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## Northern Region

**COMPANY:** Sampoorna Feeds
**FARMER NAME:** Ms.Tripta Rani

| OCTOBER-2025 | Top #1 |
|---|---|
| Farm Type | Open House |
| State | PUNJAB |
| Chicks Placed | 7958 |
| Mean Age | 32.6 |
| Avg Body Wt | 2335 |
| FCR | 1.300 |
| cFCR | 1.226 |
| Livability% | 96.3 |
| Daily Gain | 71.6 |
| EPEF | 530.5 |

## Eastern Region

**COMPANY:** IB Group
**FARMER NAME:** Mr. Brajesh Patel

| OCTOBER-2025 | Top #1 |
|---|---|
| Farm Type | EC House |
| State | BIHAR |
| Chicks Placed | 11979 |
| Mean Age | 35.0 |
| Avg Body Wt | 2500 |
| FCR | 1.424 |
| cFCR | 1.313 |
| Livability% | 98.1 |
| Daily Gain | 71.4 |
| EPEF | 491.8 |

## Central Region

**COMPANY:** Japfa
**FARMER NAME:** Mr. Avinash Choudhary

| OCTOBER-2025 | Top #1 |
|---|---|
| Farm Type | EC House |
| State | MAHARASHTRA |
| Chicks Placed | 15617 |
| Mean Age | 32.9 |
| Avg Body Wt | 2451 |
| FCR | 1.355 |
| cFCR | 1.255 |
| Livability% | 96.1 |
| Daily Gain | 74.6 |
| EPEF | 529.0 |

## South Region

**COMPANY:** SKM
**FARMER NAME:** Mr. Subash Chandra Bose

| OCTOBER-2025 | Top #1 |
|---|---|
| Farm Type | Open House |
| State | TAMILNADU |
| Chicks Placed | 5272 |
| Mean Age | 33.2 |
| Avg Body Wt | 2310.0 |
| FCR | 1.420 |
| cFCR | 1.351 |
| Livability% | 96.9 |
| Daily Gain | 69.7 |
| EPEF | 475.5 |

## OCTOBER-Top PERFORMANCE BY AREA

| Area | Chicks Placed | Mean Age | BW | FCR | cFCR(2Kg) | Livability% | Daygain | EPEF |
|---|---|---|---|---|---|---|---|---|
| North EC House | 6460 | 35.2 | 2554 | 1.390 | 1.267 | 96.0 | 72.5 | 500.6 |
| North Open House | 7958 | 32.6 | 2335 | 1.300 | 1.226 | 96.3 | 71.6 | 530.5 |
| East EC House | 11979 | 35.0 | 2500 | 1.424 | 1.313 | 98.1 | 71.4 | 491.8 |
| East Open House | 2720 | 41.0 | 2909 | 1.434 | 1.232 | 95.7 | 71.0 | 473.5 |
| Central EC House | 15617 | 32.9 | 2451 | 1.355 | 1.255 | 96.1 | 74.6 | 529.0 |
| Central Open House | 8329 | 32.6 | 2349 | 1.398 | 1.321 | 97.6 | 72.2 | 503.7 |
| South EC House | 7798 | 31.2 | 2050 | 1.350 | 1.339 | 97.5 | 65.8 | 475.1 |
| South Open House | 5272 | 33.2 | 2310 | 1.420 | 1.351 | 96.9 | 69.7 | 475.5 |

## OCTOBER-Top 10 FIELD PERFORMANCE

| Flock | Farm Type | State | Chicks Placed | Mean Age | BW | FCR | cFCR | Livability% | Day Gain | EPEF |
|---|---|---|---|---|---|---|---|---|---|---|
| Flock 1 | OPEN HOUSE | PUNJAB | 7958 | 32.6 | 2335 | 1.300 | 1.226 | 96.3 | 71.6 | 530.5 |
| Flock 2 | EC HOUSE | MAHARASHTRA | 15617 | 32.9 | 2451 | 1.355 | 1.255 | 96.1 | 74.6 | 529.0 |
| Flock 3 | EC HOUSE | MAHARASHTRA | 10580 | 33.0 | 2454 | 1.373 | 1.272 | 96.7 | 74.4 | 524.4 |
| Flock 4 | OPEN HOUSE | PUNJAB | 18967 | 33.0 | 2453 | 1.330 | 1.229 | 93.6 | 74.3 | 522.9 |
| Flock 5 | EC HOUSE | MAHARASHTRA | 9480 | 31.7 | 2310 | 1.351 | 1.283 | 96.8 | 72.8 | 521.3 |
| Flock 6 | EC HOUSE | MAHARASHTRA | 7272 | 31.4 | 2302 | 1.352 | 1.285 | 95.8 | 73.3 | 519.6 |
| Flock 7 | OPEN HOUSE | HARYANA | 15689 | 34.0 | 2618 | 1.420 | 1.283 | 94.9 | 76.9 | 514.0 |
| Flock 8 | OPEN HOUSE | PUNJAB | 11860 | 30.8 | 2120 | 1.300 | 1.273 | 97.2 | 68.7 | 513.9 |
| Flock 9 | OPEN HOUSE | PUNJAB | 10544 | 34.5 | 2484 | 1.360 | 1.252 | 97.0 | 71.9 | 513.2 |
| Flock 10 | OPEN HOUSE | PUNJAB | 11494 | 34.9 | 2514 | 1.370 | 1.256 | 97.2 | 72.1 | 511.6 |

# From the Editor's Desk

## Editorial: Strengthening Our Food Supply Chains for a Safer Tomorrow

In an age where our food travels farther, moves faster, and passes through more hands than ever before, the safety of our supply chains has become a matter of growing urgency. What once was a simple farm-to-market journey has transformed into a complex web of production, processing, transportation, storage, and retailing—each node bringing remarkable efficiency but also new vulnerabilities. As the world becomes more interconnected, the challenges facing our food systems continue to evolve, demanding greater awareness, stronger safeguards, and collective responsibility.

Today, food safety is no longer just a regulatory concern; it is a shared mission. Farmers, processors, transporters, retailers, policymakers, and consumers—all are integral players in ensuring that the food reaching our plates is safe, nutritious, and trustworthy. The rise of microbial contamination, chemical residues, food fraud, and climate-related disruptions reflects just how dynamic and fragile the system has become. Events like pandemics, extreme weather, and geopolitical tensions have further exposed cracks in global supply networks, reminding us that resilience is just as important as innovation.

