৫%তকৈ কম থাকিলে ০.১৪% ক্লৰাইডেও ত্ৰুটি কৰিব পাৰে
তাম	০.০০০০২%	০.০০৬%	পৰিমাণ বাঢ়িলে সোৱাদ নষ্ট হয়।
লো	০.০০২%	০.০০৩%	বেছিপৰিমাণে দুৰ্গন্ধ সৃষ্টি কৰে
সীহ		০.০০০২%	বেছি পৰিমাণ বিষাক্ত হয়।
মেগনেচিয়াম	০.১৪%	১.২৫%	বেছি পৰিমাণত থাকিলে পায়খানা পাতল হয়।
চদিয়াম	০.৩২%	০.৫%	বেছি থাকিলে ফলাফল বেয়া হ'ব ধৰে।
চালফেট	১.২৫%	২.৫%	বেছি পৰিমাণত থাকিলে পায়খানা পাতল হয়।
দস্তা		০.০১৫%	বেছি পৰিমাণ বিষাক্ত হয়।

পানীত থকা বেণ্টেৰীয়াঃ

প্ৰাকৃতিক উৎসৰপৰা উপলব্ধ পানীত বিভিন্ন বেণ্টেৰীয়া থাকিব পাৰে। সকলো বেণ্টেৰীয়া মিলি প্ৰতি মিলিলিটাৰ পানীত ১০০তকৈ অধিক বেণ্টেৰীয়া থকাটো কুকুৰা পামৰ ক্ষেত্ৰত কোনো কাৰণতেই গ্ৰহণযোগ্য নহয়। সাধাৰণতে পানীত অন্যান্য বেণ্টেৰীয়াৰ ওপৰি Coliform বেণ্টেৰীয়া পোৱা যায়। পানীত এনে বেণ্টেৰীয়াৰ উপস্থিতিয়ে পানীখিনি কোনো মল-মূত্ৰৰ দ্বাৰা প্ৰদূষিত হোৱাটো সূচায়। সেই পানী খুৱালে কুকুৰাজাকৰ পেটৰ ৰোগ হোৱাৰ সম্ভাৱনা থকাৰ লগতে পামৰপৰা ইক্ষিত ফল পোৱা নেযায়। পানীত এই Coliform বেণ্টেৰীয়া কোনো কাৰণতে প্ৰতি মিলিলিটাৰত ৫০ৰ বেছি হোৱা উচিত নহয়। শেহতীয়া ক্ষেত্ৰভিত্তিক অধ্যয়নৰপৰা দেখা গৈছে যে পানী বেণ্টেৰীয়া শূণ্য হোৱাটোহে কাম্য।

নাইট্ৰেট আৰু নাইট্ৰাইটঃ

প্ৰদূষিত পানীত থাকিব পৰা আন দুবিধ যৌগ হৈছে নাইট্ৰেট আৰু নাইট্ৰাইট। আচলতে এই দুবিধ যৌগ সৃষ্টি হয় কোনো জৈৱিক পদাৰ্থৰ পচনৰদ্বাৰা। যেতিয়া খেতিত ব্যৱহৃত নাইট্ৰজেনযুক্ত সাৰ, আন মল-মূত্ৰৰ পচন আৰম্ভ হয় এই যৌগবোৰ মাটিৰ ৰন্ধাইদি ভিতৰলৈ সোমাই যায় আৰু তলত থকা পানীখিনি প্ৰদূষিত কৰে। জীৱ-জন্তুৰ মল, নাইট্ৰজেনযুক্ত সাৰ, খাদ্য-শস্যৰ অৱশিষ্ট অংশ, বা আন ঔদ্যোগিক উপজাত দ্ৰব্যসমূহ পাঁচি তাৰপৰা উপাদান হোৱা নাইট্ৰাইট মাটিৰ বহু তললৈ সোমাই যাব পাৰে।

এই দুবিধ যৌগৰ বিষক্ৰিয়া বয়স আৰু পক্ষীভেদে বেলেগ বেলেগ হয়। অলপ বয়সীয়া কুকুৰাবোৰ নাইট্ৰেটৰ বিষক্ৰিয়াৰ প্ৰতি কিছু পৰিমাণে কম সংবেদী যদিও কম বয়সীয়া কুকুৰাৰ বাবে ই অতি কম পৰিমাণতেই বিষাক্ত হৈ পৰে। আনহাতে টাৰ্কী চৰায়ে পানীত থকা ০.৭৫% নাইট্ৰেট সহ্য কৰিব পাৰে যদিও কুকুৰাই ০.৫% পৰ্য্যন্তহে সহ্য কৰিব পাৰে। পানীত ০.২% নাইট্ৰেট থাকিলেই ব্ৰয়লাৰ কুকুৰাৰ বৃদ্ধি আৰু FCRত ঋণাত্মক প্ৰভাৱ পৰে, ফল বেয়া হয়। আনহাতেদি ০.০০০১% পৰিমাণত থকা নাইট্ৰাইটেই কুকুৰা জাকলৈ মৃত্যু মাতি আনিব পাৰে।

অম্লতা বা pH

পানীৰ আন এটা গুণ হৈছে ইয়াৰ অম্লতা। অম্লতা মাপক স্কেলত বিশুদ্ধ পানীৰ অম্লতা ৭ হোৱাৰ বিপৰীতে পানীত থকা বিভিন্ন উপাদানৰ বাবে ইয়াৰ তাৰতম্য ঘটে। ৬.৮-৭.৮ পৰিমাণৰ অম্লতায়ুক্ত পানী কুকুৰাৰ বাবে উপযোগী বুলি প্ৰমাণিত। অতি কম অম্লতাৰ বাবে পামত ব্যৱহাৰ কৰা সা-সঁজুলিৰ ক্ষতি হোৱাৰ বিপৰীতে পানীৰ অম্লতা-মান বাঢ়িলে কুকুৰাৰ উৎপাদনত প্ৰভাৱ পেলায়। আনহাতে ক্ষাৰযুক্ত পানী ব্যৱহৃত হ'লে পানীত অণুজীৱৰ বংশবৃদ্ধি খৰতকীয়া হয়, যাৰ ফলত কুকুৰাজাক সহজতে অণুজীৱজনিত ৰোগত আক্ৰান্ত হ'ব পাৰে।

কাঠিন্যঃ

আগতেই কোৱা হৈছে যে পানীৰ কাঠিন্য নিৰ্ভৰ কৰে পানীত দ্ৰৱীভূত হৈ থকা বিভিন্ন লৱণসমূহ। প্ৰাকৃতিক উৎসৰপৰা পোৱা পানীত সাধাৰণতে লো, কেলচিয়াম, মেগনেচিয়াম আদিৰ লৱণ বিভিন্ন যৌগ হিচাপে থাকে। এইবোৰৰ অৱস্থিতি যিমানে বেছি হয় সিমানে পানী কঠিন হয়। যদিও কঠিন পানী খুৱালে পোনপটীয়াকৈ কুকুৰাৰ কোনো ক্ষতি নহয়, তথাপি কিছু প্ৰভাৱ পৰে। মেগনেচিয়াম বেছি থকা পানী খালে পাতল পায়খানা হোৱাৰ সম্ভাৱনা বাঢ়ে। লো বেছি থকা পানী দীৰ্ঘসময় ধৰি ব্যৱহাৰ হ'লে পামত বেণ্টেৰীয়াৰ প্ৰভাৱ বেছি হয়।

