JULY 2022

MONTHLY BILINGUAL

INR 100/-

POULTRY PLANNER

R.N.I. 71668/1999

Title Code HARBIL00563

Vol. 24 | No. 07 | July - 2022

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Editorial

From the Editor's Desk

Layer Farming for Egg production

Poultry is one of India's fastest growing agricultural sectors today. India's egg production is increasing at a compound annual growth rate (CAGR) of more than 10.29%. The egg is a nutritional powerhouse, containing the majority of the vitamins, minerals, and antioxidants required by the body, and its role in healthy balanced diets is widely recognised. A daily egg and chicken consumption contributes 15-20% of the body's required proteins, vitamins, and minerals.

Local native birds as well as pure breeds of exotic origin such as White Leg Horn and Rhode Island Red are not available for commercial egg production. A layer is a commercially viable egg-producing bird. Egg production from layer poultry farming is dependent on farm management and care. Commercial hybrid layers produce significantly more eggs than pure breeds.

Layer chickens are such a special species of hens, which need to be raised from when they are one day old. They begin laying eggs commercially at the age of 18-19 weeks. They continue to lay eggs until they are 72-78 weeks old.

Layer chickens face significant risks of production losses and mortality, which can have a negative impact on farm profitability. The harsh tropical climate and severe disease outbreaks, as well as poor biosecurity, sub-minimal vaccination and treatment protocols, poor management practises, poor chick quality, feed-associated causes, and unintended accidents, frequently aggravate mortality and negatively impact egg production.

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- Publication of news, views of information is in the interest of positive poultry industrial development in India. It does not imply publisher's endorsement.
- Unpublished material of industrial interest, not submitted elsewhere, is invited.
- The submitted material will not be returned.
- Publisher, Printer Mrs. Bhavana Gupta on behalf of Pixie Publication India (P) Ltd. Karnal Printed at Jaiswal Printing Press, Railway Road, Karnal
- Published at : C/o OmAng Hotel, Namaste Chowk, Near Janta Petrol Pump, KARNAL - 132001 (Haryana) INDIA
- Editor-in-Chief : Mrs. Bhavana Gupta
- All Legal matters are subject to karnal jurisdiction

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Egg Shell Problems for Poultry Producers.

Dr. V Rajendra Prasad
Poultry Consultant

Egg shell quality problems can be a large hidden cost for poultry farming causing huge losses to Poultry Producers. Cracked and damaged eggs can account for as much as 6 to 8% of total production. It can be particularly problematic in older flocks (Bain et al., 2006).

The occurrence of shell breakage can be categorized into a number of stages.

Opportunities for breakage occur:

a) before lay,
b) at the point of lay,
c) during collection,
d) during processing and
e) during shipping.

The incidence of breakage at these stages varies.

a) It is approximately 3.5 % at the point of lay (Eggleton and Ross, 1971);
b) Ranges from a low of .3 to a high of 8.2 during the collection stage (Eggleton and Ross, 1971; Bezpa et al, 1972);
c) Is approximately 3.7%, but ranges from 1 to 11%, during processing (Hamilton et al, 1979);
d) and is approximately 1% during shipping.

Common eggshell quality problems:

a) dirty eggs
b) shell-less eggs
c) soft-shelled eggs

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d) wrinkled eggs
e) pimpled eggs
f) corrugated eggs
g) cracked eggs
h) misshapen eggs

Factors affecting eggshell quality:

a) age of the hen
b) breed of the hen
c) laying hen nutrition.
d) water quality
e) management & lighting schedule
f) immunological problems and disease.
g) heat stress

The decline in eggshell quality and laying percentage varies between flocks, breeding lines as well as individual hens. Poor eggshell quality in the late stages of laying (>70 weeks) does not mean that all hens in the ageing flock produce eggs of reduced quality.

It is rather that the variability in egg quality within the flock increases and that is the reason for replacing.

This asks for a complete package in management, feed, and genetics in order to reach this goal:

a) Eggshell quality needs to remain constant
b) Laying percentage of hens must be high enough
c) Hen health and bone health need to be maintained

Improving eggshell quality is an important parameter in order to increase ROI for poultry farmers, as well as guiding the extension of the egg laying period up to 100 weeks.

Causes and cures of eggshell problems and the strategies to be adapted in poultry farming practices for improvement of egg shell quality.

The mess left behind by broken eggs is an obvious reason for you to care about the shell quality of the eggs laid by your hens.

The main reason why older layers produce more cracked eggs has to do with egg size:

a) As they deposit a fixed amount of calcium per egg (2 grams), and calcium is the main element that provides strength to the shell, it is expected for a larger egg to have a thinner shell.
b) With age, calcium digestibility and metabolism are impaired,
c) Thus, adding a more digestible source or form of calcium is recommended for diets during the phase of egg production.

Vitamin D3 Deficiency – Deficiency is most visible when the birds get less sunlight and make less vitamin D3 on their own.

a) Adding extra vitamin D have been shown to further improve the calcium balance, and consequently egg shell quality.

Vitamin D is part of the calcium-phosphorus homeostasis within the organism.

a) Thus, high levels of dietary vitamin D can influence positively eggshell quality.
b) Nevertheless, there is a natural bottleneck in vitamin D metabolism, which can be by-passed by using an active metabolite of vitamin D, instead or in addition to the usual form.
c) As this bottleneck becomes even more limiting in laying hens, better results are expected when using an active metabolite of Vitamin D.

The less obvious decline in shell quality with suboptimal, rather than deficient, supplements is more difficult to diagnose, especially because it is very difficult to assay vitamin D3 in complete feeds.

Least but not the last , Keep your birds calm.

Do not give them more than 16 hours of daylight.

Letting them sleep longer will keep them calm during the time of day when they are forming the shell.

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Total & Standardised Ileal Digestible Amino Acids [TDAA]	Crude Fiber	Soluble Protein	T2 / HT-2 Toxin
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One Earth and One Health Approach For Sustainable Environment Production

Barathiraja S*

**Assistant Professor ©, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Kurumbapet,Puducherry, India. email: barathirajasnew@gmail.com.*

Introduction

The term environment describes the sum total of physical and biotic conditions influencing the responses organisms in terms of their life, natural behaviour, growth, reproduction and development (Douglas and Holland, 1947). Human beings are co-existing with other lives such as plants and animals in the ecosystem. Thus, the response of one influence the response of another on earth.

Sustainable environment

Pollution and environmental degradation due to anthropogenic activities resulted many environmental issues such as global warming, heat stress, acid rain, ozone depletion, damage to ecosystems, scarcity and contamination of natural resources. This has serious effects on all lives on earth (i.e.) human, animal and plant health. Thus, there has been major focus on "environmental sustainability" in recent days. The concept is "maintenance of natural capital" i.e., the current generation needs to meet their needs by keeping in mind to preserve environmental health, so that the future generation does not get affected (John, 2011).

One health focus

Biodiversity refers to the presence of a variety of plants, animals and microorganisms in a geographical area. This maintains the ecological balance such as improvement of soil quality, formation of a healthy ecosystem, reduces the risks of natural disasters such as soil erosion and climate change (Manisha, 2022). Deforestation and climate change as a result of anthropogenic activities have a serious effect on the availability (both the quality and quantity) of natural resources such as air and water. The growing human population encroaches the wildlife habitats, resulted in human and wildlife conflicts.

Animals play a major role in the ecosystem. Ruminants transform fiber in the pasture into a protein with high a biological value. They serve the society in many ways, such as livestock, pet animals/birds, companions, entertainers, food animals, draught animals and military, etc., Climate change leads to immune suppression and increases the incidence of infectious and/or zoonotic diseases (60% of emerging infectious diseases are zoonotic in nature) (Johnes et al., 2008).

Conclusion

Thus, the health of plants, animals and the environment are interrelated. So, the concept of one health and its implications is foremost essential for sustainable environment development. People need to focus on biodiversity preservation, reuse and regenerate concepts, design any new technology with the view to environmental impacts, minimize pollution and preserve animal health and productivity for sustainable environmental production by keeping in view of ecological, biological and socio-economic views.

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Biosecurity in Poultry Farm

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**drnadeem.ndri@gmail.com*

Biosecurity, simply means "the safety of living things," is a program aimed at limiting pathogen entry and transmission into and between farms in order to protect birds from disease-causing organisms. Isolation, traffic control, cleanliness, vaccination, disease serological surveillance, and air quality are all aspects of biosecurity etc. which will aid in prevent the entry and control the pathogens in and around the farm. Biosecurity is the cheapest and at the same time most effective means of disease control available without, which no disease prevention programme will work well. It's a disease-prevention strategy and sanitary practise that can help keep your farm disease-free. Biosecurity is therefore is one of the integrated part of farm operations.

As the poultry operation becomes more and more efficient, however, they also become a threat to themselves and their neighbours and the concentration of more birds in limited space. Poultry farmers should take time to eliminate as many disease causing organisms as possible. Therefore, it is better to wait a little longer before introducing new flock than to hurry and risk infection of new flock. The most effective form of protection against disease, especially for poultry under modern production techniques is biosecurity i.e. excluding disease from the farm environment and this holds the key to successful and profitable farming.

Conceptual biosecurity

1. It is best to build farm in an isolated area, atleast three km away from nearest poultry in the case of breeder farm and 1.6 km in the case of commercial layer and broiler farm.
2. In the case of breeders, the farm should be away from the major road ways that may be used to transport commercial and backyard poultry.
3. Maintain enough distance between breeders and grow-out farms and facilities such as hatcheries and feed mills.

Structural biosecurity

1. Fencing of farm perimeter to prevent unwanted visitors.
2. Test water source for minerals, bacteria, chemical contamination and pathogen load.
3. Concrete stage with suitable water and power supply for sanitation of vehicles.
4. Suitable location for storage of bagged feed.
5. All-weather roads within the farm to ease cleaning and to prevent spreading of microbes by vehicles and foot wear.
6. Facilities for safe scientific disposal of dead birds.

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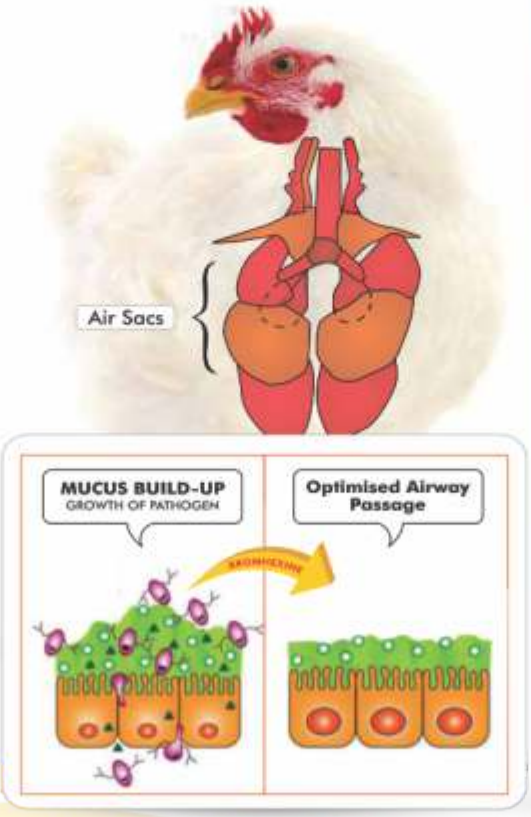

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7. Safe housing, with suitable wild birds and rodent proofing.
8. Feed, litter and equipment should be stored in a section separated from live bird area to prevent contamination.
9. A three metre boundary of land around the building must be kept free of all vegetation to prevent rodent and wild life activity.

Operational biosecurity

1. Operation manuals should be developed for day-to-day activities carried out in feed mills, hatcheries, breeding and grow-out facilities incorporating emergency plans.
2. Proper decontamination and disinfection of equipment, houses etc., following depletion of flock.
3. In breeder farms, all visitors and workers require to shower and use clean farm clothes to prevent cross contamination between them.
4. Maintain record for visitors and their purpose.
5. In the case of breeders, no vehicles or equipment should be allowed within the farm area from the time of delivery of flock until disposal.
6. In commercial broiler unit, a minimum inter flock interval of two weeks is recommended.
7. Use an effective integrated pest management program to control pest and rodent through biological, chemical and mechanical means.
8. Appropriate program of disease diagnosis and proper vaccination schedule should be implemented.
9. In small scale egg production unit, follow all-in-all-out system. If it is not possible, pullets should be obtained from a source free of vertically transmitted diseases.
10. Recycling of egg packing materials etc. should be decontaminated at the point of entry of farm.
11. Routine disease monitoring procedures like postmortem examination and periodic serum antibody assay to determine immune status of the flock.
12. Regular culling of unhealthy, unproductive and diseased birds.

Conclusion

Biosecurity, medication/ vaccination and good management of farm are three sides of disease control triangle. Poultry must be given an environment in which disease and infection is controlled to the point where vaccination and medication achieve beneficial effects. Biosecurity is the key element in the triangle of disease control.

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Mycotoxin Management in Poultry

Mycotoxins are the metabolite produced by the fungal species in feed and they produce variety of diseases when ingested through feed above its tolerable limit. Mycotoxins may have additive or synergistic effects with other natural toxins, infectious agents and nutritional deficiencies. Some mycotoxins are stable and maintain toxicity over time.

Dr. Gopal Barapatre
Asst. Product Manager,
Biozene, India

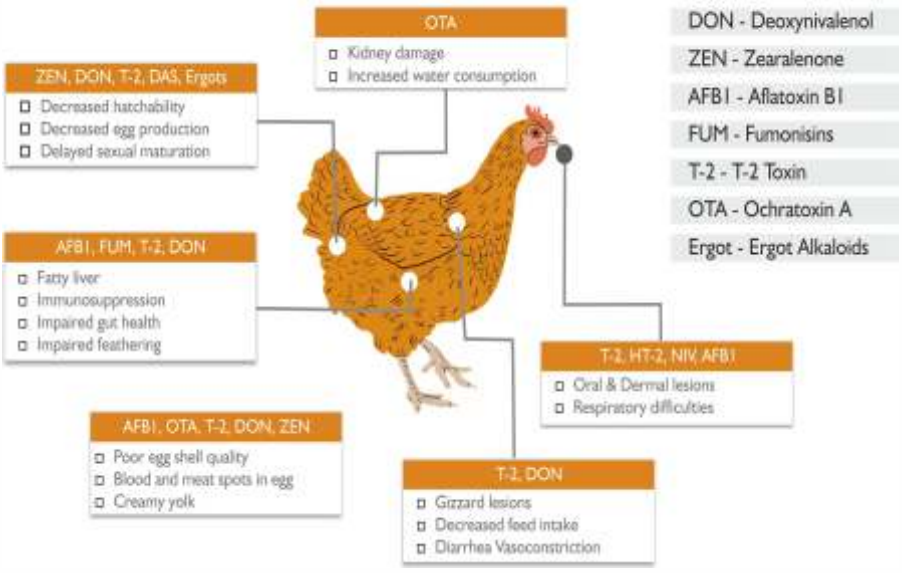
Mycotoxins occurrence in different feed ingredients

Feed	Mycotoxin	Fungi produed
Corn / Maize	Aflatoxin Ochratoxin A Fumosin Zearalenone Monilliformin	Aspergillus flavus, Aspergillus parasiticus Aspergillus ochraceus, Aspergillus nigri, Penicillium verrucosur Fusarium verticilloides, Fusarium proliferatum Fusarium graminearum Fusaium monilforme
Wheat	Ochratoxin A Zearalenone	Aspergillus ochraceus, A. nigri, Penicillium verrucosum, Fusariu graminearum
Barley	Ochratoxin A Zearalenone	Aspergillus ochraceus, A. nigri, Penicillium verrucosum, Fusariu graminearum
Oats	Ochratoxin A	Aspergillus ochraceus, A. nigri, Penicillium verrucosum
Soya	Aflatoxin	Aspergillus flavus, Aspergillus parasiticus

Factors affecting mycotoxinoccurrence in the feed & fodder

Biological factors	Environmental factors	Harvesting	Storage
• Susceptible crop • Compatible crop • Toxigenic fungus	• Temperature • Moisture • Mechanical injury • Damaged by insects/birds	• Crop maturity • Temperature • Moisture	• Temperature • Moisture

MYCOTOXINS IMPACT ON BIRD



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Prevention &Control of Mycotoxins

In the field:

- Crop rotation: Rpeated monocultures of maize should be avoided
- Tillage: Removal, burning or burial of crop residues
- Plant breeding: Fungi resistant seed varieties should be grown
- Plant density: Avoid overcrowding, maintaining intra-plant spacing
- Weed control: Suitable fungicides & insecticides should be used to protects of grains & plant
- Physiological stage of plants: Grains should be harvested as soon as possible once ripe
- Harvesting: Minimizes mechanical damage to the grains & avoid contact with soil, equipment to be used should be clean, dry & free of visible fungal growth

In the feed:

- Drying: Dry the grains to the desired moisture content for safe storage
- Thermal treatment: 70-800C are effective in reducing or eliminating the presence of fungi
- Cleaning & disinfection of all ingredients/feed & equipment's used
- Holding time of feed: Shorten the holding time of feed.
- Storage: grains should be dried & cooled before storage
- Minimize moisture content of grain and feeds <13%
- Minimize relative humidity <70%
- Storage temperature of grains & feeds <20%

Use of Mycotoxin binder

A mycotoxin binder is a substance that is added to animal feed in small quantities in order to trap mycotoxins and prevents them from entering into the blood stream where they can cause serious harm to the animal e.g. various clays

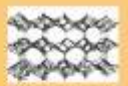
Clays	CEC Value (meq /100gm)
Kaolinites and Zeolites	3 - 20
Silicates	20 – 60
Bentonites	60 – 100
Humic acids	100 - 150
TBMA Clinoptilolite	130 - 180

Reference: Journal of Applied Geology 1(1): 29 (2016)
IOP Conf. series Material Science & Engineering 334(218)

Selection parameters of an ideal mycotoxin binder

1. Broader spectrum of activity: At a time there is presence of multiple mycotoxins which can leads to additive or synergistic effects. Therefor an effective mycotoxin binder should have the capacity of binds multiple mycotoxins at a time.
2. Higher adsorption capacity: Small amount of mycotoxins can cause serious harm to the animal thus it is necessary to eliminate most of the mycotoxins& it can be done by higher adsorption capacity of mycotoxin binder in small dosages.
3. Selective adsorption: An effective mycotoxin binder does not binds nutrients such as minerals, vitamins, amino acids etc. that are supplemented through the feed & thus not interfere with the absorption process of nutrients.
4. Nutritionally inert (does not digest): They does not take part in the digestion process, they only binds with mycotoxins& excreted through faeces& does not produce any adverse reaction.
5. Higher cation exchange capacity: Cation exchange capacity (CEC) is the measures of amount of cations (positively charged ions) that clay having capacity to bind. As mycotoxins, heavy metals, ammonia & other toxins are positively charged ions thus an ideal mycotoxin binder having highest cation exchange capacity.
6. Gut pH stable: Gut having different pH level in different parts so the adsorption capacity of an ideal mycotoxin binder does not affected by different pH.
7. Contains no harmful substances: An ideal mycotoxin binder is free from different harmful substances, heavy metals etc.

Comparison of different clays used as mycotoxin binder

Particular	 Sepiolite	 Bentonite	 Clinoptilolite
Structure	Tubular	Quartz Sheet Like	Crystal
Structure Expansion	Yes	Yes	No
Adsorption	Non Selective	Non Selective	Selective
Ion Exchange	Weak	Weak	Strong
Ammonium ion Exchange	Less	Less	Strong

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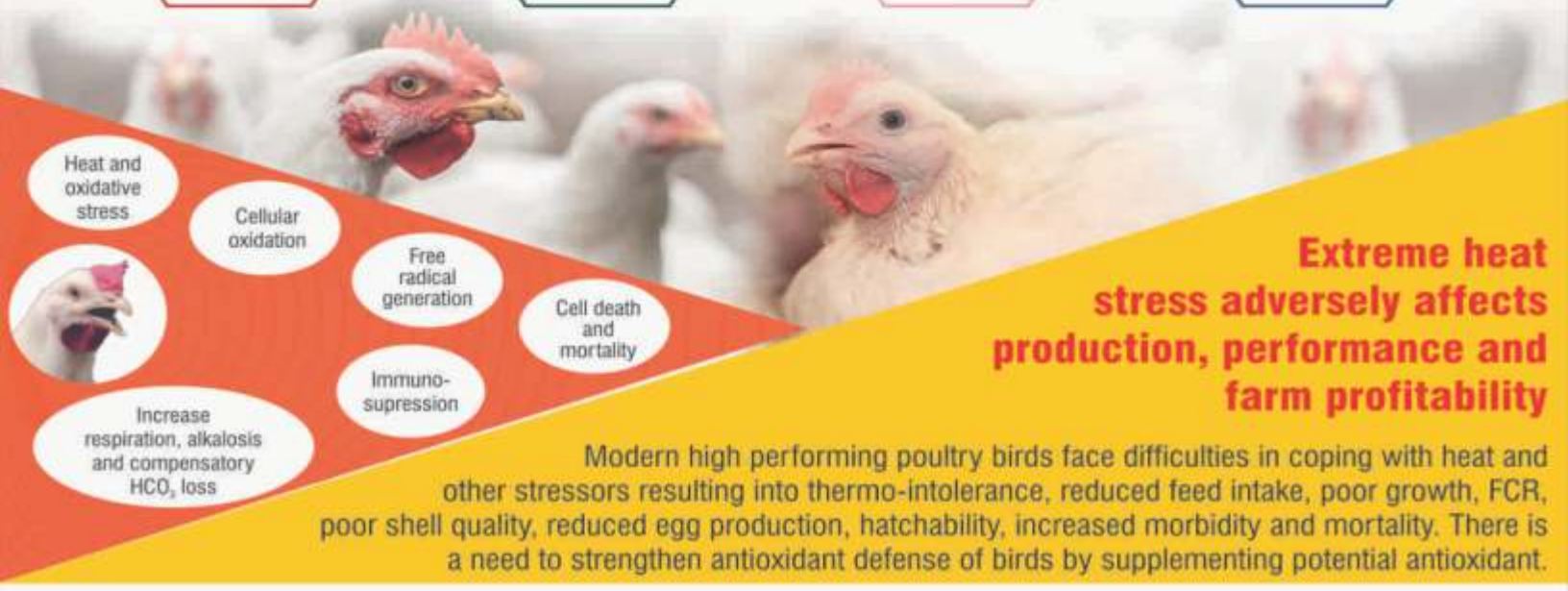

Extreme heat stress adversely affects production, performance and farm profitability

Modern high performing poultry birds face difficulties in coping with heat and other stressors resulting into thermo-intolerance, reduced feed intake, poor growth, FCR, poor shell quality, reduced egg production, hatchability, increased morbidity and mortality. There is a need to strengthen antioxidant defense of birds by supplementing potential antioxidant.

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Article

Importance of Japanese Quail Egg

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Japanese quail (Coturnix coturnix japonica) popularly known as —Bater in Hindi is distributed in many parts of the world and was first introduced in India from California University in 1974 at Central Avian Research Institute, Izatnagar. Japanese quail eggs are gaining popularity around the globe especially in Asian countries. Although they are small in size but the nutritional value of quail eggs is 3 - 4 times greater than chicken eggs. Quail eggs are rich in calories (158), total fat (11 g), saturated fat (3.6g), cholesterol (844 mg), sodium(141 mg), protein (13 g), vitamin D (55 mcg) calcium (64 mg), iron (3.65 mg), and potassium (132 mg) . They are also rich in antioxidants, selenium, lecithin, iodine, and choline

Composition One quail egg (9-10 grams)

- **Calories:** 14
- **Protein:** 1 gram
- **Fat:** 1 gram
- **Carbs:** 0 grams
- **Fiber:** 0 grams
- **Choline:** 4% of the Daily Value (DV)
- **Riboflavin:** 6% of the DV
- **Folate:** 2% of the DV
- **Pantothenic acid:** 3% of the DV
- **Vitamin A:** 2% of the DV

- **Vitamin B12:** 6% of the DV
- **Iron:** 2% of the DV
- **Phosphorus:** 2% of the DV
- **Selenium:** 5% of the DV

In general 3 to 5 quail eggs is recommended to replace one chicken egg, which weighs around 50 g. However, it is best not to consume more than 10 in a day as they are rich in cholesterol

Benefits of quail egg

- **Quail Eggs Are rich in nutrient :** Quail eggs are three to four times more nutritious than chicken eggs. Quail eggs contain 13% protein, while chicken eggs contain only 11%. Also have almost 3 times more vitamin B1 and double the vitamin B2 and vitamin A as chicken eggs.

- **Reduce anemia :** Quail eggs are rich source of iron. Quail eggs are an excellent source of vitamins B1, B2, B6 and B12. Vitamin B12 is needed by our body to make red blood cells that transport oxygen to our so help to reduce the risk of anemia.
- **Improve eyesight :** Quail eggs are rich in vitamin A . Vitamin A can protect your eyes from degeneration and reduce the risk of cataracts and glaucoma.
- **Quail eggs contain Omega 3 fatty acids :** Quail eggs are rich in essential fatty acids that are vital for our health and well-being. Omega 3 fatty acids are essential for bone and joint health, reducing inflammation, keeping the skin and hair healthy and brain active.
- **Improve Metabolism Immunity And Boost Immunit :** Quail eggs are rich in antioxidants and vitamin B . These nutrients may improve metabolism as they are involved in various cellular processes, such as cell growth and cell regulation. Leucine is also found in quail egg, an amino acid that is essential in maintaining a robust immune system.
- **Reduce risk of Diabetes:** Quail egg has a low glycemic index, thus, it releases sugar slowly into your blood, which helps in regulating blood glucose level .
- **Balance cholesterol level :** Quail egg have large amount of beneficial fatty acids eggs that can help boost your heart health. In fact, 60% of the fat in quail eggs is made up of the "good" form of cholesterol. This helps your body balance the negative effects of "bad" cholesterol.
- **Treat allergies :** They contain large amounts of ovomucoid protein – a protein that acts as a natural anti-allergenic. It helps the body fight off congestion, inflammation, and other symptoms caused by an allergic reaction.
- **Helpful for Respiratory System :** Quail eggs are rich in antioxidants which help to stabilize free radicals and in treating respiratory infections like asthma and bronchitis.

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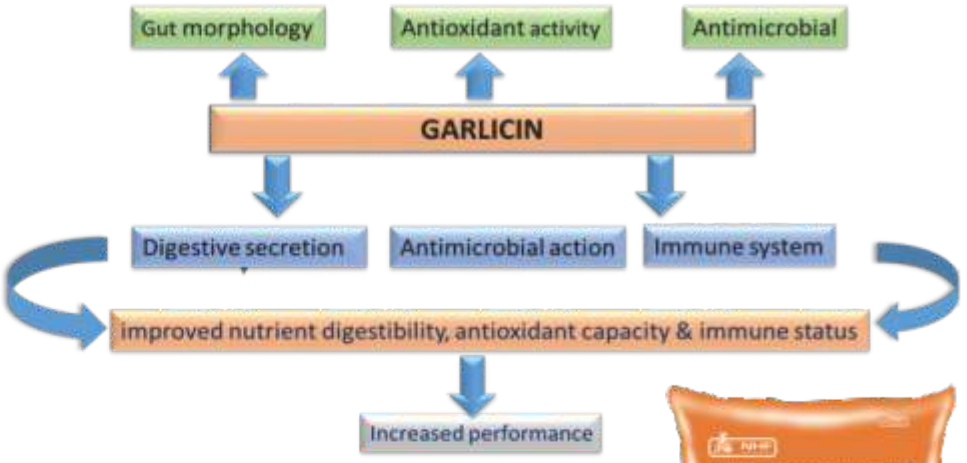

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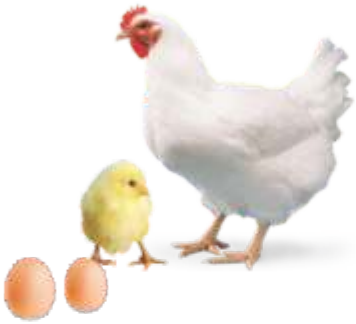

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Disease Management in Poultry Farm

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Introduction:

Various types of poultry disease seriously affect meat and egg production. There are various reasons for the diseases are poor sanitation, management, etc. Most of the diseases are identified by general or usual physical conditions. For safe poultry farming, you need to keep safe from all types of diseases.

The following managerial factors help to reduce the spread of disease in poultry farm:-

1. Isolation

- It is not advisable to rear birds of different age groups in the same house. Wherever possible, it is advisable to practice the all-in-all-out system.
- Proper layout of houses, appropriate design to prevent any entry of rodents, proper ventilation, and the designing of feeders and drinkers to avoid spillage, are essentials in disease prevention.

2. Litter management

- Wet litter is a potential source of disease transmission. Maintain proper litter conditions as suggested earlier.

3. Quality chicks

- Ensure that chicks are received from a hatchery where adequate preventive care is taken for breeder birds to guard against mycoplasmosis, salmonellosis and infectious bursal disease.
- Check for a history of vaccination against Marek's disease. Look for signs of dehydration.
- Ensure that the received chicks are healthy and are within the normal weight range.

4. Proper nutrition

- A well-balanced feed prepared according to nutrient requirements at different ages will ensure proper health and good immune status in birds; the addition of coccidiostats and vitamin and mineral supplements are essential.

5. Litter removal

- After the pen is emptied, deep litter and caged layer droppings should be removed to a field far from the poultry shed, and spread to dry in the sun.It should be disposed off as soon as possible for manure or other purposes and not allowed to remain to accumulate for a long period.Composting is better since the heat produced will destroy the pathogens.

6. Disinfection

- Disinfection is the process or act of destroying pathogenic microorganisms.
- A disinfectant is an agent that destroys pathogenic organisms, and that can be applied to inanimate objects or used as a footbath.Phenol, cresol, chlorine compounds and iodophors can be used for disinfecting surfaces as well as the egg room, feeders, drinkers, buildings and footwear; liquid formalin at a 5% level, or formaldehyde gas by fumigation, will also serve as an effective disinfectant.
- Sun-drying may be practiced for washed equipment; for cement surfaces-dry heat in the form of flame is recommended.Copper sulfate as a 0.5% solution is effective against fungi.

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1989
Patent granted for the Alpha D3 metabolite

2010
Alura launches Alpha D3 in poultry

2010
Alura bring Alpha D3 to India

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- Quaternary ammonium compounds are good disinfectants when used according to directions. However, they are not effective in hard water.They can be used for disinfecting surfaces, washing egg rooms, feeders and drinkers and other equipment.

7. Rodent control

- Keep rodents out from the initial stage of farming itself, since once the farm is infested, it is difficult to get rid of them.Remove piles of unused equipment and empty gunny bags as they serve as breeding places for rats, mice and squirrels alsoremove spilled feed daily. Store feed in well-ventilated, rodent-proof rooms.
- Use traps in the initial stages and later rodenticides. Rodenticides should be used at night according to specifications.

8. Insect control

- Countermeasures against insects are part of maintaining a sanitary environment, as insects play a significant role in transmitting disease-producing micro-organisms, tapeworms, etc.
- Flies sit on the birds, irritate them, and prevent them from taking water and feeding normally, causing stress which results in reduced egg production, especially where cage rearing is practiced.
- **Insect or fly control measures include:**

1. Avoiding stagnation of water in and around the farm premises.Provision of proper drainage facilities, attending immediately to leaky drinkers, water lines, etc.
2. Use insecticide sprays or dusting at required intervals, treat the birds and check the feed and water quality to avoid watery droppings.Keep the surroundings clean by covering the area with treated soil devoid of vegetation or by growing grass lawns.

9. Water quality

- Poultry farmers often fail to provide the birds with good quality water.
- Both the microbial and chemical quality of the water needs to be tested before establishing a poultry farm in a given area.
- Microbial contamination of water may happen at the source, for instance in ponds, rivers, open wells and the public water supply system, or during transportation and storage, as well as in the overhead tank or bins. Unhygienic practices on the farm result in the spread of disease.
- The microbial load shoots up during flood conditions. The fecal contamination of water will add to the presence of coliform organisms.
- Mineral levels in water depend on soil conditions and show only minor fluctuations based on the season and the water table.They lead to hardness in water and affect taste and palatability.
- Ionophores (1.6% available iodine) are also used as water sanitizers at the same dosage level.Products containing Quarternary ammonium compounds like quat, quatovet, encivet, sokrena, etc. may be used as water sanitizers as per the manufacturers' specifications.By providing sanitized water to the birds, the chance of water-borne infections is reduced and the cost of medication is saved.The life of pipelines and storage tanks is also increased, and the overall growth of the birds and egg production efficiency will be improved.