Despite the risks, the food industry stands at a promising crossroads. Advances in technology are offering unprecedented opportunities for traceability, transparency, and quality control. Digital tools, AI-driven monitoring, and smart logistics are gradually reshaping the way we manage food safety. Farmers are adopting better practices, processors are upgrading systems, and retailers are embracing higher standards. Yet, technology alone cannot solve all problems. Sustained improvements require investment in training, stronger enforcement of standards, and a culture that values food safety as a fundamental right rather than a compliance requirement.

As we move forward, collaboration will be our greatest strength. By working together—across sectors, across borders, and across the supply chain—we can build systems that are not only more efficient, but also more resilient and trustworthy. At its core, safeguarding the food supply chain is about protecting the well-being of families, communities, and future generations. It is a responsibility we must all share.




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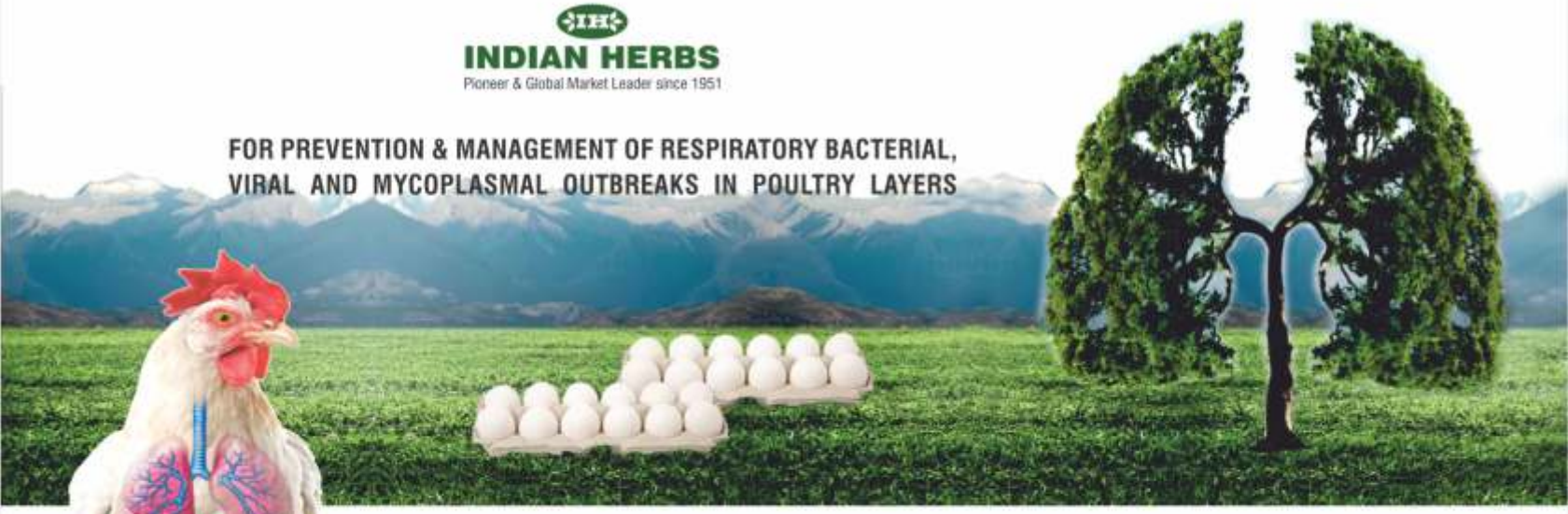

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# Understanding Intellectual Property vs. Intellectual Property Rights

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***Abstract***

*The concepts of Intellectual Property (IP) and Intellectual Property Rights (IPR) are mostly used interchangeably, yet they differ significantly in scope and legal interpretation. Intellectual property represents the creations of the human mind, such as inventions, literary and designs, artistic works, and symbols. Intellectual property rights, on the other hand, are the legal protections granted to creators or inventors, enabling them to control the use of their intellectual creations. This article explores the conceptual differences, categories, and importance of both IP and IPR in modern knowledge based economies.*

## Introduction

In today's innovation-driven world, the protection and management of intangible assets have become a cornerstone of global trade, technology transfer, and creative industries. Understanding the distinction between intellectual property and intellectual property rights is vital for researchers, entrepreneurs, and policymakers. While intellectual property refers to the product of creative or intellectual effort, intellectual property rights refer to the legal mechanisms established to protect these creations and prevent unauthorized use.

## Intellectual Property: The Concept

Intellectual property (IP) encompasses creations that originate from human intellect. These may include literary, inventions, and artistic works, designs, symbols, names, and images used in commerce. IP is not tangible like land or machinery but represents a form of intangible assets that holds significant economic value.

According to the **World Intellectual Property Organization (WIPO, 2024)**, IP contributes substantially to economic growth by promoting innovation and creative expression. Typical categories of IP include:

- **Patents** for inventions and technological innovations.
- **Copyrights** for literary, artistic, and musical works.
- Trademarks for symbols, logos, and brand identities.
- **Industrial designs** for the aesthetic aspects of objects.
- **Geographical indications** for products tied to a specific origin.

## Intellectual Property Rights: Legal Protection Mechanism

Intellectual Property Rights (IPR) refer to the exclusive legal rights granted to creators and inventors to utilize, license, or sell their intellectual property. IPR allows the owner to control how their creation is used and provides recourse against unauthorized use or infringement.

As per **TRIPS Agreement (WTO, 1994)**, member countries are required to implement minimum standards of IP protection, ensuring a balance between innovation incentives and public access. The major forms of IPR include:

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**UT-SELWAY GOLD-D Liquid**

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- 15-20 ml for 100 broiler birds for 5 days
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02 Improves vaccination titer against ND & IBD

03 Reduces the stress during transportation, debeaking, vaccination & any oxidative stress

04 Enhances overall growth performance in broiler & egg production in layer

05 Improves hatchability in breeders

06 Reduces problem of exudative diathesis in chick

07 Improves performance under heat stress

08 Improves normal absorption & metabolism calcium & phosphorus

09 Improves the egg shell quality in laying hens

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- **Patent rights** prevent others from making or selling an invention without permission.
- **Copyrights**, which give authors exclusive rights to reproduce and distribute their works.
- **Trademark rights**, which protect brand identity and consumer trust.
- **Design rights**, safeguarding aesthetic innovations in products.