পৰিবেশ নিয়ন্ত্ৰিত পামঘৰ আৰু পানীঃ

কঠিন পানী কুকুৰাজাক কৰল যে খাবলৈ দিয়াৰ উপযোগী নহয় তেনে নহয়। বৰং কঠিন পানীয়ে পামঘৰৰ উষ্ণতা নিয়ন্ত্ৰণতো প্ৰভাৱ পেলায়। দীৰ্ঘসময় ধৰি এই দিশটো আওকাণ কৰিলে পামৰ কুকুৰাজাকৰ পৰিণতি মাৰাত্মক হ'ব পাৰে।

পানীত যেতিয়া বিভিন্ন খণিজাত পদাৰ্থৰ পৰিমাণ বেছি থাকে তেতিয়াই কঠিন হয়। মেগনেচিয়াম আৰু কেলছিয়ামৰ যৌগসমূহ অসমৰ প্ৰায় সকলো ঠাইৰ পানীত যথেষ্ট পৰিমাণে থাকে। পামৰ পৰিবেশ নিয়ন্ত্ৰণৰ বাবে ব্যৱহাৰ কৰা বেৰৰ শীতক-কম্বলবোৰত অহৰহ পানী বোৱাই পানীৰ বাষ্পমিশ্ৰিত বায়ুৰ বতাহ পামঘৰটোৰ ভিতৰত বোৱাই ৰখা হয় (এই প্ৰক্ৰিয়াত বেৰৰ শীতক-কম্বলবোৰ পানীৰে তিয়াই ৰখা হয় আৰু পামঘৰৰ এটা কাষত থকা বিজুলী বিচনীবোৰে জোৰকৈ পামৰ ভিতৰৰ বায়ু বাহিৰলৈ উলিয়াই দি এক কৃত্ৰিম শীতল বতাহৰ সৃষ্টি কৰা হয়)। যদি শীতক-কম্বলবোৰ তিতিবৰ বাবে ব্যৱহাৰ কৰা পানীত কেলচিয়াম বা মেগনেচিয়ামৰ এনে যৌগ থাকে তেতিয়া পানীখিনি বাষ্পীভূত হৈ যোৱাৰ পিছত এই যৌগবোৰ শীতক-কম্বলতেই লাগি বৈ যায়। এইদৰে বেছিদিন যৌগবোৰ অহৰহ জমা পৰি এক তৰপ সৃষ্টি হয় আৰু শীতক-কম্বলখনে পানী ধৰি ৰাখিব নোৱাৰা হয়। তেনে অৱস্থাত পানী দি থাকিলেও পামঘৰৰ ভিতৰত প্ৰয়োজন হোৱা শীতল বতাহ পোৱা নেযাব। পৰিবেশ নিয়ন্ত্ৰিত পামঘৰৰ ভিতৰত বেছি গৰম হোৱা মানেই কুকুৰাজাকৰ মৃত্যু।

সেয়েহে পৰিবেশ নিয়ন্ত্ৰিত পামত শীতক-কম্বলত ব্যৱহৃত পানী কোমল হোৱা বাঞ্ছনীয়। পানীৰ সৰ্বাধিক ক্ষাৰকীয়তা pH মাপকত ৮ৰ বেছি হ'ব নেলাগে।

পানীত স্বাভাৱিকতে থকা আন লৱণসমূহঃ

কুঁৱা বা নাদৰ পানীত স্বাভাৱিক অৱস্থাতেই বহুকেইবিধ লৱণ পোৱা যায়। সেইসমূহৰ ভিতৰত কেলচিয়াম, মেগনেচিয়াম, চদিয়াম, ক্লৰাইড, চালফেট আদি। এই লৱণবোৰে কম মাস্কাত একো ক্ষতি নকৰিলেও বেছি পৰিমাণত

থাকিলে অথবা কেতিয়াবা আন উপাদানৰ উপস্থিতিত কুকুৰাৰ বিপাকীয় প্ৰক্ৰিয়াকে আদি কৰি আন শৰীৰক্ৰিয়াত ঋণাত্মক ভূমিকা ল'ব পাৰে। পানীত থকা নেগেনেচিয়ামৰ শতকৰা পৰিমাণ ০.৬৮ হ'লেও কুকুৰাৰ কোনো ক্ষতি নহয়। কিন্তু একেখিনি পানীত যদি ০.৫% পৰিমাণৰ চালফেট থাকে তেন্তে ০.৫% পৰিমাণৰ মেগনেচিয়ামৰ উপস্থিতিও কুকুৰাজাকৰ বাবে ক্ষতিকৰ হৈ পৰিব পাৰে। চদিয়াম ০.৫% পৰ্য্যন্ত কুকুৰাৰ ক্ষতি নহয় যদিও ০.১৪% ক্লৰাইদৰ উপস্থিতিত সমপৰিমাণৰ চদিয়ামেই মাৰাত্মক হৈ উঠিব পাৰে। পানীত বহু বেছি পৰিমাণে মেঙ্গানিজ থাকিলে পানীৰ স্বাদ কমি যায়। আনহাতে তামৰ পৰিমাণ বেছি হ'লে যকৃতৰ ক্ষতি কৰে।

পামত পানী পৰিচালনাৰ প্ৰক্ৰিয়াসমূহঃ

পামত ব্যৱহাৰ হোৱা পানী বিশুদ্ধ হোৱা উচিত সেয়া অনস্বীকাৰ্য্য। এক সুসংহত পদ্ধতিৰে গোটেই প্ৰক্ৰিয়াটো আগবঢ়াই নিয়াটো সেয়ে অতি জৰুৰী।

১. সময়ে সময়ে ব্যৱহাৰ হোৱা পানী খিনিৰ সকলো ধৰণৰ পৰীক্ষা কৰিব লাগে। ঋতু পৰিবৰ্তনৰ লগে লগে মাটিৰ অভ্যন্তৰত থকা পানীত উপাদানসমূহৰ তাৰতম্য হয়। গতিকে বছৰত অন্ততঃ ৩-৪বাৰ পানীৰ পৰীক্ষা কৰাব লাগে। আনহাতেদি কেৱল উৎসৰ পানী পৰীক্ষা কৰি বহি থাকিব নেলাগে। সংগ্ৰহ পাত্ৰ আৰু বাচনৰ পানীখিনিও পৰীক্ষা কৰিব লাগে।

২. পানী পৰিশোধন কৰিব লাগে। পানীত থকা অতিৰিক্ত লৱণ, বিশেষভাৱে লোৰ পৰিমাণ কমাবৰ বাবে ফিল্টাৰৰ ব্যৱস্থা কৰকিব লাগে। সময়ে সময়ে ফিল্টাৰৰ অংশসমূহ সলনি কৰিব লাগে।

৩. পানীৰ নলবিলাক সঘনাই পৰিষ্কাৰ কৰি থাকিব লাগে। অন্যথা নলবিলাকৰ ভিতৰভাগত লৱণৰ এটা তৰপ বহি নল বন্ধ কৰি দিব পাৰে। কেতিয়াবা শেলাইৰ দৰে পদাৰ্থৰো সৃষ্টি হোৱাৰ সম্ভাৱনা থাকে। এনে শেলাইৰ দৰে পদাৰ্থবোৰ বেণ্টেৰীয়াৰ বৃদ্ধিৰ মূল উৎস।