News

From 2022-23, The Andhra State Government to Provide Egg and Chikki in Every School Student's Meal.

The state government has taken several steps to combat childhood malnutrition. The government issued an order to provide egg and peanut jaggery chikki to all students in schools, regardless of whether they receive mid-day meals through the Jagananna Gorumuddha scheme.

In the order, BM Diwan Mydeen, Director of Mid-day Meals and School Sanitation, directed all DEOs to instruct headmasters to take steps to provide eggs and chikkies to all students during mid-day meals beginning with the new academic year.

Previously, the government directed DEOs to provide eggs for five days and chikkies for three days to schoolchildren who eat mid-day meals. The government has now extended it to all students in order to improve their nutritional intake.

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The role of calcium in broiler performance and phosphorus digestibility

Lode Nollet, MSc., PhD., Global Product Manager Enzymes, Huvepharma.

In the past, there was little interest in the assessment of calcium (Ca) requirements in poultry diets. This was due to the availability of cheap limestone, which accounts for 80-85% of the total Ca in feed. However, driven by the numerous studies of the effect of Ca on phosphorus (P) digestibility and phytase efficacy, the impact of Ca on performance has gained increasing interest.

Research from recent years has indicated that oversupplying Ca can negatively affect animal performance:

- Limestone is a buffering substance and hinders sufficient acidification of the feed in the gizzard.
- An excess of dietary limestone reduces feed intake.
- Ca exerts a negative effect on the tight junctions, reducing gut integrity.
- Excess Ca inhibits P digestibility of feeds.

Inhibition of phytase on phytate degradation due to Ca

Dietary Ca forms complexes with phytate and these complexes can remain insoluble at a high pH (Fig. 1).

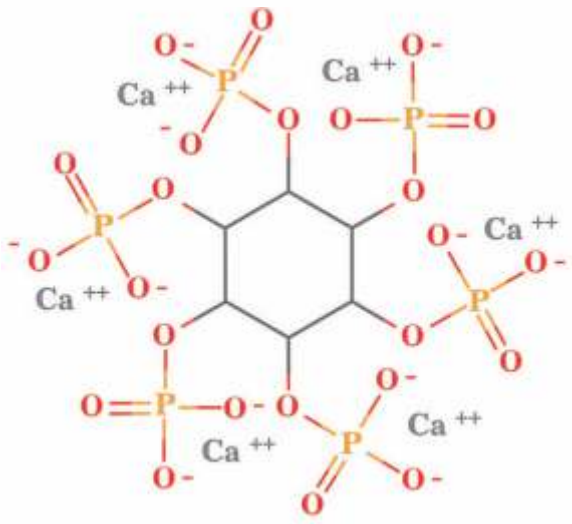

Fig. 1. Calcium chelates phytate, making it less accessible for phytase.

These precipitated phytate-Ca complexes are not accessible for hydrolysis by a phytase and this reduces the amount of P released. Therefore, an excess of Ca will reduce the P digestibility. Moreover, the speed of the limestone solubilisation will dictate the concentration of Ca available to chelate with the phytate. Fine limestone is in general more soluble than coarse limestone, meaning it will bind faster to phytate. As a result, it has a stronger negative impact on P digestibility compared to a coarse limestone.

Ca and P need to be in balance

Lowering the Ca levels in feed would be advisable to improve P digestibility, besides the choice of a coarser limestone. However, absorbed P can only be retained in the bones when enough Ca is present at blood level to form hydroxyapatite (bone mineral).

Lowering the Ca level will improve the P digestibility, but due to the lack of Ca to retain the absorbed P, the P level in the bones can still be low. Deficiency of Ca can therefore cause poor bone quality, even when P digestibility is improved by lowering the Ca level. This indicates that an uncontrolled lowering of the Ca levels in the feed can also reduce the birds' motility and thereby performance.

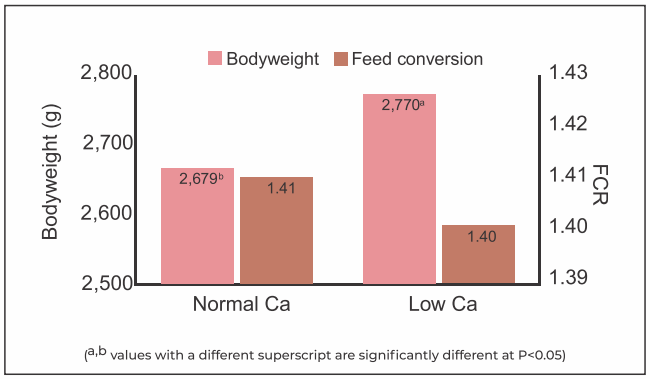

Fig. 2. Effect of lowering Ca levels on body weight and feed conversion at day 35.

A broiler study

A practical example has been demonstrated in a recent 35-day broiler trial at the University of Warmia and Mazury, Poland. Feed was reformulated with 1,000 FTU/kg of a novel intrinsic heat stable phytase (OptiPhos Plus) only using its corresponding P matrix value, while an NSPase complex (Hostazym X) was added on top. Two different Ca treatments were imposed:

- Normal Ca level: formulated at: formulated at 8.5, 7.0 and 6.0g/kg in starter, grower and finisher diets respectively.
- Low Ca leavel: formulated at 6.5, 5.0 and 4.0g/kg in starter, grower and finisher diets respectively. The overall technical performance was very good (EPEF >500) showing the impact of the enzymes on securing a high broiler performance.

The following effect of Ca could be noted:

- The low Ca level gave a significantly higher end weight vs when feeding normal Ca levels. Feed conversion was not impacted despite the higher bird weight at low Ca levels (Fig. 2).
- Ca and P digestibility (at day 35) were highest at the low Ca inclusion level.
- Bone ash analysis (at day 21) showed that tibia ash and Ca and P level in tibia ash were lower at the low Ca level. The impact was small, but significant (Table 1).

The fact that low Ca levels optimised technical performance and improved P digestibility, but reduced bone ash, demonstrates that too low Ca levels will lead to too low Ca levels at blood level, and therefore result in inefficient bone formation. This also indicates that there is a higher Ca requirement for optimal bone growth compared to what is required to optimise performance.

Table 1. Ca and P digestibility, tibia ash content, and Ca and P content in tibia ash at normal and low Ca levels.

Treatment	Ileal digestibility (%)		Tibia ash (% of DM)	Ca in tibia DM (%)	P in tibia DM (%)
	Ca	P			
Normal Ca	50.2[b]	54.5	48.4[a]	18.6[a]	10.1[a]
Low Ca	64.1[a]	60.6	46.8[b]	17.8[b]	9.8[b]

([a,b] values in a column with a different superscript are significantly different at P<0.05)

Conclusion

- Reducing the Ca levels had a large positive impact, not only on animal performance, but also on Ca and P digestibility.
- Reducing Ca levels impacts the bone formation, showing that the Ca requirements for bone formation are higher compared to the Ca requirement for optimal animal performance.

Balance is Important

- Prevention from the heat stress
- Maintain Optimum dEB
- Promote growth & development
- Protect dehydration & stress
- Heat stress makes birds more susceptible to
  - Coccidiosis
  - Mycotoxicosis Disease etc.

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or 500g/lonne of feed
(Inclusion may vary as per the environmental condition or as directed by the vateriarian/nutritionist)

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Food Safety Through Eggs

Jinu Manoj[1] and Manoj Kumar Singh[2]

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Introduction

Eggs are a nutritional powerhouse. They provide the body with 13 vitamins and minerals, high-quality protein and important antioxidants. Eggs are also tasty, convenient and good value for money, making them an excellent inclusion in a well-balanced diet. Eggs are accepted by all communities without restriction to any religion and are consumed globally by children, adults and old people. Food safety is important with eggs as it can cause health risks if eggs are not handled, stored and prepared safely. Some eggs may be contaminated with bacteria, which can cause serious food poisoning in susceptible population. Educational programme of the public about the health hazards due to consumption of raw eggs is required.

Spoilage of egg

The egg is very perishable and the quality can be severely reduced during the time of storage due to chemical changes or microbial spoilage and non-microbial spoilage. The changes occurring in the eggs are affected by the environmental conditions, temperature, moisture, the material used for packaging and storage time. Their high water content (74%) and high nutrient content make them susceptible to microbial spoilage.

1. Contamination of eggs

Freshly laid egg is sterile but the egg shell soon becomes contaminated by fecal matter of hen by nest, by washing water, by handling and by other material in which it is stored. A total number of micro organisms per shell of hen's egg have been reported to range from 102-107 with average of 105. Salmonella spp. may be found on shell or inside egg.

2. Non-microbial spoilage of eggs

These include loss of moisture and hence loss of weight during long term storage. Change in physical state of egg contents also occur during long term storage. They include thinning of egg white and breaking of yolk membrane. As the yolk membrane weakens and break, yolk becomes flat and homogenously mixed in egg white.

3. Microbial spoilage of eggs

In order to cause spoilage of shell of egg, microorganisms must contaminate the shell, penetrate through the pores in shell and inner membrane, reach the eggwhite and yolk and grow there. Some microorganisms cannot grow in egg white but can grow rapidly in egg yolk. Change in storage temperature facilitates penetration of organism through shell and hence facilitates microbial spoilage.

1. Bacterial spoilage of egg

Bacteria are more common spoilage organism than mold. Bacteria cause rots in egg. When bacteria grow within the egg, they decompose the content and form byproducts. This result in development of characteristic odor, appearance or color.

Green rot

It is caused by Pseudomonas fluorescence. Green egg white shows fluorescence when exposed to UV light. In later stage of spoilage, egg yolk disintegrates and masks green color of egg white. Odor is lacking or fruity or sweetish.

Colorless rot

It may be caused by Pseudomonas, Acetobacter, Acinatobacter and coliform. In later stage of spoilage, egg yolk disintegrates or at least has incrustations.

Black rot

It is caused by Proteus and sometimes Pseudomonas and aeromonas. Egg yolk blackens and then breakdown to give whole egg content muddy brown color. Odor is putrified due to H2S.

Pink rot

It is caused by Pseudomonas usually at the later stage of green rot. They are similar to colorless rot except that pink coloration occurs in yolk and white.

Red rot

It is caused by Serrotia marcesceus.

These eggs are distinguished by a rod dissociation of egg white and the surface of the yolk in ammonical i.e. putrified odor.

Custard rot

In this rot, yolk is incrusted with custard like material and occasionally has green to olive pigment. The albumin becomes thin with orange coloration. This type of spoilage is caused by Citrobacter and Proteus vulgaris.

2. **Fungal spoilage of egg**

Fungal spoilage goes through following stages.

Pin spot molding

In this case, small compact colonies of mold appear on the shell and usually just inside the shell. The color of pin spots varies with the type of mold. For example, Cladosporium give black spot and Sporotrichum give pink spot.

Superficial fungal spoilage

This occurs if eggs are stored in atmosphere of high humidity. In this case, molds grow on shell in the form of whiskers.

Fungal rotting:

It is the final stage of spoilage by mold. In this case, mycelium of the mold grows through the pores and cracks in the shell. Jellying of egg white may occur and colored spots may be produced. Hypha of mold grows through the yolk membrane and ruptures it, so that yolk mixes with the white.

Molds causing spoilage of egg include Penicillium, Sporotrichum, Mucor, Botrytis, Alternaria, Thamnidium etc.

Preservation of eggs from spoilage

Eggs have several ways of protecting itself from microbial spoilage. Shell and underlying membrane serve as first line of defense to prevent entry of microorganisms. In addition to physical barrier, egg albumin is not suitable growth medium and discourages growth of many microorganisms. Characteristics of egg albumin that discourage microbial growth include pH of 9-10, low level of simple nitrogenous compound, apoprotein that binds riboflavin, avidin that binds biotin, ovotransferrin that chelate iron, and lysozyme that hydrolyze peptidoglycan of bacteria. Despite physical barrier and other anti-microbial factors, many microorganisms can invade and cause spoilage of egg. Therefore, following methods are employed for its preservation.

Asepsis

Great care should be taken to reduce contamination by fecal matter by dust and nest. When eggs are broken for freezing or drying, spoiled egg should be discarded and contamination from equipment can be reduced by sanitizing it.

Removal of microorganism

Various methods can be employed to remove dirt and faecal matter from egg shell. Dry cleaning by sand blasting removes dirt and bloom. Washing with warm water removes dirt, bloom and apart of microorganisms but encourage penetration of bacteria into egg through pores in shell. Use of disinfectant in washing water reduces number of microorganisms.

Preservation by use of heat

Heat treatment suggested include heating whole egg in oil for 10 minutes at 600C or in water at 54.4oC for 80 min, Immersion of egg in boiling water for few second, immersion of egg in hot detergent, Sanitizer solution at 43.3oC to 54.4oC. Pasteurization is required for most egg product. Because of heat coagulability of egg, stabilization is required before pasteurization. This includes addition of aluminum salt and adjustment of pH.

Preservation by low temperature

Chilling

Eggs are commercially stored for six month or longer, at a temperature of -1.7oC to –0.55oC and relative humidity of 70-80%. If temperature is greater than -1.67, there is more rapid penetration of microorganisms and growth into egg and more physical and chemical changes. Special treatment like impregnation of egg shell with colorless and odorless mineral oil keeps out moisture slows dessication and air penetration during chilling.

Freezing

Eggs are first washed with 200-500ppm chloride solution and broken. Egg yolk and egg white are separated and they are frozen separately at -17.8oC to -20.5oC.

Preservation by drying

Eggs are first washed with chloride solution, broken and then yolk and white are separated. Liquid egg is then dried by drum drying or spray drying method. Glucose should be removed from egg before drying because it causes browning of egg.

Preservation by chemical preservative

Preservatives may be used on shells of egg in the atmosphere around them and on containers for egg. Waxing and oiling of shell keep the shell dry, reduce penetration of oxygen into the egg and reduce passage of carbon dioxide and moisture out. Immersion of whole egg in solution of sodium silicate is also a good preservative. Use of CO2 in ozone in storage atmosphere improves quality of egg.

Food safety

Contamination of eggs poses a high risk to food safety. Use of good hygiene practices (GHP) can maintain high quality and safety of eggs. The staff handling eggs should have knowledge and skills in food safety and hygiene. ¬Eating of raw egg is not recommended. Do not use the raw or soft boiled eggs in food preparation that will not be heat treated or cooked. ¬Keep the egg shell dry to prevent penetration of microbes. Eggs must be properly dried before packing. ¬¬Maintain the egg quality by using good packing, storage and transport methods. Eggs should be kept in cool temperature following packing and throughout transportation. ¬Do not send broken egg, soiled egg to the market for sale. It is important to discard the eggs that are broken and leaking. Homemade foods containing raw or lightly cooked eggs are often linked to food poisoning. Hence, thorough cooking is very important to assure the safety of eggs. It is advised to use pasteurized eggs or egg products. Do not reheat boiled eggs in the microwave. Boiled egg, fried egg, backed egg, poached egg, boiled egg and scrambled egg should be cooked until both the white and the yolk are firm. ¬The ideal conditions for storage of eggs are about -10°C and between 75-80% relative humidity. There is a risk of mould spoilage when relative humidity is too high. ¬Washing of hands, utensils, equipment and work surfaces with hot, soapy water before and after they come in contact with raw eggs and raw egg containing foods is highly imperative. Egg can become contaminated from various sources, hence, it is important to maintain sanitary conditions. The consumption of contaminated egg can cause salmonellosis in humans. Outbreaks of salmonellosis involving eggs or egg containing foods result due to inadequate refrigeration, improper handling and insufficient cooking. It is imperative to maintain high quality and safety by using good hygiene, cooking, refrigeration and handling practices.

Article

Folliculogenesis In Poultry


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Folliculogenesis is the development or maturation of the ovarian follicle which is densely packed somatic cells that contains an immature oocyte. This process outlines the succession of several small primordial follicles into large pre-ovulatory follicles which occurs in stages during the ovulatory cycle. Follicle development in the laying hen is characterized by a well-organized hierarchy (Fig 1).