**Key Differences between IP and IPR**

| Aspect | Intellectual Property (IP) | Intellectual Property Rights (IPR) |
|---|---|---|
| **Nature** | Creation or idea resulting from intellectual effort | Legal protection granted to that creation |
| **Existence** | Exists inherently once an idea is formed or expressed | Exists only when recognized by law |
| **Function** | Represents the asset itself | Regulates ownership and usage of the asset |
| **Objective** | Encourages creativity and innovation | Ensures creators can benefit from their creations |
| **Example** | A new book manuscript | Copyright registration for the book |

This distinction highlights that IP is the content or creation itself, whereas IPR refers to the legal framework that governs and protects it.

**Importance and Global Relevance**

IPR systems promote innovation by ensuring that creators receive recognition and economic benefits from their work. Effective protection of IP enhances competitiveness, attracts foreign investment, and supports sustainable development. In sectors like biotechnology, information technology, and the arts, IPR acts as a catalyst for research and commercialization.

However, challenges such as piracy, patent trolling, and inequitable access to technologies still exist, calling for balanced policies that support both creators' rights and public interest.

**Conclusion**

Understanding the difference between intellectual property and intellectual property rights is fundamental for fostering innovation and ensuring equitable benefit-sharing. While intellectual property symbolizes human creativity, intellectual property rights provide the necessary legal structure to protect and monetize that creativity. A robust IPR regime thus bridges the gap between creation and commercial utilization, driving progress in science, technology, and culture.

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# Summer Heat Management in Poultry: Practical Strategies for Better Health and Productivity

**Swarup Debroy[1] and Uma Kant Verma[2]**

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[2]Assistant Professor, Animal Genetics & Breeding, CoVAS, Banda University of Agriculture and Technology, Banda.

Animal husbandry and poultry farming are significant together with farming since they may make a lot of money with little effort. The weather in our nation varies every three to four months. On top of that, not only humans but animals and birds are also affected by climate change and the rising temperature of the earth n this case, heat is a major issue for people who work in animal husbandry. Summer is the most difficult time for poultry farmers. Therefore, it is important for poultry farmers to protect chickens from the harmful effects of high temperatures during the summer season, because increased heat leads to an increase in the mortality rate of chickens. During the summer, poultry producers have the worst time since the heat makes hens eat less feed, which makes their problems more severe. In such a situation, special care has to be taken of these poultry birds. In such a situation, special care has to be taken of these poultry birds. To protect the chickens from heat and heat wave in the poultry farm, it is important to keep some things in mind. These things can prove helpful in preventing harm.

## Feeding Management of Chickens during summer

During the summer months, poultry experience a marked reduction in feed intake due to heat stress. Consequently, experts recommend that diets provided during this period be enriched with higher levels of protein, vitamins, and minerals to ensure birds receive adequate nutrients despite reduced consumption. Additionally, to prevent thinning of eggshells an effect commonly associated with heat stress calcium levels in the diet should be increased. Liquid calcium supplements, such as osteo-calcium preparations mixed in drinking water, may be administered to improve shell quality.

## Optimal Feeding Time in summer

Chickens generally consume greater quantities of feed

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during winter. To maintain adequate feed intake during summer, supplemental lighting should be provided alongside natural daylight, enabling birds to utilize their feed more effectively. Chickens perform best at ambient temperatures between 60°F and 80°F, where both feed intake and egg production remain optimal. When temperatures exceed this range, birds tend to consume less feed, leading to a decline in egg production and potential economic loss for poultry farmers. Therefore, careful attention to feeding schedules and environmental conditions becomes essential during high-temperature periods.

**Water Management during summer**

Water consumption increases significantly under heat stress. Clean, cool water must be available at all times within the poultry house. During summer, avoid plastic, zinc, or steel containers for water storage, as they tend to heat quickly. Instead, earthen vessels are preferred because they keep water cool for longer periods. Bedding depth should not exceed 2 inches during summer. If the litter becomes excessively old or damp, it should be replaced promptly to minimise the risk of infections.

**Ensuring Adequate Ventilation**

Proper ventilation is crucial in poultry houses during hot weather. Adequate airflow should be arranged such that fresh air enters from one side of the shed and exits from the opposite side. This reduces internal heat load and facilitates the removal of harmful gases generated within the poultry house. Effective ventilation not only enhances bird comfort but also helps maintain optimal temperature and air quality inside the shed.

**Management of Heat Stroke in Poultry**

Heat stroke is more commonly observed in adult birds than in chicks, as younger chicks can tolerate temperatures up to 42°C, whereas mature birds are far

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less capable of withstanding such heat stress. Severe heat exposure can lead to rapid deterioration in health and may result in mortality. When symptoms of heat stress are observed in a poultry flock, the following interventions should be implemented to minimize losses:

- **Roof Insulation:** Install asbestos or heat-resistant sheets on the roof of the poultry house to reduce direct heat conduction.
- **Reflective Roof Coating:** Apply white paint to the exterior surface of the roof to reflect solar radiation and prevent heat accumulation.
- **Use of Foggers:** Fogging systems can effectively lower the ambient temperature within the poultry house.
- **Mechanical Cooling:** Fans and evaporative coolers may be used to maintain favorable internal temperatures.
- **Evaporative Curtains:** Hang jute or sackcloth curtains 3–5 feet outside the windows and keep them moist by sprinkling water regularly. This helps reduce heat through evaporative cooling.
- **Continuous Wet Curtains:** Install sackcloth curtains along the sides of the poultry shed and connect them to a perforated water pipeline attached to an overhead tank. Water dripping continuously by gravitational pressure creates a cooling effect similar to that of an air cooler, significantly lowering the internal temperature.
- **Electrolyte Supplementation:** Add electrolyte powder to drinking water to prevent dehydration and restore mineral balance.
- **Moistening of Feed:** Lightly moisten the mash feed to improve palatability and encourage feed intake.