৪. পানী পৰীক্ষাৰ ওপৰত ভিত্তি কৰি পৰিশোধন প্ৰক্ৰিয়া সালসলনি কৰিব লগা হ'ব পাৰে। এইক্ষেত্ৰত অলপো গাফিলতি কৰিব নেলাগে।

আজিকালি পানীক বীজাণুমুক্ত কৰিবৰ বাবে বজাৰত বহুতো পৰিশোধক উপলব্ধ। কিন্তু পানী পৰীক্ষা নকৰাকৈ সেই পৰিশোধকসমূহ ব্যৱহাৰ কৰা যুক্তত নহয়। সকলোৱে পৰিশোধনৰ নীতিসমূহ মানি দলিব লাগে যাতে কম আয়াসতে অধিক সুফল পাব পাৰি।

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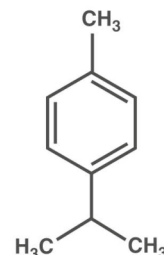
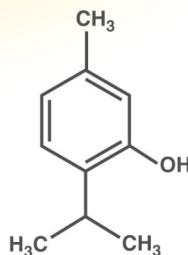
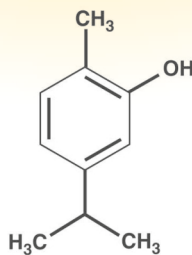


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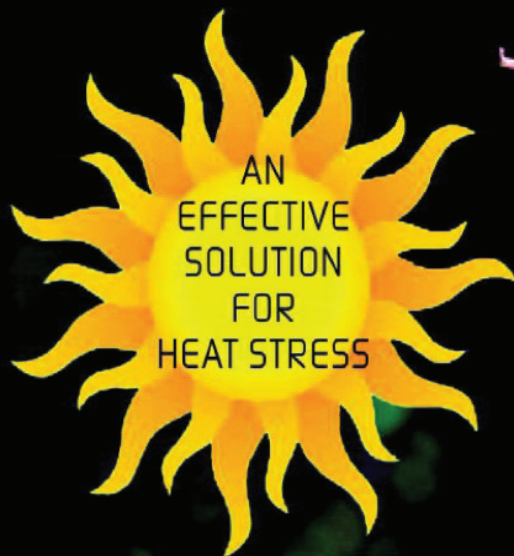
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Summer Stress Management in Poultry

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Introduction:

The centre of poultry industry is shifting to subtropical countries and this trend is likely to continue. Nearly one third of world-wide broiler stock placement is in Asian countries such as India and China and these countries are emerging as important locations for the production and trade of poultry products. India has distinctly different seasons with variable temperature and humidity. The high ambient temperature in tropical climate leads to heat stress to broilers in particular. Heat stress results in poor performance in growth, feed efficiency and meat yield as well as higher mortality. During the late 19th and 20th centuries, the global mean surface temperature increased by 0.8-1.7°C and scientists expect that there will be a further increase of 0.6-2.5°C during the next 50 years. Looking upon the future increase in global surface temperature due to modernization, deforestation and industrial growth, it demands an efficient and economical means to improve the acquisition of thermo-tolerance by domestic fowl exposed to hot climates.

Birds are warm blooded (homeothermic) and they have the ability to maintain their body temperature throughout the year. The thermoregulatory mechanism is highly efficient only in thermoneutral zone *i.e.* 21-27°C. General features of thermoregulation in birds are similar to those of other animals. Birds use plumage, fat insulation and sweat glands for thermoregulation. Birds can also regulate body temperature using heat generated in their bodies through metabolism. Heat stress negatively affects the welfare and productivity of broilers and laying hens. Poultry farming in summer is an important topic to understand because heat stress causes adverse effects on the performance of poultry production, which ultimately reduces profitability. The detrimental effects of heat stress on broilers and laying hens range from reduced growth, decreased egg production, egg quality and safety. The upper lethal temperature in birds is about 47°C (body temperature of bird).

Mechanism of heat stress in birds:

Birds become heat stressed when they have difficulty achieving a balance between body heat loss and body heat production. The average body temperature of adult poultry bird is 41°C. When the environmental temperature exceeds 35°C, a bird is likely to experience heat stress. To maintain body temperature, birds first depend upon the losing heat from blood vessels near the surface of the skin (non-evaporative cooling) but this mechanism is only effective when the ambient temperature is lower than the bird's body temperature. As ambient temperature increases beyond the bird's thermoneutral zone, non evaporative cooling becomes ineffective. At these higher temperatures, the bird relies on panting (evaporative cooling) to control body temperature. Panting is an effective but energy expensive way for the bird to regulate body temperature which typically results in lower feed intake and growth and reduces feed efficiency. It will also increase water intake to compensate water loss. Still, the situation is complicated because the body ability to retain water is reduced as the evaporative cooling process escalates. During the high ambient temperatures, the birds increase panting up to 10 times from an average rate of 25 breath/ min to 250 breaths/min, which leads to excessive loss of carbon dioxide resulting in raised blood plasma bicarbonate levels and increased blood pH by excreting bicarbonates via urine. As potassium is essential in maintaining intracellular water balance, a loss of potassium ions via urine reduces the ability to maintain this water balance. In heat stress birds, blood flow increases to the upper respiratory tract, skin and abdominal muscles for relieving heat. However, blood flow to the intestinal tract is decreased; thus, there is a reduction in appetite leading to lower feed intake. Concurrently water intake is increased, resulting in fluid contents in the intestinal tract. This further causes diarrhea that results in loss of electrolytes needed to maintain acid base balance. The most significant effect of heat stress is

to decrease body resistance and more susceptibility to many diseases.

Clinical Sign and symptoms of heat stress in birds:

- Panting/rapid breathing
- High body temperature is obtained with a rectal thermometer.
- Pale comb / wattles
- Loss of electrolyte
- Wing outstretched and feather erect
- Birds stop eating and drink large amount of water
- Diarrhea
- Chicken becomes droopy
- Decrease in egg production and thin egg shell production
- Staggering, disorientation and seizures
- Reduced appetite
- Less body weight gain in broilers
- Reduced feed efficiency
- Collapse of system and Death

Post mortem Lesions in heat stressed bird:

- Dehydrated carcass
- Muroid exudates in the mouth and nostrils
- Pale / cyanotic combs
- Pale breast muscles
- Congestion of liver, spleen, kidney and lungs
- Fluid contents in intestines
- Rapid decomposition of the carcass

Major genes and heat stress:

The naked neck gene (Na):

The naked neck gene (Na) is a single, autosomal, incompletely dominant gene. The Na gene reduces feathering by 40% in homozygous (Na/Na) and 30% in heterozygous (Na/na) genotype. The introduction of naked neck gene to male broiler lines

has manifold advantage for increasing the production efficiency at temperature 30°C or above. The meat type birds carrying Na gene have higher growth rate, better feed efficiency, higher slaughter and meat yield and better resistant to acute heat stress. In addition, faster plucking leaving few pin feathers might another desirable trait. The Na gene is also beneficial for its utilization in female line of broiler. For egg production at higher temperature, most important are lower mortality for naked neck hens, higher mean egg weight and possibly better shell strength and laying persistency than of the normal one.