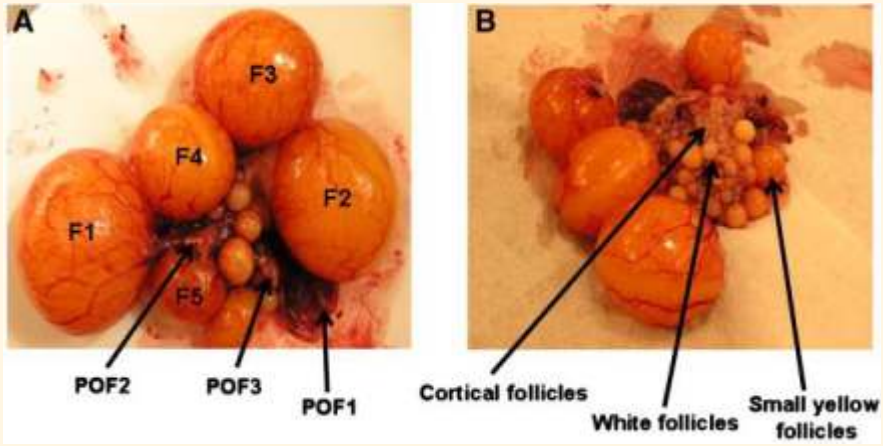


Fig 1: Follicle hierarchy POF1, POF2 & POF3

However, follicular hierarchy is not observed in birds with lower reproductive efficiency. In case of chicken, left ovary is functional both physiologically and anatomically. The right ovary is present during embryogenesis, but the distribution of primordial germ cells to the ovaries of the chicken becomes asymmetrical by day 4 of incubation andstarts regression by day 10 of the incubation. The ovary of immature birds consists nearly 2000 small ovas but only 200-500 reach maturity and are ovulated with in the production period.

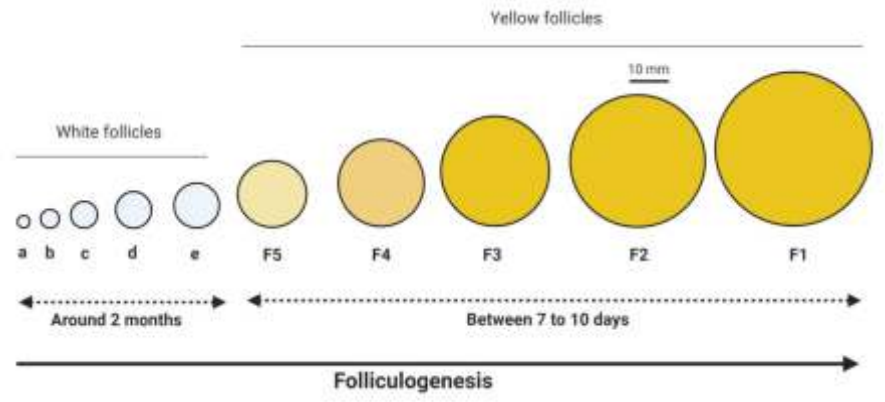
Growth of Follicles:

The single left ovary contains follicles of various sizes and developmental stages including cortical primordial follicles, white follicles and large yolk-filled follicles(Fig 1) that have recruited to the well-ordered preovulatory hierarchy.Growth from 3 to 5 mm takes 3 days, from 5 to 8 mm 2 days and from 8 mm to ovulation (40 mm) 6 days (Gilbert et al. 1983), with the total time for development from 1·5 mm to 40 mm being around 17 days (Perry et al. 1983).Yolk formation occurs in the liver and is triggered by gonadotropin and steroid hormones. A diagrammatic sequence of vitellogenesis in the hen is presented in Fig2. The yolk protein precursor, vitellogenin, is transported through the blood to the ovary, where it is cleaved into the two yolk proteins, lipovitellin and phosvitin (Deely et al., 1975). Triglycerides are transported to the yolk in the form of β- lipoproteins and later are assimilate into the yolk as lipid globules. Lipids and protein are deposited into the premature follicle withequal proportion for most of the growth phase, but during the final rapid growth phase, relatively more lipid is incorporated. The final composition of yolk in the hen's egg consists of a greater percentage of lipid (33% of wet weight) compared to protein (16% wet weight).

Hormonal regulation for follicle development

Follicle stimulating hormone (FSH) in the hen is responsible for the selection and granulosa cell development of the small follicles.FSH acts mainly on the

Fig 2: Sequence of Vitellogenesis Source:



granulosa layer of the tiny yellow and sixth (F6) to third (F3) largest follicles. It is also stimulating progesterone production in granulosa cells from F6 to F3 follicles. The Luteinizinghormone (LH) in hens does not luteinize the follicles, however it involved in ovulation and steriodogenesis. The primary target for the LH is larger preovulatory follicles (Fig 3).

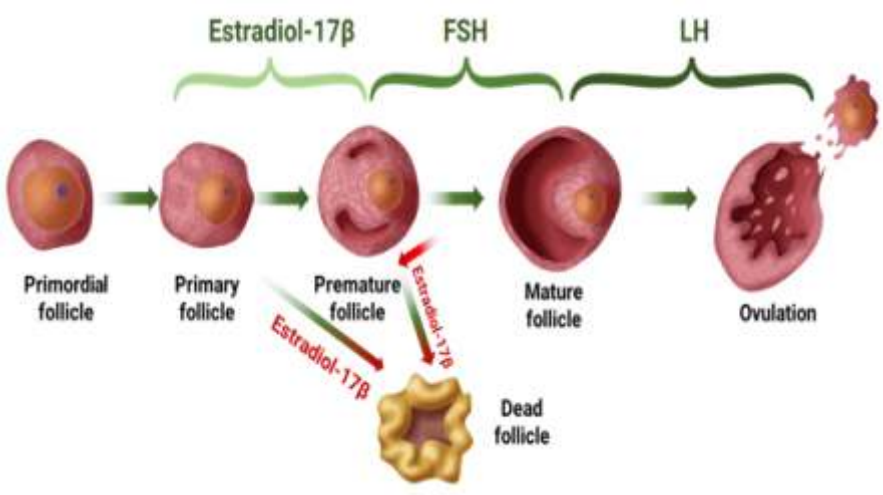


Fig 3: Hormonal regulation for follicle development

Relationship between folliculogenesis and egg production

The broiler breed of different breeder (Table 1)is performing less in actual compared to breed specific standard which creates a significant gap between actual performance and breed specific standard. There are several challenging factors that make it difficult to bridge this gap.

Table 1: Different Broiler breeder specifications

This may be due to visible factors like climate, pathogens, nutrition, and management which are completely under the control of poultry entrepreneur. These factors play important role to breeder hen performance and are major key elements for successful broiler breeder farming. However, the foundation of these factors is completely depends on hidden factors like inadequate functioning of hormones and cell damage due to oxidative stress (Fig 4).

Breed Name	Breed specific	Egg Weight (g)	Cum TE/HH (no's)	Cum HE/HH	Cum. Chicks /HH	Hatch (%)	Peak production (week)	Total Duration Peak production	Peak Hatch (%)
Broiler Breeder 1 (66 wks)	Standard	69.5	194	182.3	158	86.6	30-39	Last till 73 days	91
	Actual	67-70	174	172.7	145	84	32-38	Last till 56 days	87-88.5
	Gap	0.7-1.2	20	9.6	13	03	-	14-21 days	2.75-3.75
Broiler Breeder 2 (65 wks)	Standard	70	177.9	171.2	144.8	84.6	29-36	Last till 56 days	90.5
	Actual	69-72	169	162.6	136.6	84	31-36	Last till 42 days	86.5
	Gap	-1 to 2	8.85	8.55	8.2	0.6	-	02	04

Fig 4: Factors responsible for oxidative stress

Why to lose even a single number

EGMAX®MB a product from Natural Remedies® havea property to reduce the intracellular ROS. The key Phyto-constituents of this product are Phyto-lactones, Phyto-saponins and Terpenoids. EGMAX®MB works in laying hen with 3F:

A) Folliculogenesis improvement: EGMAX®MB increases the activity of GnRH secreting neurons/cells at Hypothalamus which in turnenhances Folliculogenisis through better LH & FSH levels at Pituitary gland. It also Enhances secretion of estrogen hormone from ovary thereby induces folliculogenesis. The study shows thatEGMAX MB has shown a significantly increase in total follicle count, serum FSH & LH levels as compared to control. (Fig 5).

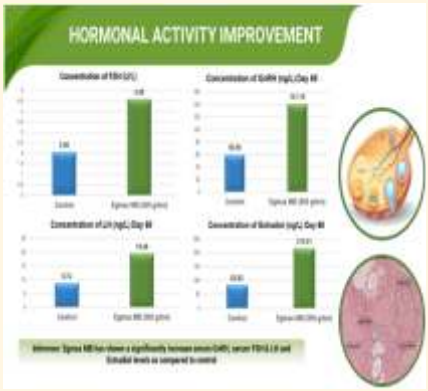


Fig 5: Graphical representation of GnRH, ESTRADIOL, LH & FSH in birds treated with Egmax®MB

B) **Free radical scavenger:** The active ingredients of Egmax®MBreducesthe level of reactive oxygen species (ROS) and in-turn reduces oxidative stress in ovarian follicles and prevents the follicle cell death. The healthy ovarian cells are necessary for produces estrogen hormone.

C) **Functional nutrition:** The active ingredients of Egmax®MBnourishes ovary and rejuvenates its functions by promoting growth and development of ovarian follicles, enhances ovulation and revitalizes the female reproductive system.

Field Trial of EGMAX- MB in different Broiler Breeder breeds

Trial 1: A trial was conducted in the month of Jan 2021 to test efficacy of Egmax®MBin Broiler breed 1 aged 41 weeks and concluded thatSupplementation of Egmax®MB at 500 g/ton resulted in Egmax MB treated group has increased HDEP %, reduced feed intake per egg (g) and increased hatchable eggas compared tostandard (Table 2-4).

Table 2: Impact of Egmax MB on HDEP (%) of Broiler breed 1

S.No.	Parameter	Age	Standards	Control	EGmax MB	Difference (As standard)
A	Pretreatment Average	41 weeks	79.00	71.91	60.46	18.54
B	After 1 month avg. (First 15 days treated with Egmax MB)	42-45 week	76.00	69.88	63.46	12.54
C	Difference(B-A)		-3.00	-2.03	3.00	6.00
D	After 2-month Avg. (First 15 days treated with Egmax MB)	46-49 week	71.50	66.61	62.30	9.20
E	Difference(D-A)		-7.50	-5.30	1.84	9.34
F	Cum. After 2-month Avg. (First 15 days treated with Egmax MB in both month)	42-49 week	73.75	68.24	62.88	10.87
G	Cum.Difference (F-A)		5.25	3.67	2.42	7.67

Table 3: Impact of Egmax MB on Feed intake (g/day) of Broiler breed 1

S.No.	Parameter	Age	Feed Intake per egg(g)
A	Pretreatment Average	41-42 week	256.94
B	After 1 month avg.(First 15 days treated with Egmax MB)	42-45 week	248.52
C	Difference(B-A)		-8.42
D	After 2 month Avg.(First 15 days treated with Egmax MB)	46-49 week	245.55
E	Difference(D-A)		-11.39
F	Cum. After 2 month Avg.(First 15 days treated with Egmax MB in both month)	42-49 week	247.04
G	Cum.Difference (F-A)		-9.90

Table 4: Impact of EGMAX® MB on Hatchable eggs (%) of Broiler breed 1

S.No.	Parameter	Age	Standards	Control	EGMAX® MB	Difference (As standard)
A	Pretreatment Average	41 week	96.00	91.65	92.71	-3.29
B	After 1 month avg.(First 15 days treated with Egmax MB)	42-45 week	96.00	92.56	93.75	-2.25
C	Difference(B-A)		0.00	0.90	1.04	1.04
D	After 2 month Avg.(First 15 days treated with Egmax MB)	46-49 week	96	92.94	93.40	-2.6
E	Difference(D-A)		0.00	1.30	0.69	0.69
F	Cum. After 2 month Avg.(First 15 days treated with Egmax MB in both month)	42-49 week	96	92.75	93.57	-2.43
G	Cum.Difference (F-A)		0.00	1.10	0.86	0.86

Conclusion:

- ✔ EGMAX MB helps to enhance quality and quantity of hatching eggs
- ✔ EGMAX MB improves fertility and hatchability
- ✔ EGMAX MB aids in optimizing egg production and egg mass
- ✔ Phyto-constituents in EGMAX MB act as functional nutrition to improve overall productivity and profitability of breeder hens.

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Threat of Avian Influenza Virus on Poultry and Human Health

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Introduction

Avian influenza, commonly known as "Bird flu", is a highly contagious viral disease of many species of birds including migratory birds and cage birds. It can also affects humans, horses, pigs, and some other animals. Migratory water fowls, especially wild ducks act as reservoir hosts for this virus and spread the disease to various parts of the world.

Etiology

Influenza virus type-A of the family Orthomyxoviridae. Having several strains/types, basing on types of Haemagglutinin (H) and Neuraminidase (N) antigens.

Presently, 16 H & 9 N (i.e. 16x9=144) strains are identified But only few are pathogenic like H5 & H7 with N1,2,3,7 & 9 combinations (Garcia et al., 1996). H5N1 is highly pathogenic to birds(mostly poultry) and also affects humans.

Transmission

- Orally
- Conjunctival
- Respiratory
- Vertical transmission is not known to occur

Common modes of infection include

- Direct transmission through secretions (feces, respiratory secretions) of infected birds.
- Broken contaminated eggs in incubators infecting healthy chicks.
- Movement of infected birds in healthy flocks.
- Fomites such as contaminated equipment, egg flats, feed trucks, and clothing and shoes of employees and service crews.
- Contact with wild birds and waterfowl, which appear to be natural reservoirs for the virus.
- Fecal contamination of drinking water.
- Garbage flies (suspected of transmitting the virus during the 1983-1984 epidemic in Pennsylvania).
- Airborne transmission if birds are in close proximity.
- The disease is highly contagious. One gram of contaminated manure can contain enough HPAI virus to infect 1 million birds.

What is the risk to humans from bird flu?

The risk from bird flu is generally low to most people. However, during an outbreak of bird flu among poultry, there is a possible risk to people who have contact with infected birds or surfaces that have been contaminated with excretions from infected birds. The current outbreak of avian influenza A (H5N1) among poultry in Asia and Europe is an example of a bird flu outbreak that has caused human infections and deaths. In rare instances, limited human-to-human spread of H5N1 virus has occurred, and transmission has not been observed to continue beyond one person.

Transmission of Influenza Viruses from Animals to People

Pigs can be infected with both human and avian influenza viruses in addition to swine influenza viruses. For example, if a pig were infected with a human influenza virus and an avian influenza virus at the same time, the genes of viruses could mix (reassort) and produce a new virus that had most of the genes from the human virus, but a hemagglutinin and/or neuraminidase from the avian virus. the resulting new virus would likely be able to infect humans and spread from person to person, but it would have surface proteins (hemagglutinin and/or neuraminidase) not previously seen in influenza viruses that infect humans.

Clinical Features of Highly Pathogenic Avian Influenza in poultry

- Sudden death.
- Severe depression with ruffled feathers.
- Inappetence.
- Drastic decline in egg production.
- Edema of head and neck.
- Swollen and cyanotic combs and wattles.
- Petechial hemorrhages on internal membrane surfaces.
- Excessive thirst.
- Watery diarrhea that begins as bright green and progresses to white
- Swollen and congested conjunctiva with occasional hemorrhage
- Diffuse hemorrhage between hocks and feet
- Respiratory signs are dependent on tracheal involvement
- Nasal and ocular discharge
- Mucus accumulation (varies)
- Lack of energy
- Coughing/sneezing
- Incoordination
- Nervous system signs such as paralysis

Complications

- Cessation of egg production, and eggs laid immediately prior to infection often soft-shelled and misshapen eggs.
- Surviving birds are in poor condition and resume laying only after a period of several weeks.

Case fatality rate

Can be as high as 100% , Death may occur prior to any symptoms or as late as a week after symptoms, though it is frequently within 48 hrs.

Lesions

- Lesions may be absent in young birds and birds that die from peracute disease.
- Severe congestion of musculature.
- Severe congestion of conjunctivae, sometimes with petechiae.
- Excessive mucous exudates in lumen of trachea.
- Severe hemorrhagic tracheitis.
- Petechiae on inside of sternum.
- Petechiae on serosal and abdominal fat and in body cavity.
- Severe kidney congestion, sometimes with urate deposits in tubules.
- Hemorrhages on mucosal surface of proventriculus, especially at juncture with gizzard.
- Hemorrhages and erosions of gizzard lining.
- Hemorrhagic foci on lymphoid tissues in intestinal mucosa.
- Ovary may be hemorrhagic or degenerated with darkened areas of necrosis.
- Peritoneal cavity often filled with yolk from ruptured ova.