- **Protein-Enriched Diet:** Increase the protein content of the feed to help maintain body weight, nutritional status, and normal egg size, shell quality, and egg mass.
- **Vitamin C Supplementation:** Provide vitamin C through drinking water at a rate of 10 grams per 1,000 birds to enhance heat tolerance and reduce physiological stress.

**Conclusion**

Effective poultry management during the summer months is essential to safeguard bird health, maintain productivity, and prevent economic losses. Heat stress significantly reduces feed intake, egg production, and overall performance, making it critical for farmers to adopt appropriate nutritional, environmental, and housing strategies. Ensuring adequate ventilation, providing cool and clean drinking water, modifying feed composition, and implementing practical cooling methods can substantially reduce heat-related mortality. With timely interventions and scientifically informed management practices, poultry farmers can successfully minimize the adverse impacts of high temperatures and maintain sustainable production even under challenging climatic conditions.

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## The Smarter, Faster and Safer Vitamin $D_3$ Revolution in Poultry Nutrition

**Authors: Dr. C. S. Bedi, Dr. Himali Kishor Gotarane, Dr. Nithin Reddy, Dr. Arun Kumar**
Guybro Animal Health Pvt. Ltd.

In modern poultry production, birds struggle to meet their growing calcium and metabolic demands due to limited sunlight exposure, liver stress, fast growth genetics, and high production pressures. Vitamin $D_3$ stands at the centre of bone strength, eggshell formation, immunity, and growth—but the form in which it is supplied makes all the difference. Ordinary Vitamin $D_3$ (cholecalciferol) has a long, burdensome pathway inside the bird. After consumption, it must pass through the liver to be converted into 25-OH $D_3$, and only then do the kidneys convert it into the active hormone 1,25-$(OH)_2$ $D_3$. This dual-step conversion is slow, depends heavily on liver health, and becomes inefficient when birds are under stress, facing toxins, or suffering from fatty liver. As a result, normal Vitamin $D_3$ delivers delayed and inconsistent results, and increasing the dosage can even lead to toxicity and hypercalcemia.

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**form of Vitamin D for poultry**. It is safer, more stable, and more bioavailable, providing better performance in layers, breeders, and broilers. It enhances calcium absorption, strengthens bone mineralization, improves eggshell quality, and works synergistically with phytase to maximize phosphorus availability. Because it follows the bird's natural physiological pathway, the risk of overdose is essentially eliminated. This is why advanced poultry nutrition programs worldwide rely heavily on 25-OH $D_3$ rather than outdated Vitamin $D_3$.

In comparison, the active hormonal form 1,25-$(OH)_2$ $D_3$, though powerful, is far too risky for commercial feeding. It has an extremely narrow safety margin and can easily cause toxicity, kidney damage, and soft tissue calcification. It is chemically unstable for feed use and is therefore restricted primarily to clinical or experimental research, not practical poultry farming. Between the two, the superiority of 25-OH $D_3$ is unmistakable.

By offering 25-OH $D_3$ directly, **Guybro D3** enhances calcium homeostasis, improves intestinal absorption of calcium and phosphorus, increases renal calcium reabsorption, and helps the bird maintain ideal serum calcium levels even under production stress. This leads to visibly stronger skeletons, fewer leg problems, prevention of rickets and cage-layer fatigue, and healthier flock growth. In layers, **Guybro D3** significantly improves shell thickness and strength while reducing thin-shelled, shell-less, and broken eggs—issues that directly impact farmer profitability. Birds on **Guybro D3** consistently show better productivity, stronger bones, higher livability, and superior performance across all stages.

In essence, **Guybro D3** provides birds with the most advanced, safe, and effective form of Vitamin D nutrition available today. By eliminating the liver bottleneck, ensuring rapid absorption, and delivering unmatched stability and performance, it empowers farmers to achieve better growth, better eggs, and healthier flocks. **GUYBRO D3 is not just a supplement—it is the smarter Vitamin D solution designed for the demands of modern poultry farming.**

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# Poultry probiotics, allied factors influencing probiotic performance, and the role of B-Act® as a key solution for optimal gut health.

Technical Team, Huvepharma SEA (Pune) Pvt. Ltd.

## 1. INTRODUCTION

Modern poultry production depends heavily on intestinal health to achieve high productivity and economic efficiency. The gastrointestinal tract is not merely a digestive organ but a complex ecosystem where microbial, nutritional, and immunological interactions take place. Disturbances in this ecosystem lead to poor feed conversion, growth retardation, and higher disease susceptibility. In this context, probiotics have emerged as vital alternatives to antibiotic growth promoters (AGPs), providing sustainable support to gut health, immunity and performance.

## 2. POULTRY PROBIOTICS: CONCEPTED AND CLASSIFICATION

Probiotics are defined as live microorganisms which, when administered in adequate quantities, confer a health benefit on the host. In poultry, commonly used probiotic strains include ***Lactobacillus, Enterococcus, Bifidobacterium, Saccharomyces*** and ***Bacillus*** species. Among these, *Bacillus*-based probiotics are particularly attractive due to their ability to form spores, survive pelleting temperatures and maintain stability during feed storage and gastrointestinal transit.

Probiotics are incorporated into feed or water and can be used in broilers, layers, breeders, and even in hatchery or in ovo applications. Their efficacy depends on strain selection, viability, administration route and compatibility with other feed additives.

## 3. MECHANISMS OF PROBIOTIC ACTION IN POULTRY

Probiotics contribute to gut health and performance via several biological mechanisms:

- **Competitive exclusion**: Occupying epithelial binding sites and competing with pathogens for nutrients, thereby reducing colonization by *Salmonella*, *E. coli*, and *Clostridium perfringens*.
- **Antimicrobial production**: Many probiotic bacteria secrete organic acids, hydrogen peroxide and bacteriocins that inhibit harmful bacteria.
- **Enzyme secretion**: Especially in *Bacillus* spp., the production of amylases, proteases, and lipases improves nutrient digestion and absorption.
- **Immune modulation**: Probiotics enhance mucosal immunity, increase secretory IgA levels and reduce proinflammatory cytokines.
- **Gut morphology improvement**: They promote villus height, crypt depth ratio, and mucin production, ensuring efficient nutrient uptake and barrier integrity.