Frizzle Feather gene (F):

The frizzle (F) gene is an incompletely dominant, autosomal gene. This causes the contour feathers that curve outward away from the body. In homozygous, the curving is extreme and the barbs are extremely curved so that no feather has flat vane. Heterozygotes have less extreme effect. F gene increased the egg number and egg mass and reduced mortality under hot condition.

Control measures of heat stress:

The following management steps will helps to combat heat stress in poultry farming in summer: Housing management, Water Management, Feed Management and General Management.

Housing Management of Poultry farming in summer:

Orientation of the long axis of poultry houses in an east-west direction to minimize solar heating and direct sunlight access. Poultry houses in the tropics should have good roof insulation (if possible with false roofs to reduce the conduction of heat) with the support of fogger and cooler systems. In open sided houses, the width of a house will be a limiting factor, so keep the optimum width (24-30 feet) based on temperature, humidity and wind velocity, type of house and birds nature for adequate cross ventilation. Air movement can increased over the birds by coolers/fans/exhaust to produce a wind chill effect. It will also keep the birds cool, even without a drop in the house temperature. Poultry shed should be design and construct in such way that sunlight should not allow directly on birds. Thatching of the roof with paddy straw or sugar cane leaves will reduce the temperature inside the shed. The roof should be painted with a whitewash to reflect light. Shades from tall trees and plantations around the sheds can reduce

the radiant heat. The plantation of trees should be such that trees will be leafy during summer and bald during the winter. Roof overhangs should be sufficient (3-5 feet) to protect the birds from strong sunrays.

Water management in poultry farming in summer:

Water management is the essential factors during summer. In summer, water consumption is increased 3-4 times more than normal. Even a slight shortfall of water can lead to heatstroke and mortality. Normally, feed and water consumption ratio is 1:2, but when the temperatures increased beyond 35°C, this ratio may increase to 1:4 or more. Plenty of fresh clean and cool water (60-70°F) must be provided during the summer months to the birds. Day old chicks should provide cool water and electrolytes on their arrival to avoid dehydration after transportation. Water tanks should cover with wet gunny bags to avoid direct exposure to the sun. The number of drinkers should increase by 25% in summer. Frequency of watering should increase in summer. In the case of nipple drinkers, nipple pipe should insulate with wet gunny cloths. Electoral energy should provide (1-2 gm/litre) in water during hot hours. Drinking water should not withhold from the flock when the vaccine is provided through drinking water.

Feed management in poultry farming in summer:

During summer, due to low feed consumption of feed by birds; body weight, egg production, and shell quality is reduced, so a proper feeding strategy is required to overcome these problems. In broilers, feed should not offer during the day time. You have to feed either in morning or evening period. In feed formulations, there is need to do specific changes such as increase the nutrient density of feed to compensate for depressed feed intake. The energy of feed should be reduced. 20-30% extra vitamins and trace minerals should be added to feed. The available phosphorus of the feed has needed to increase. Vitamin C is necessary to maintain the integrity of blood vessels. Supplementation of vitamin C@200-500 gm/tons feed will be beneficial. Pelleted feeding is beneficial where low energy fibre diets are used. Hot and humid climate favour the growth of molds/fungi in feed, so constant use of antifungal is recommended. The diet should be balanced with limiting amino acids, methionine and lysine, which will give better results.

General management in poultry farming in summer:

Fresh liter thickness should be 2 inches with racking or stirring of litter 2-3 times a day during cool hours. Birds have to provide 10 % extra floor space in summer. Overcrowding of birds should be avoided. Farmers have to do shifting, transportation during the night or cool hours of the day because it causes less stress. Birds severely heat stressed may be dipped in cold water for 2-3 minutes keeping their neck and head above water level. Ventilation should be cross ventilation in shed. Fans may be fitted in the shed. Foggers may use in the shed, which could reduce the shed temperature up to 5-10°C depending upon quality. The use of paint, white lime etc. practically reduced the shed temperature up to 2°C. Side curtains can use a in the shed and it should be sprinkle with water. Three exhaust fans should provide on one side and pad cooling on another side, which will completely seal the shed sides and brings down the temperature below 8°C. Sprinkler may use on the top or inside the shed. Poultry shed should surround with tall trees and thatched roof is suitable for hot areas. The house should be situated away from other buildings to facilitate free movement of air. The high altitude of the roof is ordinarily 2.6 to 3.3 metre from the foundation to the roofline to provide maximum ventilation. Overhangs should be 1 meter in length to cut the direct sun and rain into the house.

Conclusion:

Heat stress has emerged as a major concern to poultry keepers because of reducing heat tolerance in modern poultry genotypes in addition to the dramatic increase in global temperature. Heat stress causes many harmful impacts on poultry growth, meat quantity and quality, laying rate and egg quality criteria. These effects cause several economic losses to poultry production. In opened poultry houses, it is important to ensure that the outdoor air can flow smoothly into and out of poultry house. Heat stress mitigation can be achieved by feeding the birds at cooler times, wet feeding, feed withdrawal before an expected period of heat stress, good ventilation, increasing level in poultry rations and supplementing diets and drinking cool water with vitamins, antioxidants, probiotics and minerals.

NATIONAL EGG CO-ORDINATION COMMITTEE

DAY / MONTHLY EGG PRIZES DECLARED BY NECC AND PREVAILING PRICES AT VARIOUS PRODUCTION CENTERS (PC) AND CONSUMPTION CENTERS (CC) MAY-2023