Differential diagnosis

- Velogenic (exotic) Newcastle disease
- Infectious laryngotracheitis
- Acute Escherichia coli infections
- Acute fowl cholera (Pasteurella multocida)
- Bacterial sinusitis (ducks)

Cleaning and Disinfecting Solutions

Sodium hypochloride 1% : Material containing blood, body fluid

Bleaching powder 7g/ : Toilet, basin

Alcohol 70%, isopropanol, Ethanol, spirit : Table top, soft tissue

Who are in high risk groups

- Farmers and farm workers.
- Veterinarians and health workers.
- Laboratory workers.
- Wild life workers.
- Food handlers.

precautions for Farm workers/Animal handlers

- Immediate culling of infected and exposed birds
- All workers involved in the culling, transport, or disposal should use Protective clothing (an impermeable apron or surgical gowns with long cuffed sleeves plus an impermeable apron) Gloves capable of being disinfected or disposed, Respirators, Goggles, Boots or protective foot covers.
- Unvaccinated workers should be vaccinated.

Laboratory workers

Highly pathogenic avian influenza A (H5N1) must be worked with under Biosafety Level (BSL) 3+ laboratory conditions. Respiratory virus cultures should not be performed in most clinical laboratories. Influenza A (H5N1) suspected cases may be tested by PCR assays using standard a BSL 2 work practices in Class II biological safety cabinet. In addition, commercial antigen detection testing can be conducted under BSL 2 levels to test for influenza.

All employers processing biologic specimens suspected of being infected with influenza A (H5N1) must ensure protection.

Veterinarian/wildlife workers

- Pay careful attention to hand hygiene before and after handling animals/birds.
- Contact Precautions : Use gloves and gown for all patient contact.
- Eye protection : Wear when within 3 feet of the patient.

Medical workers that transport/treat avian flu patients

Standard Precautions: Pay careful attention to hand hygiene before and after all patient contact.

Contact Precautions : Use gloves and gown for all patient contact.

Eye protection : Wear when within 3 feet of the patient.

Airborne Precautions : Place the patient in an airborne isolation room (i.e., monitored negative air pressure) The CDC has recommended recommended respirator.

Handling of avian influenza birds (Capua et al.,2006)

Vaccine against H5N1 in avian influenza

Sanofi pasteur (Swiftwater, PA) and Chiron (Emeryville, CA) are developing vaccines against H5N1 AI. Seasonal Influenza vaccination should be Continued (World Organization for Animal Health).

Conclusion

The scientific veterinary community must control AI infections in poultry for several reasons: to manage the pandemic potential, to preserve profitability of the poultry industry, and to guarantee food security to developing countries. Although biosecurity is recognized as an excellent means of preventing infection, in certain situations the biosecurity standards necessary to prevent infection are difficult to sustain. Vaccination is a potentially powerful tool for supporting eradication programs by increasing the resistance of birds to field challenge and by reducing the amount and duration of virus shed in the environment. Vaccination strategies that encompass monitoring of infection in the field are crucial to the success of such efforts.

Importance of Vaccination In Poultry Sector

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Poultry production offers various types of animal proteins in the form of meat and eggs. A wide range of illnesses can affect poultry. Some of the more prevalent ones are chicken typhoid, pullorum, fowl cholera, chronic respiratory illness, infected sinusitis, infectious coryza, avian infectious hepatitis, infectious synovitis, blue comb, Newcastle disease, fowl pox, avian leukosis complex, coccidiosis, blackhead, infectious laryngotracheitis, infectious bronchitis, and erysipelas Strict hygienic standards, the wise use of medicines and vaccinations, widespread use of cages for layers and confinement rearing for broilers, and other practices have made it possible to effectively control disease.

Vaccination and it's Importance for Layer Poultry Farming:

An effective and safe dose of a biological preparation known as a vaccine is used to enhance active acquired immunity against a specific disease. They are produced utilizing a variety of methods, including egg-based vaccines, cell-based vaccines, and experimental production systems (plant, bacterial culture, and insect cell systems).

Vaccination program is a must for chicks for keeping them free from all types of diseases. Chicks must be vaccinated in order to be healthy and free from various diseases. Vaccination plays a key role in the management of the health of the poultry flock. A variety of diseases affecting chickens can be avoided using vaccinations. Through the procedure of vaccination, a dead or weakened pathogen is deliberately introduced to healthy hens. After the vaccination, the birds' own immune system will respond to the vaccine by initiating an army of cells designed to try to destroy the invaders before they cause damage to the bird. After the attack, numerous specialized immune system cells remain, called memory cells. These memory cells will keep in mind the infectious agent against which the bird was immunized. These memory cells will keep in mind the pathogen against which the bird was immunized. If the infectious agent is encountered later in life, the bird's immune system has the ability to quickly "identify and kill" the pathogen, providing protection from the disease and preserving the productive health of the flock.

The following is a list of the primary benefits of vaccination for poultry.

- Timely vaccination helps make disease resistance power in the body of chick.
- Help keep infectious poultry illnesses away from the hen.
- Disease prevalence will be less.
- Mortality rate will decrease.
- low mortality rate = more production = more profit.

Before Vaccination of Poultry:

Prior to immunization, you must follow a few guidelines.

- Hold the poultry very carefully.
- Vaccinate the hens gently.
- The sick fowl do not require vaccination.
- Wash the vaccination equipment with viraclean or hot, boiling water.

- Perform the immunization programme when it is cold outside.
- A healthy bird can always benefit from preventative immunization. Never immunize a sick bird.

Age, dose and route of vaccine:

Route and dose prescribed by the manufacturer must be followed. Under dosing will not protect the bird adequately. The age of bird at vaccination, proper timing of revaccination affects the level, quality and duration of immunity.

Vaccines can be given:

a) Parentally -Subcutaneous, intramuscular, intranasal, and intraocular are the parental routes.

b) Orally -The vaccine is given orally through drinking water. For effective oral vaccination in birds, the following safety precautions must be noted:

- In hot weather, turn off the water supply to the birds for an hour; in cool weather, turn it off for two hours before vaccination.
- When combining the vaccine, use simple water without any water sanitizer.
- Water and skimmed milk powder should be combined before the vaccination is added. A 3g/Lit of water mixture is required. This both stops the residual sanitizer's ability to kill microbes and stabilises the microbial antigens. The vaccination has to be diluted in water that will be ingested by the bird within an hour.
- Comply with the manufacturer's directions.

Types of Vaccines

- **Live vaccine:**

The diseasecausing organism is the vaccine's active ingredient. As a result, it has the ability to cause the sickness in birds that have never previously come into touch with that bacterium. In many circumstances, if kept together, vaccinated birds can spread diseases to non-vaccinated birds.

- **Attenuated vaccines:**

These vaccines include an organism that has been rendered ineffective at causing the serious form of the disease via the use of special manufacturing techniques. The vaccination can still cause the immune system to create antibodies even if the birds only get a very minor case of the disease at worst.

- **Killed vaccine:**

with this type of vaccine, the pathogen has been killed and unable to cause the disease, although the capacity to trigger the immune system remains. The amount of immunity provided by this type of vaccination is frequently lower than that of live and attenuated vaccines.

Vaccine in chick by oral drop method

Suggested Vaccination Programme for Broilers		
Age	Disease	Route of vaccine Administration
Day-old	Marek's disease HVT- strain	Subcutaneous (S/C) at hatchery
5-7 days	Ranikhet disease F/ LASOTA/VH strain	Nasal drop or Oral drop Drinking water
12-14 days	Infectious Bursal disease (IBD) 'MB' intermediate strain	Oral drop Or Drinking water
Source: www.vuatkerala.org		

Vaccine in chick by oral drop method

Suggested Vaccination Programme for Layers		
Age	Disease	Route of vaccine Administration
Day-old	Marek's disease HVT- strain	Subcutaneous (S/C) at hatchery
5-7 days	Ranikhet disease F/ LASOTA/VH strain	Nasal drop or Oral drop Drinking water
14-15 days	Infectious Bursal disease(IBD) 'MB' intermediate strain	Oral drop Or Drinking water
4-5 weeks	Fowl pox ' BM' strain	Intramuscular (I/M)
6-8 weeks	Ranikhet disease R2B strain	Intramuscular (I/M)
8 weeks	Gumboro disease (Live) (Only in area of out break prone)	Oral drop Or Drinking water
Source: www.vuatkerala.org		

Conclusion

Vaccination is a crucial component of poultry husbandry that supports hens' immune systems. A good vaccination regimen will protect chickens from contagious illnesses.

Cage-Free Egg Production: Trends & Challenges

For decades, cages had been the essential element of an egg production system. Without a cage, cannot imagine the overall design. However, concerns were raised over the last few months, and the same are driving egg producers, food service companies, consumers, government, and retailers. The situation has worsened so much that cage eggs can be banned from the supply chain. The European Commission (EC) has taken initiatives and is committed to prohibiting age use and will soon present a law to address this issue by 2023. Even without law or any ban, many retailers, food service companies, large egg producers, and hotel chains are even taking strict steps against cage eggs.

It has been widely discussed, researched, and finally recognized that equipped cages improve behavior and expressions and the bird's bodily form. A consumer can choose because different egg production systems cause other inherent traits. For consumers, it's natural to demand to want to reserve the opportunity to provide freedom and the right to choose from the products to purchase.

Remarkably, this is the case for those customers who are increasingly health-conscientious, as there is no difference between a cage and cage-free eggs in terms of egg nutrition.

There are various challenges and uncertainties in the production of cage-free eggs:

- Additional cost for Suppliers: The additional cost of creating and maintaining houses will increase the cost and bring down the producers' profits. Will the egg buyers like chain restaurants, retailers, and grocers compensate for this additional cost?
- Indoor air quality concerns: This is another challenge for both workers and hens, as when hens are left free, there will be higher levels of dust due to wing-flapping and flying. It could lead to widespread airborne bacteria and cause atmospheric ammonia. Ultimately it will result in health problems for both hens and humans.
- Increase of Accidents: When left free and unattended, there could be a higher mortality rate and may also cause injuries to the birds due to ground-scratching. Some of the injuries could be deformed keel bone or fractured legs.

Lack of Cleanliness:

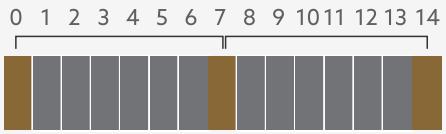
- Cleaning and Maintaining the houses or floors could be difficult for the workers, leading to litter floors as the place could remain uncleaned. Such incidences would increase microbial contamination, reduce the nutritional part, and may give rise to a new disease.
- Higher potential for diseases: Though managed, cage-free hens can quickly achieve good performance and increase productivity. But, a lack of Cleaning and Maintenance and good homes for the hens can cause various health issues and accidents.
- Lower feed efficiency: Lack of attention which raises the environmental footprint system, can lead to a lack of food intake of the hand and ultimately affect the production of the eggs.

Nutrition skills, Management practices, improved genetics, and improved housing design are some solutions that could overcome the shortcomings and challenges.

However, these solutions will take time to execute. While research and development are growing on these issues, there is a long way to go. The industry has crossed decades of research and innovation to reach where it is today.

Six Considerations for Choosing Xylanase Enzyme in Broiler Feed

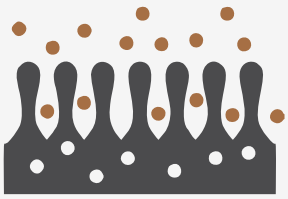
Superior Thermal stability



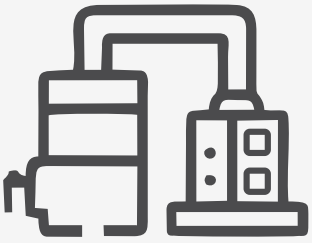
Ideal pH profile

Gastric stability

Product efficacy data



Improvement in Gut morphology



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Article

Functional Properties of Egg

Sachin Dongare[1], Indrayani Gawas[2], Mohit Bharadwaj[3] and Manoj Kumar Singh[4]

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Introduction

India is the third largest egg producing country in the world with an estimated production of 114.38 billion number (2019-20) from 215 million layers. Egg production in India is growing at a compounded annual growth rate (CAGR) of over 10.29 per cent. The egg having most of the nutrients which helps to develop a new life. In India per capita availability is 86 egg per person. Most of the egg producing industries like Suguna, Venky's, IB Group, Skylark produce eggs and chicken and sell in market with their own brands. Egg having various other properties which can use to prepare other products, bakery products, drinks, dishes, pharma industries, animal feed, treatments etc.

Functional uses

A. Egg Used in Food Production

Egg products are invaluable in a huge variety of food production and processing industries. Different properties of egg like binding, emulsification, coagulation and adhesion are integral to the production of a large number of food products found in every supermarket.

1. Confectionery

Egg acts as a binding agent for fondant and other soft fillings, improving the softness and texture and adding richness. Confectionery such as chocolate bars and fondant are stabilised by egg proteins.

2. Dairy products

The addition of egg to ice cream and other frozen desserts improves consistency and decreases melting point. To eliminate crystallisation and ensure a smooth texture, eggs are included in frozen dairy products.

3. Prepared foods and sauces

Egg gives a smoother texture to pre-prepared microwaveable dishes. Frozen microwaveable dishes which include egg have better freezing and thawing properties. Foods such as mayonnaise, salad dressing, dips and sauces are bound and emulsified by the addition of egg.

4. Drinks

Egg whites act as a clarification agent in the manufacture of wine and some juices, inhibiting enzyme growth and prevent browning of the product.Adding egg to yoghurts and probiotic drinks gives a desirable creamy texture to the product.

B. Egg Uses in Bakery Sector

Properties such as binding, emulsification, coagulation and adhesion are integral to the production of a large number of food products in the bakery sector.

1. Bread

- Mostly egg added to the recipe it acts as a humectant, trapping moisture in starch molecules to prolong shelf life while preventing products from becoming soggy.
- Egg keeps a stable pH in bread products.
- Standard bread and rolls are given an egg wash to brown and glaze the crust, locking in flavour and aroma.
- In speciality breads and rolls, egg gives flavour and structure as well as allowing ingredients such as seeds and grains to adhere to the bread.

- All breads are given body, softness and smoothness by the addition of egg to the recipe.

2. Frozen bakery products

- To prevent thawed products from becoming soggy, egg proteins act as insulators to maintain texture and palatability.
- Control of crystallisation in frozen products is achieved by the addition of egg proteins, which stabilises the product during reheating and baking.

3. Cakes and other baked products

- Cakes of all kinds depend on eggs to achieve volume and height. Egg proteins create foam, which results in a lighter and airier cake with a solid structure.
- Meringues and other light items are aerated by the foaming effect of egg.
- Binding in cakes, pastries, muffins and other bakes products can only be achieved through the use of egg, which gives a more desirable texture.
- The addition of egg carries and enhances flavours in the product.

4. Custard fillings

- The coagulating effect of egg acts to gel the filling and add richness.
- Phospholipids and lipoproteins found in egg act as emulsifiers, maintaining oil and water emulsions to stabilise custards.
- Xanthophyll pigments in egg yolk give a rich yellow colour to custard fillings.

5. Frosting and icings

- Frostings, icings and fillings are improved by the addition of egg products. Egg proteins coagulate from a fluid state to a gel, which acts to thicken and the recipe.
- Proteins in egg white prevent sugar crystallisation and promote smoothness in the finished product.

C. Egg Uses in Wider Field

Because of the functional capabilities of eggs, Liquid, frozen or dried egg products are utilised in the manufacturing process across a number of additional industries. There are various industries currently utilizing egg includes:

1. Cosmetics

- Egg white is frequently used in face masks.
- Egg yolk are used to made shampoos and conditioners.

2. Science

- Mostly in science egg is used as a medium for the growth of microorganisms, including viruses in the manufacture of vaccines. Lysozyme, found in egg proteins, is an antibacterial agent.
- Laboratory animals may be fed egg when a protein reference is required.

2. Animal feeds

- Normally yolks and whites are used in the manufacturing many pet foods.
- Grinded eggshells are given to laying hens as a source of calcium and protein.