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## 4. ALLIED FACTORS INFLUENCING PROBIOTIC PERFORMANCE

The success of probiotic supplementation is not determined by the product alone. Several allied factors interact to influence probiotic efficacy:

### 4.1 NUTRITION FACTORS

- **Feed quality and composition**: The substrate available in feed influences microbial activity. Diets with high digestibility and low anti-nutritional factors favor probiotic colonization.
- **Feed enzymes**: Supplementation with xylanase, phytase and protease reduces undigested nutrients that could fuel harmful bacteria.
- **Protein and energy balance**: Excess protein in the hindgut encourages pathogenic growth; balanced nutrient formulation complements probiotic function.

### 4.2 WATER QUALITY

Efficacy of Probiotics also depend on clean, low-TDS, pathogen-free water for effective colonization. Chlorinated or contaminated water can reduce probiotic viability.

### 4.3 Environmental and management practices

- **Litter management, stocking density and ventilation**: Influence microbial load and stress, which impact probiotic performance.
- **Temperature and humidity**: Extreme heat or humidity can predispose birds to gut stress and dysbiosis.

### 4.4 Health and medication programs

- **Coccidiosis and enteritis control**: Effective anticoccidial programs reduce intestinal damage, enhancing probiotic colonization.
- **Antibiotic compatibility**: Some antibiotics may inhibit probiotic activity; therefore, strain-specific compatibility is essential.

### 4.5 Early-life microbial programming

The early establishment of beneficial microbiota (via hatchery sprays or early probiotic administration) provides long-term gut health and performance advantages.

## 5. B-Act® as a key solution for optimal gut health

- B-Act® is a probiotic developed by Huvepharma®, consisting of a single-strain, spore-forming *Bacillus licheniformis* (DSM 28710) with a minimum viable count of 3.2 × $10^9$ CFU/g
- It is formulated to support gut health (intestinal microflora), help maintain gut integrity, aid nutrient digestibility and improve performance in poultry. Along with other beneficial modes of action and metabolites, *Bacillus licheniformis* is specifically known for producing a peptide called lichenicidin. It is a bacteriocin that inhibits the growth of *Clostridium perfringens*, the causative agent of necrotic enteritis, and helps in managing dysbacteriosis in poultry gut. Optimum results are achieved when B-Act® is administered at 500 g per ton of feed.
- B-Act® has good stability (pelleting temperature, processing, storage, etc) and does not reduce viability and it is compatible with many other feed additives (antibiotics, coccidiostats)

### Benefits of using B-Act®

- Improved feed conversion, improved body-weight gain in broilers under both normal and challenged (enteric disease) conditions.
- For layers: improved egg production, better egg-shell quality, reduced protein excretion in manure (indicating better nutrient utilisation) when using B-Act®.
- Helps the gut ecosystem by competitive exclusion of pathogens + production of beneficial metabolites (so not just “fill the gut with benign bacteria” but actively influences the microflora environment).
- Economic benefit: use of this product leads to improved ROI

For more details, please contact our technical team

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# Intellectual Property in the Development of Veterinary Vaccines

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## Introduction

Veterinary vaccines contribute to global food security, public health, and economic stability, especially in livestock dependent economies. Developing a novel veterinary vaccine involves pathogen characterization, antigen identification, clinical trials, and regulatory approval processes that may span several years and require substantial investment. Intellectual Property Rights help protect the technical advances made during these stages, thus promoting innovation and competition in the animal health industry.

## Forms of Intellectual Property Relevant to Veterinary Vaccines

### 1. Patents

Patents are the most significant IP tool in vaccine development. They provide important rights to the inventor for typically 20 years, covering:

- Vaccine formulations
- Manufacturing processes
- Antigenic components
- Delivery systems (e.g., nanoparticle carriers, adjuvants)
- Diagnostic methods associated with vaccine administration

Patents incentivize companies to invest in R&D by granting temporary monopoly rights, enabling cost recovery.

### 2. Trade Secrets

Proprietary manufacturing methods, fermentation parameters, cell culture conditions, and stabilization processes are often protected as trade secrets. These are especially important in biological vaccines where minor process variations affect efficacy.

### 3. Trademarks

Brand names of commercial vaccines (e.g., FMD-tech™, Avipro®) are protected through trademarks. This ensures product recognition, market differentiation, and consumer trust.

### 4. Copyright

While copyright does not protect biological materials, it safeguards technical documents, vaccine manuals, software used for genomic analyses, and marketing materials.

## International Frameworks Influencing Veterinary Vaccine IP

### TRIPS Agreement (WTO)

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) harmonizes global minimum standards for patent protection, ensuring that biotechnological inventions including veterinary vaccines—are patentable.

### UPOV Conventions & Genetic Resources

Genetic material from livestock or pathogens may raise access and benefit sharing concerns regulated under the Convention on Biological Diversity (CBD) and the Nagoya

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#1 FCR point represent third/last decimal point of 1000

*Majority of field trials were conducted at same farm with multiple sheds in integrations across various geographical locations and at different time of the year. Some of the integrators were generous in sharing complete production indices while others communicated the summary of the trial results. In the field trials, Improval™ MS was compared with antibiotic/probiotic/antibiotic + probiotic/probiotic + prebiotic control. Detailed reports availble on request.

Protocol, influencing vaccine research.

**OIE Standards**

World Organisation for Animal Health (OIE) does not grant IP rights, its guidelines for vaccine quality and safety are integral to regulatory approval and commercialization.

**Importance of IP in Veterinary Vaccine Development**

**1. Incentivizing Innovation**

IP rights encourage companies and research institutes to engage in high risk R&D by offering a period of exclusivity.

**2. Technology Transfer**

Patents facilitate licensing agreements between universities, biotech startups, and pharmaceutical companies, accelerating vaccine development.

**3. Ensuring Quality and Reliability**

Trademark protection and regulatory excellence reinforce product authenticity, preventing the spread of counterfeit or substandard vaccines.

**4. Supporting Public–Private Partnerships**

Government agencies often combined with private firms under IP-protected frameworks, particularly for vaccines against transboundary animal diseases like FMD, PPR, and Avian Influenza.