Name Of Zone / Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Average		
NECC SUGGESTED EGG PRICES																																		
Ahmedabad	440	445	455	460	460	460	465	470	480	490	495	495	495	495	495	495	498	500	500	500	500	500	500	480	480	480	485	-	-	-	-	482.15		
Ajmer	410	435	437	437	437	447	465	465	475	475	465	460	450	450	453	457	460	460	450	450	445	435	435	437	-	446	452	-	-	-	-	449.54		
Barwala	409	431	433	433	436	442	444	459	469	471	471	471	450	450	453	457	460	460	460	460	445	435	435	437	440	446	452	455	-	-	-	-	448.71	
Bengaluru (CC)	445	450	460	470	475	475	480	490	500	510	515	515	515	515	515	515	515	520	520	520	525	525	525	525	525	525	525	530	-	-	-	-	504.46	
Brahmapur (OD)	443	448	460	470	470	480	485	488	495	505	508	508	508	490	490	495	497	502	502	502	507	507	507	492	492	497	502	507	-	-	-	-	491.5	
Chennai (CC)	470	470	470	470	485	485	485	495	505	505	520	520	520	520	520	520	520	520	530	530	530	530	530	530	530	530	530	540	-	-	-	-	511.07	
Chittoor	463	463	463	463	478	478	478	488	498	498	513	513	513	513	513	513	513	513	523	523	523	523	523	523	523	523	523	533	-	-	-	-	504.07	
Delhi (CC)	428	428	455	455	455	460	464	480	490	490	490	490	490	470	470	470	480	480	480	475	475	465	450	450	455	458	467	-	-	-	-	-	466.11	
E.Godavari	420	425	435	445	450	460	465	470	475	485	490	490	490	490	475	475	478	481	484	484	487	487	487	475	475	475	480	485	490	-	-	-	472.5	
Hospet	405	410	420	430	435	435	440	450	460	470	475	475	475	475	475	475	475	475	480	480	480	485	485	485	485	485	485	490	-	-	-	-	464.46	
Hyderabad	400	405	415	420	425	430	435	445	455	460	465	465	465	465	450	450	453	456	459	462	465	465	465	450	450	-	453	460	-	-	-	-	447.04	
Jabalpur	435	440	453	460	465	465	465	465	480	490	490	490	490	490	470	470	470	470	477	477	477	477	477	477	-	465	475	-	-	-	-	-	470.77	
Kolkata (WB)	475	495	505	510	525	530	530	540	550	550	550	550	550	540	540	540	550	550	560	560	560	560	550	540	542	545	547	550	-	-	-	-	539.07	
Ludhiana	400	409	435	435	435	437	442	443	464	468	468	468	468	458	445	452	457	458	458	458	450	445	445	440	440	440	440	451	453	-	-	-	-	447.39
Mumbai (CC)	465	465	465	475	480	485	490	495	505	515	520	525	525	525	510	510	513	516	519	522	525	525	525	510	510	510	513	520	-	-	-	-	505.82	
Mysuru	455	460	465	475	475	480	485	495	505	515	520	520	520	520	520	520	520	525	525	525	530	530	530	530	530	530	530	535	-	-	-	-	509.64	
Namakkal	405	410	415	425	425	430	435	445	450	460	465	465	465	465	465	465	465	470	470	470	475	475	475	475	475	475	475	480	-	-	-	-	456.07	
Pune	475	485	485	485	485	485	495	501	511	521	525	525	525	525	525	525	525	525	525	525	525	525	525	510	510	510	515	520	-	-	-	-	511.36	
Raipur	430	440	450	455	455	465	475	475	490	501	501	501	501	501	501	490	492	495	495	495	495	495	480	-	462	464	-	-	-	-	-	-	480.73	
Surat	465	465	475	480	480	480	485	490	500	510	515	515	515	515	515	515	515	515	515	515	515	515	500	500	500	500	500	-	-	-	-	-	500.93	
Vijayawada	420	425	435	445	450	460	465	470	475	485	490	490	490	490	475	475	478	481	484	484	487	487	487	475	475	480	485	490	-	-	-	-	472.5	
Vizag	425	430	435	445	450	460	465	470	475	485	490	490	490	490	475	475	480	485	490	490	495	495	495	480	480	485	490	495	-	-	-	-	475.54	
W.Godavari	420	425	435	445	450	460	465	470	475	485	490	490	490	490	475	475	478	481	484	484	487	487	487	475	475	480	485	490	-	-	-	-	472.5	
Warangal	402	407	417	422	427	432	437	447	457	462	467	467	467	467	452	452	455	458	461	464	467	467	467	452	452	455	462	467	-	-	-	-	449.79	
Prevailing Prices																																		
Allahabad (CC)	476	481	486	486	486	500	505	533	533	533	533	533	524	514	510	505	505	505	505	505	505	505	500	500	500	500	500	500	500	-	-	-	506	
Bhopal	415	415	415	445	450	455	460	460	485	485	485	485	485	485	465	465	465	465	465	465	465	455	455	-	435	440	-	-	-	-	-	-	458.46	
Indore (CC)	435	450	460	460	460	470	470	480	495	495	485	480	470	470	475	480	485	485	475	475	475	460	460	465	-	470	475	-	-	-	-	-	471.54	
Kanpur (CC)	471	486	486	486	486	500	500	514	529	529	529	529	514	500	500	500	500	500	500	500	500	490	471	471	471	471	471	481	481	-	-	-	-	496.25
Luknow (CC)	500	513	513	513	513	523	523	540	557	557	557	557	547	533	533	533	533	533	533	533	533	520	520	510	510	500	500	500	-	-	-	-	526.32	
Muzaffarpur (CC)	465	485	500	500	500	505	507	520	535	540	540	540	530	515	515	520	525	528	528	528	508	508	500	505	505	508	520	520	-	-	-	-	514.54	
Nagpur	460	460	460	460	490	475	475	475	490	490	490	490	490	490	490	480	480	485	485	485	485	475	465	-	470	475	-	-	-	-	-	-	479.04	
Patna	465	485	500	500	500	505	507	520	535	540	540	540	530	515	515	520	525	528	528	528	508	508	500	505	505	508	520	520	-	-	-	-	514.54	
Ranchi (CC)	471	457	467	500	500	500	500	510	514	524	524	524	524	514	514	514	514	514	514	514	524	524	514	514	514	514	514	514	514	-	-	-	509.11	
Varanasi (CC)	483	486	486	486	486	500	507	517	533	533	533	533	533	523	523	523	517	510	510	510	510	500	500	500	500	507	513	513	-	-	-	-	510.18	

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ROLE OF GALT IN OPTIMIZING GUT IMMUNITY

Dr. Ankur - Product Manager, Natural Remedies pvt ltd
Dr. Jagritee Singh - MT (Marketing), Natural Remedies pvt ltd



Introduction

The poultry industry is a significant sector of global agriculture, with the market growing significantly from \$352.02 billion in 2022 to \$378.84 billion in 2023, representing a compound annual growth rate (CAGR) of 7.6% (The Business Research Company, 2023). Unfortunately, poultry raised for commercial purposes are susceptible to a variety of environmental pathogen exposures (Sharma, 1999). There is nonetheless optimism because specific dietary treatments can have a significant impact on immunological function (Poultry World, 2019). The immune system in birds and other vertebrates is made up of two complementary parts, called the innate and adaptive systems, that cooperate to identify and defend against pathogens (Poultry World, 2019).

Gut immunity

The intestine is crucial for the absorption of nutrients, the tolerance of benign and helpful microorganisms, and the capacity to react appropriately to harmful microbes or microbial products while preventing their translocation to more sterile body compartments. The mucus layer(s), antimicrobial peptides, and IgA, which serves as the first line of defence, are a few elements that contribute to antimicrobial defences in the colon (Broom and Kogut, 2018). In the intestine of monogastric animals like poultry, there is a complex system of submucosal and mucosal lymphatic tissue known as gut-associated lymphoid tissue (GALT). As it is exposed to the microflora from both feed and the environment, GALT has a crucial role in regulating the occurrence of poultry enteric illnesses through its immune capabilities (Talkad et al., 2019). The distinct GALT features include

Meckel's diverticulum, Peyer's patches, lymphoid clusters inside the lamina propria, and cecal tonsils. GALT includes 75% of all lymphoid cells in the body, and of these, the gut produces 50% of lymphocytes and about 80% of all immunoglobulins (Ig). The distinguishing characteristic of the GALT system is the synthesis of IgA antibodies produced on the mucosal surface (Talkad et al., 2019).

STODI in gut immunity

To improve poultry's immune system, there is a need to enhance gut immunity. STODI, a polyherbal formulation with major bioactive compounds include andrographolides, catechins, ellagitannins, punicalagin, and other polyphenols are responsible for better immunity by increasing the surface area of the gut-associated lymphoid tissue. In a study by Talkad et al. (2019) on broiler chicks (Ross 308), when supplemented with STODI (750 g/ton), it significantly increased the GALT area (μm^2) of the lamina propria of the ileum and Meckel's diverticulum. Study has shown 96% increase surface area of GALT over negative control in ileum and 86% increase surface area of GALT over negative control in Meckel's diverticulum. The surface area of the GALT plays a crucial role in its ability to mount an effective immune response. The larger the surface area, the more immune cells and antibodies can be produced, leading to better protection against infections.