D. Industries Use

- **Face mask:-** For creating a skin-firming face mask mix egg whites with a little bit of water. Egg whites help to reduce puffiness, leave pores looking smaller and are thought to have anti-aging properties.
- **Leather cleaner:-** Egg white has a sticky qualityso it makes them good at cleaning certain surfaces, in particular leather. Egg whites also form a protective covering for leather. Gently rub onto shoes, bags or even sofas, and then wipe off with a cloth.
- **Glue:-** Dry egg whites, become increasingly sticky. Although not particularly strong, but it works well as glue for paper or light cardboard.
- **Hair conditioner:-** Sperate the egg yolk and mix with water or olive oil for a rich conditioner then apply the mixture to your hair after shampooing and leave on for about 10 minutes.
- **Biscuit decoration:-** For preparing or decorating biscuit simplymixing egg yolks with water and use when baking biscuit. For example: spinach or parsley for green, baked beetroot for purple and saffron or chamomile for yellow
- **Fertilizer:-** As we know shell is the richest source of calcium, so simply crush the shells and add into the soil to increase the calcium content.
- **Pan cleaner:-** Adding crushed shells to soapy water for creating a natural abrasive cleaner to use on pots and pans. The rough edges help to remove tough stains, and possibly remnants of scrambled eggs!
- **Seed holders:-** After breaking the egg shell in two parts in same portion fill with soil, fertilizer and add the seeds. The calcium from eggshells can also help seeds to grow. After growing small seed it can be use as show purpose in the house.
- **Pest repellent:-** Egg shell has a rough surface, so when the crumble eggshells spread or sprinkle on your plants or soil, you can deter pests such as snails and slugs.
- **Fabric whitener:-** Used only clean shell of eggs and then put it into small cotton bag into your washing machine along with the laundry to whiten your whites.

In Vivo Feeding: New Approach Towards Chick Feeding

Priyanka Bhandari[1], Anshu Rahal[2] Mohit Bharadwaj[3], Manas Arora[1] and Shriya Bhatt[1]

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Introduction

In ovo feeding is a very new concept of feeding during the late embryonic stage and early post-hatch stage as it is critical for the enhancement of a functional intestinal tract. Addition of the essential nutrients, when the embryo is in the egg can increase the possibility of increase in hatching weight, growth performance, and pectoral muscle weight of broiler chickens. The growth and development of the GIT in initial stages are of critical importance to enhance nutrient utilization in poultry.

During the transportation of the newly hatched chicks, the chicks don't have water or feed in easy access for about 48–72 h and also they don't have any training regarding feeding so it is difficult to feed during transportation between hatchery and production farms. The time taken in providing early nutrition, exposure to the microbes, and the triggering mechanism of stimulation of the immune system of chicks. In ovo feeding can provide early nutrition with lot of essential nutrients and additives to embryos, also it stimulate gut's good micro flora, and help in mitigating the adverse effects of starvation during all this periods. On the basis of the birds transportation or the nutrient supplementation, the nutrient and the additives which is to be given to the embryo is either around day 12 or 17 to 18 of incubation and via air sac or amnion.

In commercial poultry rearing, the newly hatched chick health is very Important from the point of view of the profit generated from the flock when reach in the market. The general rule in any hatchery is that, at a particular time if more than 95% chick is hatched than only the chicks are shifted, so it leads to addition of time to those which has hatched earlier, also added to the time required for hatchery treatments and transport to the rearing farm, that means those chicks may be deprived of feed and water for up to 48–72 h. The yolk which is lasted for this period is mainly comprises of fat and protein as a major source of energy for the maintenance and growth. The absence of feed after hatching show the adverse effect those can be retarded growth, weak immune system, weak digestive system and improper or incomplete organ development.

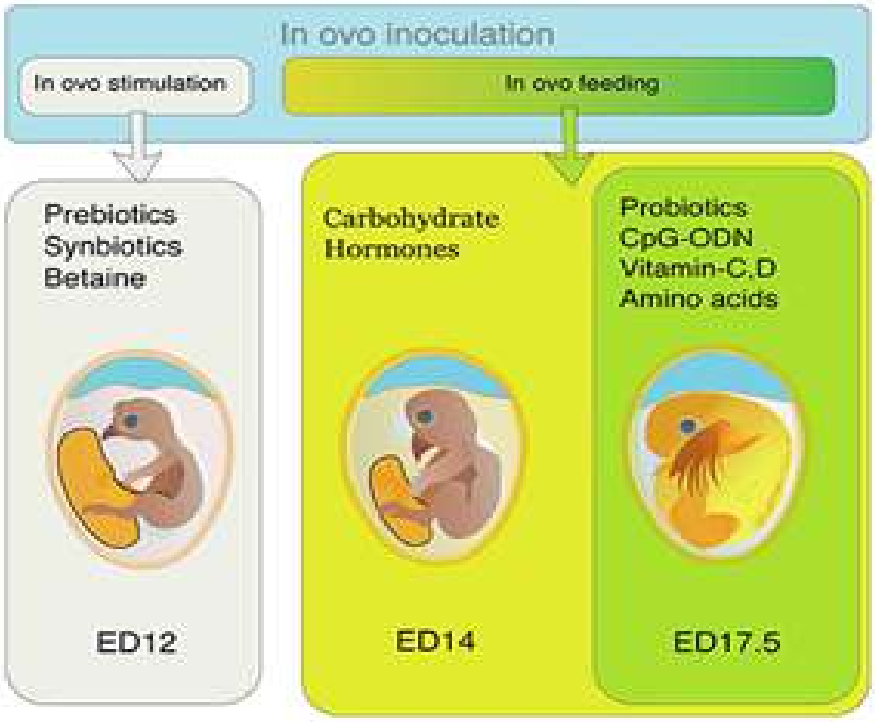
In ovo Feeding

The nutrient or bioactive compound provided to the chick from different routes i.e. amnion, air sac, amniotic fluid of egg on day 14th to 18th. This type of feeding is called in ovo feeding. These nutrient which injected in the egg, provides nutritional support to the pre- and post-hatch chicks. This feeding provides help to the chick in post hatch.

Routes and Time of In Ovo Delivery

It is very important and crucial to know the route of administration and the time to inject the nutrient for in ovo feeding as it result in the main output or future success. The in ovo injection of amino acid into the eggs is injected through the yolk sac or extra embryonic cavity. the route through air sac is chosen when the

administration is done in early phase of the incubation and amnion or the amniotic fluid is chosen to deliver the nutrient or additive compound at late phase of incubation. For administration of is done more efficiently through air sac route as compared to the other methods like spray vent lip or oral gavages methods. A bioluminescent non-pathogenic E. coli DH5α was injected into the embryo through either the air cell region or through the amnion on day 18th to know the visceral load in different viscera.



Tools for in ovo Delivery

There are two types of tools requied that are manual and automatic. The manual tools have a disadvantage that they are time-consuming and also sometime limit the scaling up the sample size for research. Whereas the machine or automatic tools can deliver the biological substance in the egg as much faster rates i.e. 12,000 – 70,000 per hour. The machines can do more work with efficiency i.e. dual needle system, automatic needle sanitation, adjustable needle depth, vaccine saving technology, live, embryo detection, candling technology, and viable egg transfer.

Bioactive Compounds Administered Through in Ovo Injection

1. Vitamins- these are essential for the newly born for proper development and proper functioning of metabolic cycles in the body for initiation for energy or protein metabolism. So, vitamin-C i.e. L-ascorbic acid alleviates the stress-related responses when birds go through stress due to the exposure of overheating during the end of the incubation.

2. Amino Acids and Their Metabolites- Heat stress (HS) can lead to the formation of reactive species. The heat stress can cause oxidative stress that may lead to up regulation of the defense system to adapt the cells against the stress, leading to cell injury, and cell death through apoptosis or through necrosis. The significant role of amino acids like Methionine and cysteine with their metabolites i.e. taurine, polyamines etc.the presence of amino acids are crucial for protein synthesis, immune functions and oxidative actions.

3. Carbohydrates- carbohydrates are required during late embryogenesis, and generated through conversion of glucose through glycolysis from the liver reserve of glycogen, through gluconeogenesis from fat, or from protein; initially from amnion albumen, and then from muscle.l organs.

4. Pre biotic- these are compounds that induce activities of beneficial microorganisms and these are Carbohydrate-rich fibers (containing oligosaccharides, polysaccharides, etc.) which are fermented in the ceca by microbes and produce short-chain fatty acids (SCFA) along with other metabolites and changing the cecal microbial ecology and promoting the gut health of host animals. The commonly used prebiotics are galactooligosaccharides (GOS), Inulin, mannan, and fructooligosaccharides (FOS), oligosaccharides (MOS).

5. Probiotics- Probiotics help establish a beneficial gut microbiota that is congenial to the development of gut-associated lymphoid tissues and intestinal integrity.

6. Hormones- These are administered in the broiler embryo on day 18th through the air cell, albumen, or amniotic fluid in quantity like 0.1, 1 or 2 µg.

Conclusion

The advancement in technology opens various gates for changing world. As the field of poultry nutrition is also one of them. The increasing demand and the increasing weight gain in short period of time lead us to think of new innovation like in ovo feeding. It is new and indeed a technique, the administration of digestible nutrients in ovo can improve bird quality, increase glycogen reserves, fast development of the total digestive tract, superior skeletal health, better muscle growth rate, and higher body weight gain, improved feed conversion, and enhanced immune function. The prenatal nutrition is a vast field for research as poultry industry is a very large industry and as human population is increasing day by day it will be huge in future. So, for that matter we should be considering this technology and use this in commercial scale.

Induced Moulting in Layers – A Descriptive Overview

Suyesha Kadam [1]*, B.C. Mondal[2], Mohit Bharadwaj[3], Shriya Bhatt[1], Priyanka Bhandari[1] and Manas Arora[1],
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Moulting is defined as a normal physiological process of shedding and renewing feathers in feathered species which occurs in both male and female.in the wild state birds usually shed and renew old, worn plumage before the beginning of the cold weather. This process of shedding feathers is controlled by gonads and the thyroid gland which is associated with drop in estrogen levels and decreasing rate of egg production.it occurs once a year in natural circumstances.

Natural moulting in commercial layers occurs normally after 8 to 12 months of egg production. Loss of feathers in birds is a orderly process beginning with shedding of feathers from head followed by feathers on neck, body, wing and at last tail. Onset and length is affected by several factors such as Weight and physical condition of the bird, Length of light exposure, Nutrition of the bird and Environmental temperature and humidity. Themoulting process can be fastened through a program of induced moulting, thereby recycling the hens for another period of egg production and improved egg quality.

Purpose of Induced Moulting (Flock Recycling)

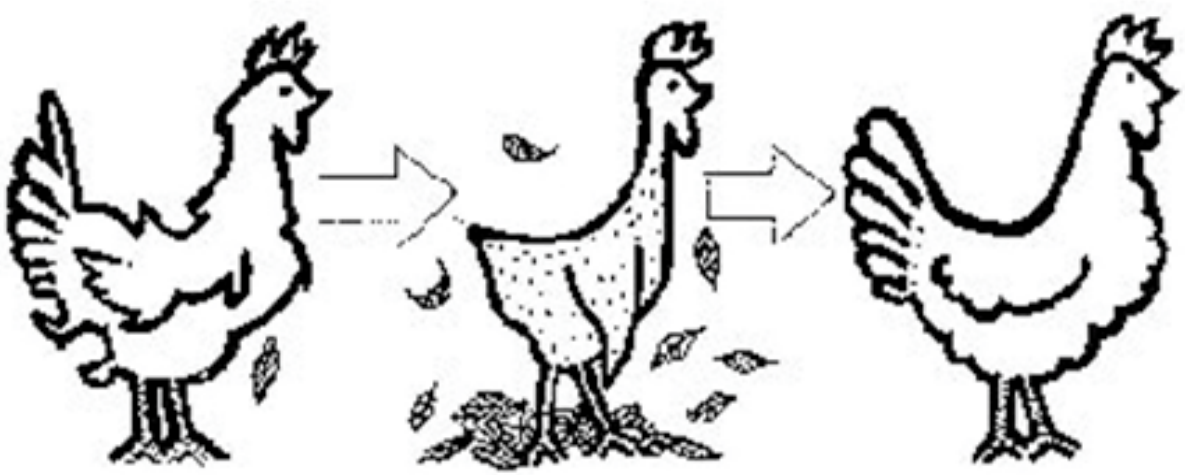
It helps to decrease the cost to bring the flock into production. It causes the increase in length of egg production. It is helpful when the current egg prices are low in anticipation of higher egg prices after the flock returns to production. Moulting can be performed when there is availability of empty laying houses.

Induced Moulting Requirements

During induced moulting a layer flock is induced to shed and replace its feathers at a time selected by the flock manager. An induced moult causes all of the hens in a flock to go out of production for a period of time. During this period, regressing and rejuvenation of the reproductive tract occur, accompanied by the loss and replacement of feathers.

Induced Molting Involves Three Main Factors:

a) Initiating the Moult- All moulting programs require that egg production be reduced to zero, which is usually accomplished by fasting (no feed) the flock or by limiting critical nutrients such as protein, calcium or sodium until or beyond the time of production ceases. Artificial lights should be turned off in open-sided houses and reduced to not more than 8 hours in environmentally controlled houses.



b) Resting the Flock- Once the flock is out of production, it may be held out of production for as little as 1 week to as much as 4 to 5 weeks depending on the requirement and the feeding program implemented during this period. The level of nutrition can regulate the length of the resting period. Low-protein or low-calcium diets will generally keep a flock out of production.

c) Returning the Flock to Production- When the flock is to be returned to production, a layer diet should be fed and lights should be returned to the normal lighting program for layers. A 50% rate of lay should be reached in 2 to 3 weeks and the peak should follow in an additional 2 to 4 weeks.

Types of induced moulting programme

a) Two cycles moulting program- This program involves one moult and two egg production cycles. The hens are moulted after about 10 months of egg production, brought back into egg production and then sold at about 24 months of age.

b) Multiple- cycle moulting program-This program involves two or more moults and three or more cycles of egg production. The hens are first moulted after about 9 months of production, then held through successfully shorter cycles and sold at 30 or more months of age.

Method of induced moulting

1. Low nutrient diet program
2. Moulting by feeding zinc
3. Use of drugs and other compounds

Low nutrient diet program

Many countries do not allow egg producers to use the fasting methods because of concern for the welfare of the flocks. In such instances, the producer must use feeding programs which will achieve zero egg production without resorting to the complete removal of feed. These methods include

1. Full or limited feeding of low protein or low nutrient diets
2. Pullet diet - calcium and phosphorus levels
3. No water restriction
4. Reduction of day length

Moulting by Feeding Zinc

About 20g of zinc per kg in the layer diet (25kg of zinc oxide per ton feed) is used for a period of 5 days along with reduced photoperiod. Then the birds are subjected to a regular laying ration containing 50 mg of zinc per kg diet (Normal level) and increased light period (14 to 16 hours). While on the high zinc program, hens will eat less than 10% of the normal amount of feed and will lose from 450 to 340g of their original weight within the first 7 to 10 days. Egg production should stop by the fifth day after zinc feeding is started. Birds will come back into production about 7 days after the high zinc diet is removed and peak egg production (75 to 80%) occurs depending upon the age at moult.

Use of drugs and other compounds-

Compounds such as methalibure, enheptin, progesterone, chlormadinone, aluminium, iodine and others have been shown experimentally to effectively produce a moult.

Advantages and disadvantages

The advantage of keeping hens during the moult is cheaper to carry a bird through a moult than to buy replacement pullets. The main disadvantage is that although moulted birds eat less feed than pullets, they, alsolay less eggs. Overall, their conversion of feed into eggs, and feed cost per dozen eggs is higher. During the moult the birds continue to eat but remain unproductive. If the birds are to be slaughtered for the table after two years of laying, they will not be as tender to eat too.

Conclusion

Induced molting is the practice of artificially provoking a flock to molt simultaneously, typically by withdrawing food for 7–14 days and sometimes also withdrawing water for an extended period. It is usually implemented when egg-production is naturally decreasing toward the end of the first egg-laying phase. The purpose of forced molting is therefore to increase egg production, egg quality, and profitability of flocks in their subsequent laying phases.

Nandus - We Walk The Talk

Narendra K. Pasuparthy returned to India in 2008 to join his family business, the Bengaluru based Nanda Group. Established in 1963, Nanda Group are one of the pioneers of poultry farming industry in India.

Initially focusing on the family business he soon realized the problems ravaging the industry and the opportunities to be explored.The largely unorganized meat sector, and the huge demand-supply gap in the meat retail space led him to conceptualize and launch Nandu'sin 2016.

Today Nandu's with 55+ retail outlets across Bengaluru and Hyderabad also offers home delivery via their e-commerce website, app, call-center orders and popular e-commerce marketplaces like Swiggy, Dunzo etc.

Nandu's ever-expanding product portfolio currently offers 71SKUs for online and 97 SKUs for offline retail which include fresh chicken, mutton, fish and seafood that is responsibly farmed and sourced, free of antibiotics, steroids, hormones and all chemicalsat an affordable price.