**Challenges in IP Management for Veterinary Vaccines**

**1. High R&D Costs and Limited Market Size**

In low-income regions, the economics of vaccine development may not justify patenting unless government or donor support is available.

**2. Ethically Sensitive Patents**

Patenting genetic sequences or attenuated pathogens can raise bioethical concerns.

**3. Regulatory Complexity**

Although patents protect inventions, regulatory delays may shorten the effective commercial life of vaccines.

**4. Access vs. Protection**

During outbreaks, debates arise over compulsory licensing, open sharing of viral isolates, and equitable access to vaccines.

**Conclusion**

Intellectual Property plays an important role in veterinary vaccine development by supporting innovation, incentivizing investment, and ensuring quality and commercial viability. Balanced IP protection, combined with transparent regulatory systems and international collaboration, is necessary to meet the growing demand for advanced veterinary vaccines. As an emerging diseases and antimicrobial resistance rise, robust IP frameworks will continue to shape future breakthroughs in animal health biotechnology.

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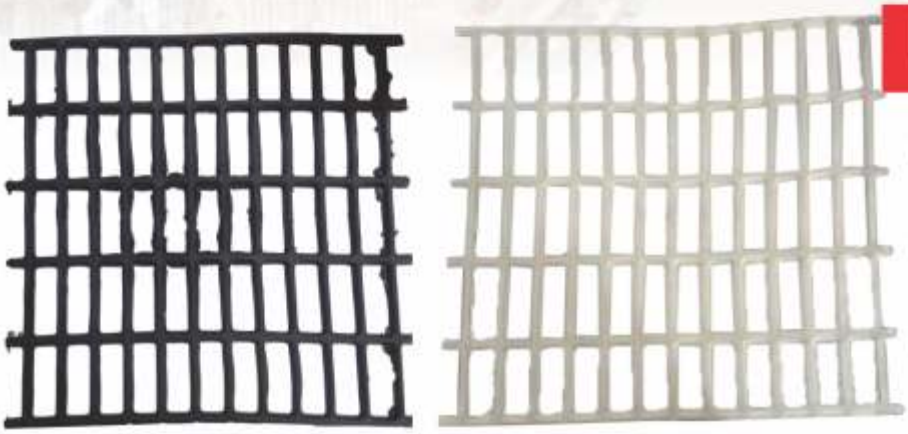

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# Food Safety in Poultry Production: Protecting the Farm-to-Fork Chain

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***Food safety is not just a process — it's a promise to every consumer who sits down to a meal***

## Introduction

The global demand for poultry products has risen dramatically over the past few decades, driven by affordability, nutritional value, and consumer preference for lean protein sources. However, with this growth comes an equally critical responsibility: ensuring food safety throughout the poultry production chain. From farm management and feed formulation to processing and distribution, every stage of poultry production plays a crucial role in safeguarding consumers' health.

Food safety in poultry is not merely a regulatory obligation; it is a moral and economic imperative. Contamination or disease outbreaks can devastate producers, erode public confidence, and disrupt international trade. Thus, the commitment to stringent hygiene practices, biosecurity, and traceability has never been more vital.

## Understanding Food Safety Risks in Poultry

Poultry production faces unique food safety challenges due to the biological nature of birds and the complexity of modern supply chains. The primary hazards include:

1. **Microbial Contamination:** Pathogens such as Salmonella, Campylobacter, Listeria monocytogenes, and Escherichia coli are among the most common culprits in poultry-related foodborne illnesses. Contamination can occur at multiple stages — during rearing, slaughter, or processing — and may persist despite cooking if cross-contamination happens in kitchens.
2. **Chemical Hazards:** Antibiotic residues, mycotoxins in feed, and disinfectant residues are potential chemical threats. Improper use of veterinary drugs or non-compliance with withdrawal periods can introduce harmful residues into the human food chain.
3. **Physical Hazards:** Foreign materials such as metal fragments, plastic pieces, or feathers can accidentally enter poultry products during processing. Although less common, these hazards can severely damage consumer trust and brand reputation.

Understanding these risks allows producers to design control strategies based on science, risk assessment, and proactive management.

## Biosecurity: The First Line of Défense

Biosecurity is the foundation of any successful poultry safety program. It encompasses

measures designed to prevent the introduction and spread of infectious agents in poultry operations. Effective biosecurity reduces the need for antibiotics, enhances flock health, and supports sustainable production.

**Key biosecurity practices include:**

- **Controlled Farm Access:** Limiting visitor entry, requiring clean clothing and footwear, and maintaining a visitor logbook to trace movements.
- **All-In/All-Out Systems:** Ensuring that each flock cycle begins with a clean environment by thoroughly cleaning and disinfecting poultry houses between batches.
- **Pest and Vector Control:** Flies, rodents, and wild birds can carry pathogens; regular control programs are essential.
- **Clean Feed and Water:** Using high-quality, pathogen-free feed and ensuring clean, regularly disinfected water lines prevent many microbial challenges.

A well-designed biosecurity plan is dynamic — it should be regularly reviewed and adapted to emerging threats or changes in production systems.

**Feed Safety and the Role of Nutrition**

Feed is often overlooked in food safety discussions, yet it is a major factor in maintaining bird health and reducing contamination risk. Contaminated feed can introduce pathogens or toxins that affect both animal welfare and meat safety.

**Best practices for feed safety:**

- Source raw materials only from reputable suppliers with verified quality assurance systems.
- Monitor feed for mycotoxins, which can impair bird immunity and lead to residue issues.
- Store feed in dry, rodent-proof facilities to prevent spoilage and contamination.
- Incorporate natural feed additives such as probiotics, organic acids, or essential oils to promote gut health and reduce pathogenic load.

Feed safety connects directly to food safety: a healthy gut means healthier birds, and healthier birds produce safer meat.

**Hygiene and Sanitation in Processing**

Once birds enter the processing plant, maintaining strict hygiene standards becomes paramount. Even a single lapse in sanitation can cause widespread contamination of carcasses and processed products.

**Critical hygiene measures include:**

- Regular cleaning and disinfection of all equipment, surfaces, and transportation vehicles.
- Proper temperature control during slaughtering, chilling, and packaging to inhibit bacterial growth.
- Implementation of **Hazard Analysis and Critical Control Point (HACCP)** systems to identify and manage critical safety points.
- Continuous staff training on hygienic handling, equipment use, and waste disposal.