Conclusion

In conclusion, the poultry industry is a significant sector of world agriculture, and the gut immunity of commercial birds can be enhanced through certain nutritional interventions, including the use of polyherbal formulations such as STODI. By increasing the surface area of the gut-associated

lymphoid tissue, STODI can improve the immune system of poultry and help control the incidence of enteric disorders. References

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- Sales & Marketing of Broiler Breeder.
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- Field Trial of Drugs & Feed additives.
- Speaker in Technical Seminars.

He can be Contacted at:- **Dr. Manoj Shukla**

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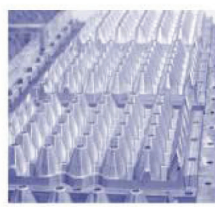
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Natural herbal plants for poultry health and augmenting production

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Several herbal plants naturally grown and cultivated in different agro-climatic zones around the world. Few of which are identified and categorized as medicinal and spice herbs based on their chemical compounds and phytonutrients contents with abundant properties viz. natural antibiotics, growth promoter, anti-inflammatory, antimicrobial, coccidiostats, stimulate digestive enzymes secretion, rich in antioxidants, essential oils and phytonutrients. Every parts of these herbal plants can be utilized in different forms (essential oils, plant extracts, powder or meal, dried or fresh). Supplementation of these herbal plants to poultry broiler chicks, it enhance performance by increasing the gut nutrient digestibility, better nutrient absorption and reduce enteric pathogenic microbial loads while it improves egg laying performance and egg quality in poultry layers.

Natural medicinal herbal plants:

❖ Aloe vera (*Aloe barbadensis* Miller):

Aloe vera is a cactus-like perennial plant in the family Asphodelaceae (Liliaceae) and native to/ Arabian Peninsula, but grown in wild or cultivated mostly in tropical, sub-tropical, and arid climates around the world. Aloe vera leaf contains about 98.5% to 99.5% water/ and the rest is of dry matter (0.5–1.5 percent solid) with an average pH of 4.55. The solid materials contains over 75 biologically active ingredients viz. vitamins, minerals, enzymes, hormones, sugars, phenolic compounds, lignin, saponins, sterols, amino acids and salicylic acid. While majority are in anthraquinones, saccharides, vitamins, enzymes and low-molecular-weight compounds. Aloe

Vera is known for several properties - anti-inflammatory, immunomodulatory, natural laxative, wound-healing, anti-viral, anti-fungal, anti-tumor, antidiabetic, antioxidant and skin hydrating. Aloe vera added into broilers feed resulted to improves digestion, immunity, body weight gain and wound healing effects.

❖ Fenugreek (*Trigonella foenum-graecum*):

Fenugreek is a fragrant annual herb in the family Fabaceae. It originates from southern Europe and Mediterranean regions, and is cultivated mainly in India, Pakistan and China. Fenugreek seed is rich in phytonutrients 28.4% crude protein (4-hydroxyisoleucine), crude fibre (9.3%) and crude fat (7.1%) and total lipids (about 7.5%) of which neutral lipids constituted 84.1% (high glycolipids 5.4% and phospholipids 10.5%). Others including high dietary fibers, carbohydrate, minerals (P, Fe, Na, K, Zn, Mg, Ca) and vitamins (C, B₆). Biochemical compounds are 1.7-4.8% saponins, flavonoids, polysaccharides and alkaloids (trigonelline, choline). Fenugreek seed possess anti-microbial, hypoglycemic, hypolipidemic, anti-helminthic, anti-inflammatory, hypocholestoremic, antidiabetic and antioxidant effects. Fenugreek seed meal fed to poultry layers and broilers, it enhances the feed conversion ratio, growth and as antistress.

❖ Ashwagandha (*Withania somnifera*):

Ashwagandha as “Indian Winter cherry” or “Indian Ginseng” part of the family Solanaceae. Naturally grown in Asia and Africa continents. Steroidal alkaloids and lactones are the main

active compounds in the plant. This herb is known to have immunomodulatory, analgesic, anti-stress, antioxidant, hepato-protective/ and antibacterial properties. All parts of Ashwagandha can be utilized and as feed additive to broilers, it improves feed intake, feed conversion ratio and nutrient metabolism.

❖ **Tulsi (*Ocimum sanctum*):**

Tulsi or holy basil is queen of herbs and aromatic/ perennial/ plant in the family/ Lamiaceae. It is natural herbs, abundant in Indian subcontinent/ and widely cultivated for religious as well as/ traditional medicinal/ purposes throughout the/ Southeast Asian/ tropics. Tulsi main compounds are eugenol, ascorbic acid, β -carotene, β -sitosterol, palmitic acid and tannins. It was recognized for several properties including anti-infertility, anticancer, antibacterial, antidiabetic, antifungal, antimicrobial, hepatoprotective, cardioprotective, antiemetic, antioxidant, antispasmodic, analgesic, anti-ulcerogenic, ulcer-healing, adaptogenic and diaphoretic. Dietary supplementation of tulsi leaf powder and its extract to broiler during summer shown to increase the overall performance mainly due to its antioxidant and immunity booster effects.

❖ **Black mustard (*Brassica Nigra*):**

Black mustard is a winter/ annual herb in the family Brassicaceae. It originates from Africa, Asia, and Europe, and cultivated as oil seed crop, vegetable and fodder all over the world. Black mustard seed contains about 1% sinigrin (allylglucosinolate), a thioglycoside-like compound (glucosinolate) of allyl-isothiocyanate with glucose, strong enzyme called/ myrosinase, rich in crude protein, vitamins (A, E, B, C), minerals (rich Se, Fe, Cu, Mg, Ca, P, Zn) and dietary fibres. Its seed can cause vomition, reduce oedema, and has digestive stimulant, anti-inflammatory and diuretic effects. Black mustard seed meal is used as protein source and at low level to broilers for promoting growth.

❖ **Horse radish (*Armoracia rusticana*):**

Horse radish is a wild flower and perennial plant in the family Brassicaceae. It is natural habitat to Eastern Europe, Southern Russia and Eastern Ukraine, but is cultivated in North America, New Zealand, Northern India, and hill stations of South India. Horse radish root has a pungent taste and spicy due to rich glucosinolates and allyl isothiocyanate. Besides these, it contains rich vitamin C, Foliates, and minerals (Ca, P, Mg, K, Zn) but low in protein and energy. Horse radish can act as anti-bacterial, antimicrobial, antioxidants, appetite stimulant, rubefacient, anti-inflammatory, anti-cancerous, digestive stimulant and immunity booster. Horse radish is considered a potential feed additive in broilers and an alternatives to antibiotic.