The plan is to set up 600 stores across India by 2026 and take the current turnover of over Rs 500 crore to Rs 2,000 crore with a growth projection of 100 percent Y-o-Y for the next four years.

Health, safety and hygiene are a priority today and consumers demand greater trust and transparency from brands in the food sector. Consumers should know what they are eating. Nandu's have an edge because they offer an end to end solution with the entire supply chain from farm to the fork that is tech-enabled.

The Nanda Group already owned farms and the backend with their own feed mills, breeding farms, hatcheries, broiler farms, processing centers. With contract farmers the feed, management and technical services are provided by them ensuring quality, traceability and transparency.

Quality is the key starting with the right kind of feed, to growth of hens,

egg health, incubation and hatching of chicks and all other processes which are captured by ERP.Some of the farms are solar-powered and the litter is processed to produce bio-gas. The capital expenditurewhile heavy, puts the team in an enviable position.

Cold chain infrastructure is a critical component in meat handling.Nandu's completes this with food factory, cold chain infrastructure and retail stores.

The company hygienically cleans, cuts, and packs fresh, healthy, high-quality meat and meat products in FSSAI-certified production facilities & FSSC-certified processing centers, untouched by bare human hands.

Nandu's has been at the forefront of bringing innovation, effectiveness, and efficiency to the way meat is produced and delivered to the Indian consumerirrespective of where they are based.The company adopts stringent quality checks across the supply chain and follows global food safety standards for the processing, handling and storage of meat.

They are also a zero-waste company in the making the eco-friendly packaging has been a game-changer and now the goal is to go 100% plastic-free. This will strengthen their commitment to becoming a 100 percent sustainable and environment-friendly company.

Nandu's has been consistently raising the bar and are counted among the most trustworthy brands in India.

At Nandu's, it is about walking the talk when it comes to animal welfare, responsible farming, and sustainability.

Desiccant Rotors International - Turning Walls into Doors

DRI®
Innovative Air Solutions

Educating the underprivileged has been a key focus of DRI's CSR Policy.DRI's CSR work is inspired by Late Rai Bahadur Dr. Mathra Das Pahwa, a philanthropist, eminent eye surgeon & educator who worked tirelessly in the field of vision, more so, for cataract surgery and education. Dr. Mathra Das Pahwa had set up the Civil hospital and many educational institutions in Moga, Punjab. He was awarded the Padma Shri in 1954 in recognition for his charitable work and contribution in the field of cataract.

Mr. Deepak Pahwa, the Chairman of Pahwa Group and Director of Desiccant Rotors International Pvt. Ltd. draws inspiration from his grandfather Dr. Mathra Das Pahwa for his philanthropic activities and contribution to the society.

DRI's focus areas are:

- **Vision:** Promoting preventive care with a special focus on the cataract "Eye Care"through the "Dr. Mathra Das Pahwa – Vision Outreach Program".
- **Education:** Promoting education, including special vocational education and skill development for increasing employment opportunities.
- **Environment including Hygiene and Sanitation:** Educating projects for environmental sustainability and making available safe drinking water & sanitation.

DRI shall give preference to the local area and areas around it where it

operates. However, DRI shall be keener to support interventions that address the needs of the vulnerable, marginalized and low-income population in rural areas.

Under DRI CSR initiatives, the following educational programs are supported:

Primary Education

- "DRI Pathshala" in Gurugram, caters to underprivileged children and creates a Primary School environment conducive for non-school-going children and weak students who are given remedial classes.
- DRI Gyantantra Digital Dost" which caters to underprivileged children and provides Gyantantra Digital Dost (GDD), a PC-based, interactive learning tool to improve the learning process of primary school-going children.

Vocational Skill Development

- "DRI Udaan Spoken English Course" in Udaipur provides Spoken English Course to the underprivileged youths.
- "DRI Udaan Skill Development Center for Beautician and Tailoring" provides Beautician and Tailoring course to girls/women.
- "DRI Udaan Skill Development Center for Computer Training" provides computer training to underprivileged girls Scholarship Programs
- To encourage education and help bright students from economically weaker backgrounds to continue their higher education after they pass out from school.

Bry-Air and Desiccant Rotors International the two flagship companies of the PahwaGroupnhave adopted learning centres in Haryana with NGO partner Literacy India.This initiative by the Pahwa Group has provided primary education to 6000+ children, scholarships to 100+ students and 2000+ youth have received skills training in electronics, computers, beautician and tailoring and benefitted 700+ students with its library facility.

ABTL
ENZYMES • NUTRITION • TECHNOLOGY

Bringing smiles in other's face is all We need !!

An initiative for something good !!

Food Safety is everyone's business. Let's draw attention & inspire action to help, prevent, detect & manage food borne risks.

SAFE FOOD FOR A HEALTHIER TOMORROW..

Sumit Sipany
Product & Marketing Executive, ABTL






On the 4th anniversary of World Food Safety Day - 7th June 2022, ABTL organized an activity of distributing food packets & water to the needy persons across the city of Pune. "There are people in the world so hungry, that God cannot appear to them except in the form of bread".



"Production of safe food is a joint responsibility of every stakeholder including government to create a healthy future. Interestingly, food safety is a science of greater implementation with various authentic research activities ensuring sustainable production system. And safety, sustainability is a balanced business opportunity for everyone."

SAFER FOOD BETTER HEALTH !!

Scan the QR code and watch Mr. O.P. Singh sharing his insightful thoughts on the occasion of World Food Safety Day!

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Novus Knowledge Forum on Gut Health Optimization in Poultry

Bangalore, India (28 July 2022) – As a way to share knowledge on how gut health can impact poultry production, Novus International, Inc.,hostedthe first in a series of informational forums titled Gut Health Optimization in Poultry in the cities of Kolkata (West Bengal) and Pune (Maharashtra) on 15 and 17June2022 respectively.

Kolkata and Pune are prominent poultry-producingareas in India. Both the markets consist of strongly integrated farming, commercial feed operations, and a mix of layer farms. With increases in demand for broiler meat and eggs, the challenge of getting good quality raw feed materials at a competitive price is increasing. At the same time, maintaining good gut health is an ongoing challenge for poultry producers. There are certain organic acids and essential oil complexes that have become an important tool to improve/optimize bird gut health. Novus hosted these events with an aim to provide insight on how to use these feed additives and other options to positively impact poultry gut health.

The Novus Forums received an overwhelming response with over 70 attendees that included integrators, feed millers, and layer farmers, along with eminent thought leaders from the poultry industry.

The keynote speaker was Dr.D. Chandrasekaran, a retired professor of animal nutrition at TANUVAS (Tamil Nadu Veterinary and Animal Sciences University). Having published more than 75 scientific articles in national and international journals, Chandrasekaranis a renowned poultry expert, nutritionist, and researcher in India and the subcontinent.

Chandrasekaran spoke on how maintaining gut health is the first priority for every nutritionist in the poultry industry. Linked to better immunity, nutrient utilization, improve digestibility and overall performance, the bird's gut health is the most important factor. He said it's possible to impact guy health through the usage of non antibiotic additives, acidifiers, enzymes, and protected organic acid to control many

gut pathogens and improve beneficial microbes.

During the event, AnnafePerino, Novus poultry solution manager in Asia, explained how Novus gut health solutions are unique and help poultry producers to maximize their profit by reducing the pathogen load in the intestine. She talked about various research trials conducted to show how Novus products they work in controlling pathogens in the gut and increase beneficial bacteria, highlighting Novus eubiotic solutions AVIMATRIX® feed supplement and NEXT ENHANCE® 150 feed additive.

"Novus believes in providing our customers solutions with demonstrable value," Perino said. "With our unique eubiotic solutions for optimizing gut health and farm profitability, we are strategically well-positioned to serve our customers and increase their profits."

Perino explained how AVIMATRIX®, Novus's premium blend of high benzoic acid concentration in embedded matrix technology helps create homogeneous dispersion and the slow and continuous release of active ingredients along the entire intestinaltract. AVIMATRIX® also ensures a dustless free-flowingand non-corrosive product, which allows the active antibacterial ingredients to be delivered to the lower part of the intestinal tract.

ForNEXT ENHANCE® 150, Perino explained how the high level of essential oil compounds are thermostable through a patentedmicro-encapsulation technology that ensures the release of active ingredients at the right site in the gut.

"This allows NEXT ENHANCE® 150 to reduce pathogenic bacteria and improve gut morphology, controlling Eimeria species pathogenic bacteria and increasing beneficial bacteria in the gut. These changes help to improve the overall performance of the bird," she said.

The sessions were moderated by Reena Rani L C, Novus senior marketing communication specialist for South Central Asia. Dr. Manish Kumar Singh, Novus director of strategic marketing in Asia, led the event with details about Novus; sharing details about the company's foundation in feed additive products based on science and research, as well as its strong presence in India.

The event was supported by the Novus India team including, Dr. Krishnamurthy Dasappa- sales director, Dr. Koushik De - technical service director, Sukanta Nandy– national sales manager, Santu Nandy – sales manager, Dr. Milind Rainchwar - technical service manager, Dr. Rajesh Kharvi –product category manager for Asia/Pacific, Vikram Tambewagh –sales manager, Nilesh Sen – sales manager, and Anand Srivastava – key account manager.




For more information email: info.sca@novusint.com or visit www.novusint.com.

Novus International, Inc. is a leader in scientifically developing, manufacturing, and commercializing nutrition and health solutions for the animal agriculture industry. Novus's portfolio includes ALIMET®, MFP®, and MHA® feed supplements, MINTREX® bis-chelated trace minerals, CIBENZA® enzyme feed additives, NEXT ENHANCE® feed additive, ACTIVATE® nutritional feed acid, and other feed additives. Novus is privately owned by Mitsui & Co., Ltd. and Nippon Soda Co., Ltd. Headquartered in Saint Charles, Missouri, U.S.A., Novus serves customers around the world. For more information, visit www.novusint.com.

Press Release

International Health Care Ltd (PVS Group India) Successfully Participated in "NIPOLI EXPO" at Ibadan-Nigeria

International Health Care Limited
ANIMAL HEALTH CARE DIVISION

International Health Care Ltd (PVS Group), a company from India successfully participated in the Nigeria International Poultry and Livestock Expo, (NIPOLI) from 17th to 19th May 2022 at Ibadan in Nigeria. After covid-19, this is the company's first global participation and it was a platform that served as a connection between the poultry, livestock, and fishery industry.

Mr. Arun Pamulapati (Director) and Dr. Ajit Jadhav (General Manager) represented the company and well interacted with all visitors. The many Nigerian farmers, distributors, and wholesalers visited the stall and interacted with the company people which were seeking for latest products, productive business partnerships, and many more. The company introduced its newly developed product with metabolite technology and explained to the visitors about its importance and value addition benefits in the poultry, livestock, and aquaculture industry.

PVS Group is one of the leading manufacturers and exporters of animal health care products for more than 28 years.

The group has its own dedicated manufacturing units in India (Vijayawada) that include a drug formulations facility, feed supplements, and disinfectants production set-up. PVS values Product Quality, Service, and Transparency in business, and began operations with the same principles, and has so far lived up to the expectations of all its customers globally through the group's motto 'Try and Trust'.

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Website: www.internationalhealthcare.in

Press Release

zoetis

Zoetis India Limited conducted Series of Technical Seminar on"Best approach to control Mycoplasma in Poultry" at Hyderabad, Bengalore and Coimbatore

Zoetis India (South Team)

Zoetis is a global animal health company driven by a singular purpose to nurture our world and humankind in advancing care in animals. We stand by ourcustomers and their businesses by providing solutions across the continuum of care to predict, prevent,detect, and treat diseases.The company develops and manufactures animal-health medicines and vaccines for companion animals, dairy, and poultry. Zoetis provides Vaccines, Anti-Infectives, Disinfectants, Embrex biodevices, MFA, Anticoccidials and Toxin Binders. Today, the company has over 300 product lines globally, operating in more than 100 countries.

Zoetis India is dedicated to deliver quality products for the health of Animals. The Indian poultry market size reached a value of $ 24 billion in 2021. The industry is further expected to grow at a CAGR of 8.1% in the forecast period of 2022-2027 and to reach a value of approximately $ 40 billion by 2027.Every industry has its own challenges. Currently Mycoplasma and E. Coli are the major issues which are bothering the industry,most of the farmers are losing their profits because of unprecedented level of Mycoplasma and E. Coli in the farm. There are multiple options available in market to tackle these issues, but somehow the farmers are not getting asatisfactory solution.

Looking at the plight of the farmers andcurrent mycoplasma scenario,Zoetis India Limited recently conducted series of technical seminar at Hyderabad, Bangaloreand Coimbatore. The topic was "Best Approach to Control Mycoplasma in Poultry". Zoetis India has always tried to provide a sustainable solution in the form of various products. Mycoplasma is one of the organismswhich isubiquitous, and which lowers the profits of the farmers by increasing production cost. In the current scenario and for long term benefits preventive vaccination has proven efficacy against various bacterial and viral diseases. AsZoetis we understand the challenges faced by the farmersand therefore we have launched a complete solution against mycoplasma. We took this as an opportunity and conducted seminars with the help of poultry experts and tried to provide knowledge about

For more information, please write to
Zoetis India Limited
31, 3rd Floor, Kalpataru Synergy, Opp. Grand Hyatt, Santacruz (East), Mumbai- 400 055
Web: www.zoetis.in • Email: indiaanimalhealth@zoetis.com

zoetis

the best approach against Mycoplasma.

Events started with welcome note from Dr Bhushan Gangurde (Group product Manager -Poultry) followed by brief introduction of the speakers Dr S R Anand and Dr Anupam Kr Srivastava . Dr S. R. Anand was the guest speaker along with Dr Srivastava who isNational technical Manager at Zoetis India Limited forall the events conducted at Hyderabad, Bangalore, and Coimbatore. Dr S. R. Anand sharedhis insight about current scenario of poultry industry and difficulties faced by Indian Farmers. He specifically mentioned that how Mycoplasma is slowly affecting the health of the birds and reducing the productivity. He provided insight into various options to tackle Mycoplasma by the wide usage of live and killedvaccine. According to Dr. S. R. Anand, Anti-mycoplasma drugsare not meant to providelong term solution. Continuous use of Anti-mycoplasma drug will lead to development of resistance against Mycoplasma. He mentioned that it's only vaccine which will provide long term sustainable solution against Mycoplasma. Dr S. R. Anand mentioned that Mycoplasma gallispeticum and Mycoplasma synoviae are highly prevalent in India. He sharedmany reports of ELISA titers showing Mycoplasma infection in the farms.In his opinionMycoplasma gallispeticum symptoms are more visible in the forms of clinical signs but Mycoplasma synoviae is hidden enemy which is creating a problem in later stage of breeder as well as layer. Dr S. R. Anand also added that prevention is the bestapproach against mycoplasma spp. Dr S. R Anand Sir mentionedvarious available option in prevention program which includes live vaccine MG-TS11/MSHagainst MG (Mycoplasma gallispeticum) and MS (Mycoplasma synoviae) followed by MG and MS killed vaccine program in Breeder. Dr S. R. Anand also recommended to go for clean-up program with linco-spectin 100 before introducing the live Vaccine. Dr S. R. Anand said these cleanup programs followed by live vaccine will protect the flock u and if by any chance flock get infected at an advance age due to immunosuppression then usesany suitable molecule beto treat . Vaccinated birds will show good response versus non vaccinated birds. He mentioned various test methods like ELISA, PCR to diagnosed Mycoplasma infection. After vaccination he specifically mentioned to go for DIVA PCR which will identify vaccine strain and wild strain. Dr. S. R Anand also added his personal experience with vaccines like Vaxsafe® MG, Vaxsafe® MS and MG-Bac® and how these Zoetis vaccinesare helping the farmers to reduce the treatment cost for mycoplasma. He also emphasized returns on investment after using Mycoplasma vaccine in the form of number of extra eggs in Breeder and improvement in the shell quality in layers.

Dr. Anupam Kr. Srivastava, Technical Head of Zoetis India,spoke aboutrange of Zoetis products against Mycoplasma. He also highlighted that how clean up of mycoplasma is very crucial before introducing vaccine. Dr Srivastava mentioned newly launched product Linco-Spectin® 100 for the cleanup program in Breeder and Layer. Linco-Spectin®100is not only effective against Mycoplasma gallisepticum and Mycoplasma Synoviaebut also E. Coli. Dr Srivastavapinpointed the benefits of using Vaxsafe MG and Vaxsafe MSH in breeder as well as layer. He also recommended to use MG-Bac in breeder for a better chick quality and to transfer the maternal antibodiesto next generation. He also mentioned that how Zoetis technicaldiagnostics and services are providingvarious benefits to the customers who are using Vaxsafe® MG and Vaxsafe® MS, he emphasized how these customers are getting a better returns on investment.