Automation and technological innovations such as UV disinfection, smart sensors, and real-time microbial monitoring are enhancing hygiene management and traceability in modern processing plants.

**The Role of Antibiotic Stewardship**

The misuse of antibiotics in poultry production contributes to antimicrobial resistance (AMR), one of the most pressing global public health concerns. Responsible antibiotic use — guided by veterinary oversight and based on accurate diagnosis — helps maintain both animal health and food safety.

Key principles of antibiotic stewardship include:

- Preventive health management through vaccination and good husbandry, rather than reliance on antibiotics.
- Observing strict withdrawal periods before slaughter to ensure residue-free meat.
- Avoiding antibiotics critical to human medicine unless absolutely necessary.
- Keeping detailed treatment records for transparency and traceability.

Producers adopting antibiotic-free or reduced-antibiotic systems often gain a competitive edge in markets increasingly concerned with ethical and safe food production.

**Traceability and Regulatory Compliance**

Food safety does not end at the processing plant. The ability to trace products through every stage — from hatchery to consumer — ensures accountability and rapid response during contamination events. Digital traceability systems using barcodes, RFID tags, or blockchain technologies are becoming

standard practice in progressive poultry industries.

In addition to internal monitoring, compliance with national and international regulations is essential. Standards such as **Codex Alimentarius, ISO 22000**, and various national poultry inspection acts guide best practices for food hygiene, labelling, and quality control. Export markets often demand adherence to even stricter sanitary and phytosanitary measures, emphasizing the global nature of food safety.

**Consumer Awareness and Final Handling**

Even when poultry leaves the processing plant in perfect condition, improper handling at the retail or household level can reintroduce hazards. Educating consumers about safe handling, cooking, and storage is a shared responsibility between producers, regulators, and retailers.

**Consumer-level food safety tips include:**

- Keeping raw poultry separate from cooked or ready-to-eat foods.
- Cooking poultry to an internal temperature of at least 74°C (165°F).
- Refrigerating products promptly and avoiding the "danger zone" between 5°C and 60°C.
- Washing hands, utensils, and surfaces after contact with raw poultry.

Effective consumer education campaigns strengthen the final link in the food safety chain.

**Future Trends in Poultry Food Safety**

Innovation continues to reshape food safety management in the poultry industry. Some emerging trends include:

- **Rapid Pathogen Detection:** Use of biosensors, PCR-based kits, and AI-driven diagnostics for on-site microbial testing.
- **Blockchain and Data Analytics:** Enhancing transparency, traceability, and consumer trust through digital records.
- **Sustainable Sanitation Technologies:** Adoption of eco-friendly disinfectants and water recycling systems.
- **Precision Farming:** Leveraging smart sensors, automated feeders, and health monitoring systems to detect disease risks early.

By integrating technology with traditional husbandry wisdom, the poultry sector can achieve both safety and sustainability goals.

**Conclusion**

Food safety in poultry production is not a single-stage responsibility but a **continuous commitment** stretching from farm to fork. Producers must invest in biosecurity, hygienic processing, responsible antibiotic use, and traceable systems to protect consumers and strengthen global food security.

Ultimately, ensuring the safety of poultry products sustains not only public health but also the reputation and profitability of the entire industry. In an era where consumers demand transparency and assurance, the future of poultry production belongs to those who prioritize safety above all else.

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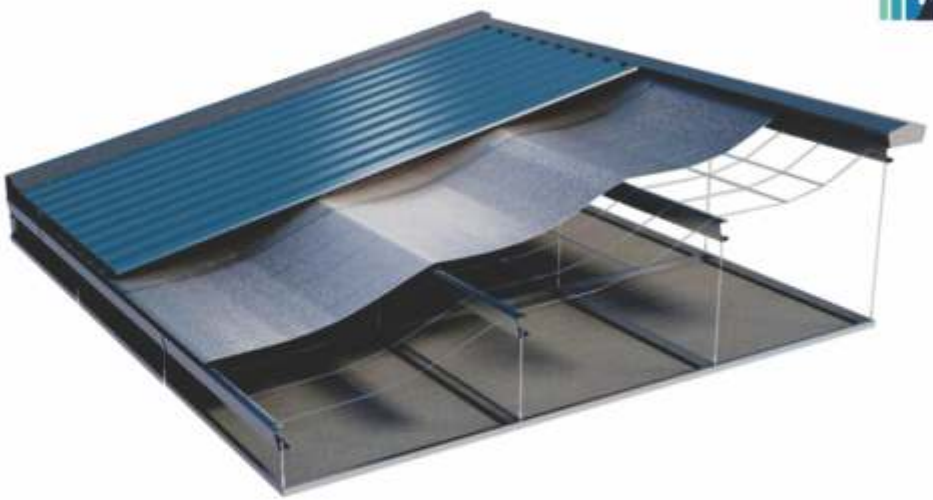

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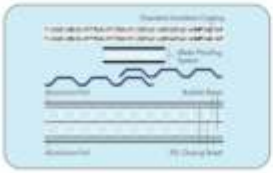

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# Key Risks and Hazards in Today's Food Supply Chains

In today's interconnected world, food rarely stays where it is produced. A tomato grown on a small farm might travel hundreds of kilometers before landing in a supermarket basket. Milk produced in one state may be processed in another, packaged in a third, and distributed across the country. While this complex network allows consumers access to a diverse range of foods year-round, it also exposes the food system to a wide spectrum of risks. The modern food supply chain—spanning from farm to fork—has become more efficient, but it has also become more vulnerable. Each stage brings its own set of hazards that can compromise food safety, consumer trust, and even national economic stability. Understanding these risks is essential not only for policymakers and industry stakeholders but also for farmers, processors, retailers, and consumers who rely on safe and reliable food access every day.