❖ **Shatavari (*Asparagus racemosus*):**

Shatavari is a species of asparagus and adaptogenic herb in the family Asparagaceae. Naturally grown in Africa and throughout southern Asia including India. Shatavari root contains high saponins, sapogenins, flavonoids, racemofuran, asparagamine and racemosol/ that can function as antioxidants. Racemofuran has significant properties of anti-inflammatory, immunity booster, cough-relieving, anti-diarrhea, dyspepsia, galactagogue, diuretic and used for treating several ailments. Low level of shatavari root powder added into poultry feed has revealed to improves growth performance and general health status whereas stimulant appetite in broilers.

❖ **Jivanti (*Leptadenia reticulata*):**

Jivanti or cork swallow wort is known as climber/ herb in the family Apocynaceae. This herb is grown naturally in north-west, northern, and southern India. The bioactive compounds in jivanti are/ hentriacontanol, α - and β -amyrin, stigmasterol, β -sitosterol, tocopherols, flavonoids (diosmetin, rutin, luteolin), pregnane

glycosides and leptadeno. In Ayurveda, it is known for its revitalizing, rejuvenating, lactogenic, antioxidant, antibacterial, antimicrobial, galactagogue, anti-inflammatory, vasodilator and antibacterial. Its significant used in broilers and layers to work as a good natural herbal antibiotic.

Spices herbal plants:

❖ Ginger (*Zingiber officinale*):

Ginger is a rhizome and herbaceous perennial plant in the family Zingiberaceae. It is originated from Southeast Asia, India and China. Bioactive compounds present in ginger are gingerdiol, gingerol, gingerdione and phenolic compounds./ Protease and lipase are two types of digestive enzymes present in ginger as plant's natural protective mechanisms. Ginger has antibacterial, gastric stimulant, anti-inflammatory, antioxidant, antiseptic, antiparasitic, immunomodulatory and excellent methane reducing ability. Supplement of ginger powder to poultry, produce lipid reducing effect, promote growth, reduce mortality, stimulates gastric function and boost immunity.

❖ Black cardamom (*Amomum subulatum*):

Black cardamom is a perennial herbaceous plant/ in the family Zingiberaceae. It is a native herb of Eastern Himalayas, but cultivated all around the Asian regions. Black cardamom has rich essential oil primarily of 1,8-cineol (55.37 %), á-terpinyl acetate (11.66%), á-terpineol (4.67%), limonene (6.05%), other phytonutrients (carbohydrates, proteins, minerals, lipids), flavonoids, terpenoids and carotenoids. Black cardamom extracts as appetizer, digestant, antispasmodic, allopathic, analgesic, antibacterial, anti-inflammatory, antimicrobial, antioxidant, antiulcer, cardio-adaptogenic and hypolipidaemic properties. Cardamom essential oil supplemented to broilers has significant effect

on the broiler performance and similar effect seen when added in combination with ginger powder.

❖ Garlic (*Allium sativum*):

Garlic is a strong aromatic bulbous flowering plant in family Alliaceae and grown naturally in Central Asia. Fresh garlic has diverse bioactive compounds as allicin, allin, allyl cysteine, ajoene, diallyl sulfide, dithin and sullylcysteine. Garlic contain sulphur and has several properties of antibacterial, anti-inflammatory, antimicrobial, antiseptic, antifungal, antiparasitic, antiviral, immunostimulatory, antioxidant, anticholesteremic, anti-cancerous, and vasodilator. Garlic as natural feed additive to broilers could enhance digestibility, palatability and growth.

❖ Coriander (*Coriander sativum*):

Coriander or dhania is an annual herb in the family Apiaceae and is native to southern Europe and Asia but is cultivated in many parts of the world. Coriander seeds contains essential oil (carvone, geraniol, limonene, borneol, camphor, elemol, linalool), tannins, terpenoids, reducing sugars, alkaloids, flavonoids, phenolic acid, fatty acids, sterols and glycosides; and rich beneficial phytonutrients. Coriander is known for anti-parasitic, antihelminthic, antibacterial, analgesic, sedative, antioxidant, anti-septic, anti-diabetic, immunity booster and digestive stimulant properties. Recent years, phytobiotics feed additives of coriander to broiler feed has gained increasing interest due to their natural growth promoting activity.

❖ Parsley (*Petroselinum crispum*):

Parsley or Cilantro/ is/ a biennial herb in the family Apiaceae. This plant is native to Mediterranean but naturalized around the world. Parsley has concentrated source of phytonutrients of rich vitamins (A, C, rich K,

folate), minerals (K, Ca, Fe, Se, Zn), flavonoids (myricetin, apigenin) and carotenoids (beta-carotene, lutein, zeaxanthin). The active component contain called apiol which has pungent, oily and green liquid. It has anti-inflammatory, antioxidants, anti-cancer, appetite and digestion stimulant, antiseptic and antibacterial properties. Fresh Parsley leaves, seed and stem supplemented to poultry layer, it support blood-vessel development and stimulate egg-laying whereas in broiler it enhance productive performance.

❖ **Fennel (*Foeniculum vulgare*):**

Fennel is a/ short-lived perennial herb/ in/ the family Apiaceae. It originates from Mediterranean and/ Asia Minor, but cultivated worldwide. Fennel is an excellent source of phytonutrients such as vitamins (C, B₁, B₂, B₃), minerals (K, Na, Fe, P), rich proteins and dietary fibres. Mainly it contains volatile oil/ (trans-anethole (31.49%), 2-pentanone (25.01%), fenchone (11.68%), benzaldehyde-4-methoxy (8.01%) and phenolic acid (rosmarinic acid, chlorogenic acids). It has antioxidants, anti-stress, galactagogue and anti-parasites properties. Fennel fruit in poultry layer feed, produce a multiple beneficial impacts on poultry productivity such as improves fat (cholesterol and triglyceride) contain in egg yolk, produce antioxidant effect during heat stress and protection against several infectious diseases.

❖ **Celery (*Apium graveolens*):**

Celery or Ajmoda is a herbaceous plant in the family Apiaceae, which grows throughout the world. It is loaded with antioxidants (volatile oils, flavonoids, phenols, alkaloids, steroids, glycosides, furocoumarins, sesquiterpene alcohols), and phytonutrients as fatty acids, carbohydrates and several micronutrients (Na, Ca, K, Zn, Mn, Cu), vitamins (C, K, beta carotene, folate). Celery has antioxidant, anti-cancer, anti-inflammatory, digestion stimulant, diuretic and

antibacterial properties. Supplementation of Celery powder to broilers could suppresses lipogenesis but improve antioxidant status and reproductive performance.

❖ **Licorice (*Glycyrrhiza glabra*):**

Licorice or Liquorice is a perennial/ herb/ in the family Fabaceae. Naturally grown in southern/ Europe, but cultivated/ around Europe and Asia. Licorice/ root has main bioactive compound called triterpene glycoside glycyrrhizin which contribute a distinctive sweetness, and produce side effect in high amount. Other present as phytonutrients (protein, fat, carbohydrate, dietary fiber). Licorice has anticancer, antiviral, antibacterial/ and anti-inflammatory properties. Licorice extracts fed to broilers, it boost immunity and promote growth.

v **Cumin (*Cuminum cyminum*):**

Cumin is an annual herb in the family Apiaceae. It originate from the Mediterranean region, but cultivated mostly in India, China, and Mexico. Cumin contains terpenes, phenols, flavonoids and alkaloids. It has phytonutrients of rich fat, protein, dietary fibre, minerals (high Ca, Fe, good Mg, P, Zn) and vitamins (E, A, C, K, B₆). Cumin is known for antioxidants, antibacterial, antiparasite, anti-inflammatory properties. Supplementation of cumin seed powder to poultry layers and broilers found to stimulate the secretion of various digestion enzymes, increase nutrient utilization, carminative action, reproductive performance, promote growth and galactagogue.