Poultry division is an integral part of Zoetis India. Since several decades Zoetis (earlier Pfizer animal health) has provided severalsolutions against various health issues in the form of vaccines, MFA's (medicated feed additives), Parasiticides and Anti-infective. The trust that has been bestowed by farmersthat a product coming from Zoetis will be the best in best and willpositively impactthe bird's performance. Considering this scenario and to address the issues Zoetis India conducted seminars to have fruitful discussion on current challenges in poultry.We believe that there was a strong take away messages fromthese technical seminars that "Vaccination is thelong-term solution against Mycoplasma in Poultry".

All the technical seminars were attended by important consultants and key opinion leaders of the industry. Feedback from attending consultants and farmers was very encouraging as the topic was pertinent and discussion was very informative .

Zoetis India is very much confident that Linco-Spectin® 100 , Vaxsafe® MG , Vaxsafe® MS and MG-Bac®is definitely new approach towards challenging Mycoplasma spp.and the combination of these will provide much sustainable and long term benefits to the farmers

Technical Seminar Participants

Question and Answer session with participants

Technical Seminar Participants

For more details on Linco-Spectin® 100, Vaxsafe® MG, Vaxsafe® MS and MG-Bac® please contact Zoetis field colleagues

GLOCREST Pharmaceutical Pvt. Ltd

Grand Opening of GLOCREST Pharmaceutical Pvt Ltd Corporate Office @ Mumbai.

GLOCREST Pharmaceutical Pvt Ltd announced its new corporate office opening in Thane - Mumbai on 22 June 2022. Big thanks to all our valued customers/ consultants/ business partners from all India for spending their valuable time to grace this event. We look forward to much more of such events & support from our valued guests.

Inaugaration of Glocrest Pharmaceutical Pvt. Ltd. – Corporate office @ Mumbai – Dr. AjitRanade , Associate Dean , Mumbai Veterinary College , Mumbai . Mr. Rajesh Babu Kaparthy and Dr. Ramdas Kambale.

GLOCREST Team: T. Mathusoothanan, Dr. Ramdas Kambale, Hemendra Sengar, Dr. Mahesh Rajurkar , Rajesh Babu, Nishank Kaparthy , Mrs. Seema Kaparthy,Vaibhav Kadam

Dr. Ramdas Kambale, Dr. Ajit Ranade, Rajesh Babu, Nishank Kaparthy

Dr Ranade with GLOCREST BOARD MEMBERS At time of lightening of Lamp for Inaugaration.

Group Photo

GLOCREST At glance

Caring About Life, That Is Our Core Business.

GLOCREST is a global animal health venture of Krishna Group – prestigious poultry and agricultural conglomerate. Being an industry pioneer, GLOCREST & its peers, has more than half a century of combined expertise in the development and manufacturing of nutrition products. Our customers include everyone from small and large farmers, to integrations and dealers. We aim to provide them with nutritional solutions that ensure maximum animal health and performance.

Krimanshi Technologies Signs an MOU with SGVU for the Exchange of Knowledge and Information in the Areas of Agri-Livestock

Krimanshi Technologies Pvt. Ltd. Jodhpur (Raj.) as a First Party and Suresh Gyan Vihar University Jaipur (Raj.) as a Second Party agreed for exchange of knowledge & information pertaining to the areas of Agri-Livestock and Startup Entrepreneurship.

There will be exchange of students by the parties for academic, research, training and allied purposes from time to time and it would be a major benefit to the student community to enhance their skills and knowledge.

The parties discussed and agreed that it would be expedient and beneficial to form a long-term collaboration to carry out joint activities and to assist and support each other in their respective individual activities and programmes.

As a result, the parties have executed and signed this MOU, settling the terms and conditions of this collaboration, which will be in effect for 5 years.

About Krimanshi

Krimanshi Technologies Pvt Ltd, founded in 2015, develops sustainable and novel feed systems for animals by converting food waste and surplus into highly nutritious feeds with the goal of improving the nutrition of farm animals.

Its products are marketed to the dairy, poultry, and fishing industries.

Luis-Miguel joins the Huvepharma as Colombia's country manager

Dr. Gómez-Osorio has joined the Huvepharma team in Latin America as Colombia's country manager. He is a veterinarian and university professor with an MSc in molecular biology and immunology and a PhD in animal sciences from the University of Antioquia in Medellin.

Dr. Gómez-Osorio is the editor of 6 books, over 100 book chapters, and has published 35 international scientific articles on subjects ranging from animal nutrition to immunology. He brings 20 years of experience, a broad understanding of animal science, health, and nutrition, and a high level of energy and motivation to his work.

About Huvepharma: Huvepharma is a rapidly expanding global pharmaceutical company focused on the development, manufacturing, and marketing of human and animal health products. In addition, the company manufactures and sells enzymes for food, feed, and industrial applications.

UTTARA IMPEX PVT. LTD. IS CONTINUOUSLY EXPANDING THE PRODUCTS RANGE

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.

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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.

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INDIAN POULTRY JOURNALISTS ASSOCIATION

Under the Farmer FIRST Project, Vet Varsity conducts a one-day training on backyard poultry

Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, organised a one-day training for beneficiary farmers under the ICAR-sponsored Farmer FIRST Project at Krishi Vigyan Kendra, Handiaya.

Different poultry-related inputs, such as day old chicks, feeders, drinkers, calcium supplements, multivitamins, and antibiotics, were distributed to encourage entrepreneurship development among them.

Dr. P.S. Brar, Director of Extension Education and Farmer FIRST Project Nodal Officer, oversaw the training-cum-input distribution camp. Dr. Y.S. Jadoun, the project's Principal Investigator, Dr. Pragya Bhadauria, Co-PI, Dr. Amandeep Singh, Co-PI, and Dr. Navkiran Kaur organised the event, at which 30 farmers from the Channanwal and Dhaner villages were trained and given inputs for backyard poultry farming.

Dr. YS. Jadoun welcomed the farmers to the camp. Dr. Amandeep Singh's expert lecture provided the beneficiary farmers with basic information about backyard poultry farming. He placed special emphasis on the care and management of day old chicks in order to reduce mortality, feeding and housing management practises, provision of adequate lighting, proper bedding material, adequate amount of ventilation, and proper placement of feeder and drinker for the chicks. He also discussed the use of antibiotics, calcium supplements, and multivitamins as farm inputs.

Dr. Pragya Bhadauria's expert lecture covered the various entrepreneurial opportunities associated with backyard poultry farming, farm expansion, marketing connections, and value-added products made from eggs and meat. She encouraged farmers to adopt backyard poultry farming in order to gain nutritional and financial security, which will aid in the improvement of their socioeconomic status.

Dr. YS Jadoun proposed a vote of thanks to the experts and farmers, while also thanking Dr. PS Tanwar, Associate Director KVK Barnala, and Dr. Suryendra Singh for their assistance.

Zoetis Celebrates the Five-Year Anniversary of the A.L.P.H.A. Initiative and Progress Toward Improved Livestock Health and Farmers' Livelihoods in Sub-Saharan Africa

On June 27, Zoetis reported on the five-year progress of its African Livestock Productivity and Health Advancement (A.L.P.H.A.) initiative to establish sustainable veterinary care in Uganda, Nigeria, Tanzania, and Ethiopia, including access to vaccines, medicines, and diagnostic services. The initiative, co-funded by the Bill and Melinda Gates Foundation, has completed five years of progress in Sub-Saharan Africa by improving livestock health, productivity, and farmers' livelihoods.

"The A.L.P.H.A. initiative has assisted veterinarians in improving their technical knowledge while also assisting farmers in increasing productivity and making the sector more sustainable." Farmers in the region are now adopting better farming practises, increasing their profitability, income, and quality of life," said Dr Olutoyin Catherine Adetuberu, President of the Nigerian Veterinary Medical Association (NVMA), who spoke about the initiative's impact in Nigeria at the anniversary event in Brussels.

Nagaland Government Encourages 'Poultry Farming' To Address Meat Shortage Caused By ASF Outbreak

The current year's demand and supply gap for pork is expected to widen as a result of the African Swine Fever (ASF) outbreak, which is wreaking havoc on piggery farmers.

To alleviate the state's meat crisis, the Department of Animal Husbandry & Veterinary Services (AH&VS) is encouraging poultry farming, which has a shorter gestation period of marketing age and is also easily available and popular on Naga menus.

As a result, the Department has capacitated 10 Poultry Satellite Farms under NEC project with a capacity of 300 Grower Birds per cycle on June 10, 2022 in the presence of Additional Secretary to the Nagaland Government – Chisi Thou & Additional Director & Head of Department (HoD) – Dr. Nsanthung Ezung.

These 'Poultry Satellite Farms,' which are spread across Dimapur, Chumukedima, Peren, and Nuiland Districts, can rear 3000 birds and are expected to produce 7.13 tonnes of chicken for human consumption in a single production cycle (i.e. after 2 months of rearing).

According to the DIPR report, during the formal capacitation programme, the concerned officials encouraged the entrepreneurs to take up farming with sincerity and dedication; and to address their concerns, particularly in technical matters, through the online platform that has already been created.

August 2022

1. **ILDEX Vietnam 2022**
   Dates: August 3-5, 2022
   Venue: SECC, HCM
   City: Ho Chi Minh City
   Country: Vietnam
   Email: panadda@vnusiapacific.com
   Website: www.ildexvietnam.com

2. **Livestock Asia**
   Dates: 10 – 12 AUGUST 2022
   Venue: MITC Complex
   City: Melaka
   Country: Malaysia
   Email: livestockmalaysiamy@informa.com
   Website: www.livestockmalaysia.com

3. **Livestock Phillippines 2022**
   Dates: August 23 - 25, 2022
   Venue: World Trade Center
   City: Pasay city
   Country: Phillippines
   Email: rita.lau@informa.com
   Website: www.livestockphilippines.com

September 2022

1. **Victam Asia 2022**
   Dates: 7 - 9 September 2022
   Venue: IMPACT Exhibition Center
   City: Bangkok
   Country: Thailand
   Website: www.victamasia.com

October 2022

1. **Sommet-elevage, France**
   Dates: 4 - 7 October 2022
   Venue: Grande Halle Showgrounds
   City: Clermont- Ferrand
   Country: France
   Website: www.sommet-elevage.fr

2. **VIETSTOCK 2022**
   Dates: 12 - 14 October 2022
   Venue: Saigon Exhibition & Convention Center (SECC)
   City: Ho Chi Minh City
   Country: Vietnam
   Website: www.vietstock.org/en-us

3. **The Poultry Expo @ The Livestock & Agri Expo**
   Dates: October 28-30, 2022
   Venue: India Expo Center & Mart
   City: Greater Noida
   Country: India
   Email: info@pixieexpomedia.com
   Website: www.pixieexpomedia.com

November 2022

1. **EuroTier**
   Dates: 15 - 18 November 2022
   Venue: Deutsche Messe AG
   City: Hannover
   Country: Germany
   Website: www.eurotier.com/de

December 2022

1. **Agri Livestock**
   Dates: 02 - 04 December 2022
   Venue: Myanmar Expo Hall
   City: Yangon
   Country: Myanmar
   Website: www.agrilivestock.net

Editorial Calendar 2022

Publishing Month: **January** Article Deadline : **30th, Dec. 2021** Advertising Deadline : **3rd, Jan. 2022** Focus : **Disease Prevention**	Publishing Month: **February** Article Deadline : **30th, Jan. 2022** Advertising Deadline : **3rd, Feb. 2022** Focus : **Nutrition Management**	Publishing Month: **March** Article Deadline : **28th, Feb. 2022** Advertising Deadline : **3rd, March 2022** Focus : **Vaccination**	Publishing Month: **April** Article Deadline : **30th, March 2022** Advertising Deadline : **3rd, April 2022** Focus : **Heat Stress**
Publishing Month: **May** Article Deadline : **30th, April 2022** Advertising Deadline : **3rd, May 2022** Focus : **Cold Chain Mgmt.**	Publishing Month: **June** Article Deadline : **30th, May 2022** Advertising Deadline : **3rd, June 2022** Focus : **Feed Production**	Publishing Month: **July** Article Deadline : **30th, June 2022** Advertising Deadline : **3rd, July 2022** Focus : **Layers, Cages, Eggs**	Publishing Month: **August** Article Deadline : **30th, July 2022** Advertising Deadline : **3rd, August 2022** Focus : **Genetics & Breeding**
Publishing Month: **September** Article Deadline : **30th, August 2022** Advertising Deadline : **3rd, September 2022** Focus : **Biosecurity**	Publishing Month: **October** Article Deadline : **30th, September 2022** Advertising Deadline : **3rd, October 2022** Focus : **Winter Management**	Publishing Month: **November** Article Deadline : **30th, October 2022** Advertising Deadline : **3rd, November 2022** Focus : **Environment Control**	Publishing Month: **December** Article Deadline : **30th, November 2022** Advertising Deadline : **3rd, December 2022** Focus : **Industry Outlook**

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GLOCREST is a global animal health venture of Krishna Group -prestigious poultry and agricultural conglomerate. Being an industry pioneer, GLOCREST & its peers, has more than half a century of combined expertise in the development and manufacturing of nutrition products. Our customers include everyone from small and large farmers, to integrations and dealers. We aim to provide them with nutritional solutions that ensure maximum animal health and performance.

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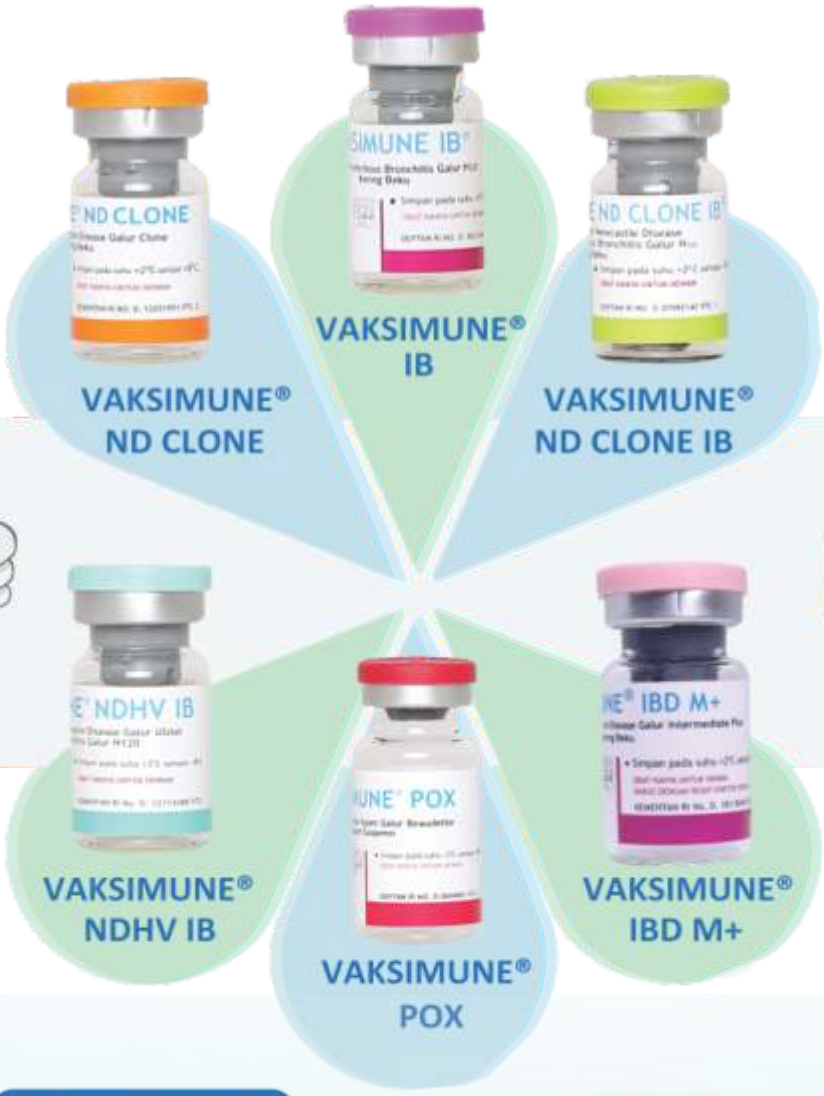

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