❖ **Black cumin (*Nigella sativa*):**

Black cumin or kalonji is an annual flowering plant in the family Ranunculaceae. It originates from Asia and the Mediterranean regions. Bioactive compounds in black cumin are alkaloids, essential oils, thymol, thymoquinone (TQ), dithymoquinone, nigellidine, nigelline, carvacrol/

and hedrin. Black cumin seed is effective for diabetes, infections, inflammation, hypertension, chronic headache and body pain, digestive issues and muscle paralysis. Cumin seed powder fed to poultry has shown effective against bacterial infections but enhance production due to antioxidant, immune-regulator, decreased triglycerides and cholesterol efficiencies in broilers.

❖ **Turmeric (*Curcuma longa*):**

Turmeric is perennial herbaceous plant in the family Zingiberaceae, popular spice in India and many other Asian regions. It contains numerous bioactive contains as curcumin, cinnamic acid, curlone, niacin, demethoxycurcumin, bisdemethoxycurcumin, and tetra hydro curcuminoids. Curcumin in turmeric has a potent antioxidant and anti-inflammatory properties, while it can also be antimicrobial, anticoccidial, anti-carcinogenic and immunostimulatory effects. Turmeric meal could enhanced the overall performance in broilers by increasing feed intake, nutrient utilization, feed conversion ratio and immune response when added into their feed.

❖ **Cloves (*Syzygium aromaticum*):**

Cloves has aromatic flower buds in the family Myrtaceae and is native to Indonesia. Clove bud contain approximately 15 to 20% volatile essential oils dominated by eugenol and phytonutrients (dietary fiber, vitamins, minerals). Clove is known for supporting the immune system, rich antioxidants, anti-inflammation, anticancer, digestive stimulant, and antibacterial properties. Broilers fortified with clove extracts, it improve growth performance and some carcass characteristics such as water-holding capacity, tenderness of the meat, etc.

❖ **Red pepper (*Capsicum annuum*):**

Red pepper or Chile a common spice in the family Capsicum and native to tropical America.

Bioactive contains are capsaicin, capsinin and capsanthin. Red pepper has properties of antioxidant, anti-inflammatory, antiallergenic and anticancer. Red pepper has pigments (capsanthin, capsorubin, xanthophyll, capsanthin 5-6 epoxide) and rich vitamins (A, C, folic acid, K). Supplementation of Hot red paprika to broiler, gave a good impact on poultry's health, growth and productive performance, and often used as an antibiotic alternative. Paprika extract can also intensifies the yolk colour by pigment xanthophyll and antistress in poultry layers.

❖ **Black Pepper (*Piper nigrum*):**

Black Pepper is a flowering vine in the family Piperaceae and natives to Malabar, a tropical region on the Western Coast of Southern India. Black pepper contains alkaloid (piperine), glutathione peroxidase, glucose-6-phosphate dehydrogenase and rich phytonutrients (vitamin C). It has several properties of anti-microbial, antioxidants, antidiabetic, anticancer, anti-inflammatory and digestive stimulant. Black Pepper fed to poultry layers, it enhances the laying performance by preventing the re occurrence of diseases and immune system by increase immunoglobulins concentration.

❖ **Anise (*Pimpinella anisum*):**

Anise or aniseed or chakra phool/ is a herbaceous annual plant in the family Umbelliferae and native to eastern Mediterranean region. Since then cultivated extensively for both fruits and seeds. Anise has wide contains of volatile oil (2%) primarily trans-anethole eugenol and others methyl-chavicol, anisaldehyde, estragole, coumarins, scopoletin, umbelliferone, estroles, terpene hydrocarbons, polyenes and polyacetylenes in lesser amount, lipids rich in fatty acids (palmitic and oleic acids), carbohydrates, protein, vitamins (A, C) and minerals (Fe, Ca, Mg, Mn, P, K). Anise seeds has properties of antioxidant, expectorant, antibacterial, antifungal, anticonvulsant, anti-inflammatory, antispasmodic, carminative,

parasitocidal, gastro-protective, antidiabetic, galactagogue and preservative agent. Anise seed meal acts as natural growth promoter and immunomodulant when incorporated into broilers diet.

Conclusion

Every herbs included has its unique bioactive compounds and rich phytonutrients contains. These herbal plants found to enhance poultry productions and performances when incorporated into poultry diets. They can be used as an alternative to antibiotic without any harmful or residual side effects. However, there is chances of toxicity due to some toxic phytochemical content. Therefore, its supplementations to poultry has to be regulated well as some of these plants are still in their infancy.

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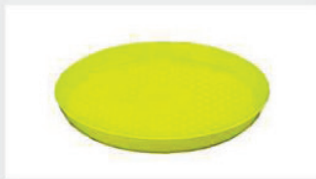
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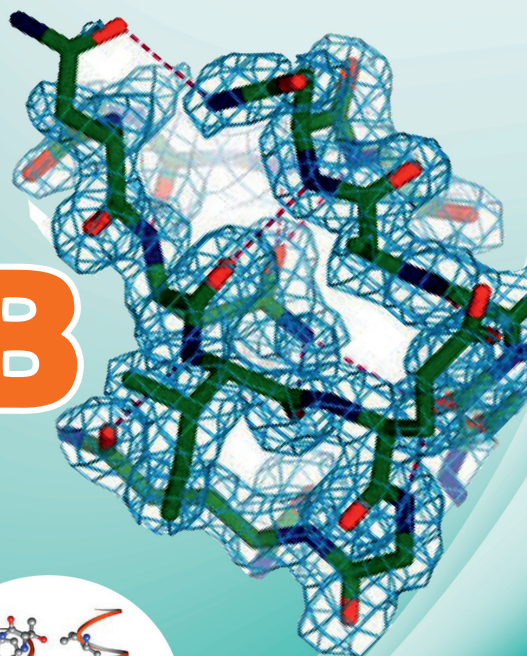
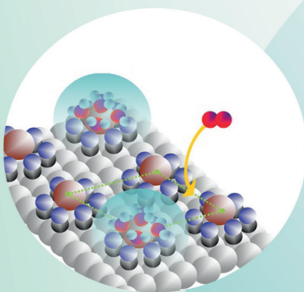


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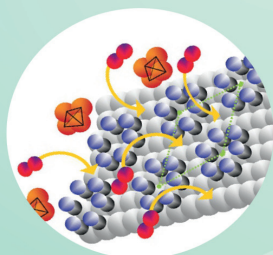
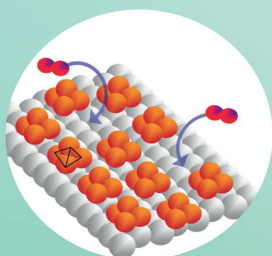
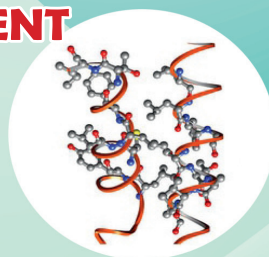
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