One of the foremost challenges in today's food supply chain is **microbial contamination**. Pathogens such as Salmonella, E. coli, Listeria, and Campylobacter continue to be leading causes of foodborne illnesses worldwide. The problem intensifies in long supply chains where food changes multiple hands, environments, and temperatures. A single contamination event at the farm level can silently travel through transport vehicles, processing plants, storage units, and retail shelves—only becoming visible once consumers fall ill. In perishable commodities like meat, milk, poultry, and leafy vegetables, microbial risks are particularly high due to temperature sensitivity and high moisture content. The surge in convenience foods, ready-to-eat products, and minimally processed items further increases vulnerability because these foods often skip the cooking step that could otherwise kill harmful pathogens. Ensuring robust hygiene practices, cold chain integrity, and rapid traceability has never been more important.

Alongside microbial hazards, **chemical contaminants** pose another serious threat. Pesticide residues, heavy metals, veterinary drug residues, and industrial pollutants continue to find their way into food products. While some contamination occurs due to poor agricultural practices, others result from environmental pollution, adulteration, or unsafe processing methods. Even packaging materials can leach harmful chemicals, especially when exposed to heat or prolonged storage. For example, plasticizers, inks, or adhesives used in packaging may migrate into food, raising long-term health concerns for consumers. As urbanization grows and industrial activities expand, the risk of chemical infiltration into the food supply also increases. Regulators worldwide are tightening standards, but enforcement gaps and lack of

consumer awareness remain significant hurdles. For farmers and companies, switching to safer inputs and rigorously monitoring chemical levels is no longer optional—it is a responsibility that directly influences consumer trust and export opportunities.

Equally concerning are **physical hazards**, which are often overlooked but can cause severe harm. Physical contaminants include glass shards, metal fragments, stones, plastics, and other foreign materials accidentally introduced during harvesting, processing, or packaging. In highly mechanized facilities, metal parts from machinery or broken equipment components may find their way into food products. Poor sorting practices during harvesting or inadequate cleaning of raw materials also increase the risk. For instance, stones or soil clods in legumes, stray hairs or feathers in animal products, or fragments of packaging materials in processed foods can lead not only to consumer injury but also to large-scale recalls. Modern manufacturing systems rely heavily on technologies like X-rays, metal detectors, and optical sorting machines to minimize such hazards, yet the risk remains persistent, especially in facilities with outdated equipment or limited quality control protocols.

Beyond contamination, the food supply chain today faces the growing challenge of **food fraud and adulteration**. The economic incentive to cut costs or increase profits often drives unscrupulous actors to substitute genuine ingredients with cheaper, inferior, or even hazardous alternatives. From diluted milk and adulterated spices to counterfeit packaging and mislabelled meats, food fraud has become a global problem. The increasing complexity of supply networks, cross-border transactions, and the rise of e-commerce marketplaces have further widened the loopholes for fraudulent practices. Consumers may unknowingly purchase products that do not match their labels, nutritional claims, or safety standards. What makes food fraud particularly dangerous is its invisibility—most adulterations go unnoticed until regulatory agencies conduct targeted testing or a major incident occurs. Strengthening supply chain transparency, promoting digital traceability, and adopting technologies like blockchain can play an essential role in combating these risks.

Another major hazard comes from **supply chain disruptions**, which have become more frequent and severe in recent years. Factors such as pandemics, geopolitical conflicts, natural disasters, transportation strikes, border closures, and market volatility can swiftly disrupt food movement. The COVID-19 pandemic, for instance, exposed how fragile global and regional food supply networks can be. Shortages of labor, delays in transportation, and closure of processing units created ripple effects that affected both producers and consumers. For perishable foods, even a short delay can result in massive spoilage and financial loss. Climate-related disruptions—from droughts affecting crop yields to storms damaging logistics infrastructure—pose even greater long-term challenges. Ensuring supply chain resilience requires improved planning, diversified sourcing, stronger local value chains, and greater investment in infrastructure capable of withstanding unforeseen shocks.

Climate change itself represents one of the most critical risks to the food supply chain. Rising temperatures, shifting rainfall patterns, extreme weather events, and new disease outbreaks directly influence agricultural productivity. Heat stress affects livestock performance, drought impacts crop yield and feed availability, and floods damage storage facilities and transportation networks. Moreover, climate change can alter the ecology of pests and pathogens, increasing their survival and spread. For example, warmer and more humid conditions promote faster bacterial growth in food products, increasing the risk of contamination during handling and transport. Farmers and food businesses now need to invest more in adaptive strategies such as climate-smart agriculture, improved water management, drought-resistant crop varieties, and better insulation and cooling technologies for livestock and storage facilities. Long-term solutions require joint efforts from governments, industries, researchers, and farming communities to build food systems resilient to climate unpredictability.

Labor remains another vulnerable point in the food supply chain. The industry heavily depends on skilled and unskilled workers for activities such as harvesting, processing, packaging, transportation, and retail handling. Any shortage of manpower—whether due to migration, health emergencies, poor working conditions, or seasonal fluctuations—disrupts the entire chain. Low wages, difficult working environments, and limited access to modern equipment often lead to high labor turnover, particularly in post-harvest and processing stages. When workers are rushed, inadequately trained, or demotivated, the risk of mistakes such as improper handling, inadequate sanitation, or mislabelling increases significantly. Investing in worker safety, better training programs, and improved labor rights not only protects

employees but also ensures higher standards of food safety throughout the chain.

The rapid growth of global trade has brought many benefits, yet it also increases **biological and cross-border risks**. International shipments allow pests, diseases, and invasive species to travel across continents. Contaminated produce, infected livestock, or improperly treated packaging materials can introduce new pathogens into different ecosystems. Border inspections and quarantine processes help control these risks, but gaps in monitoring, weak enforcement, or inadequate documentation can allow hazards to slip through. In addition, different countries operate under varying food safety standards, making harmonization difficult. This inconsistency sometimes results in products that meet one region's regulations but fail another's, creating confusion and risk for importers, exporters, and consumers alike.

Today's food supply chain is also profoundly shaped by technology, and while digitalization is transforming efficiency, it also brings **cybersecurity risks**. Many modern processing plants, distribution systems, and retail operations rely on digital platforms for managing inventory, monitoring cold chains, and automating production. A cyberattack on these systems—whether deliberate or accidental—can shut down operations, compromise food safety data, misroute deliveries, or manipulate expiry dates. Hackers targeting critical infrastructure can cause widespread shortages or trigger massive recalls. As food companies become more digitally connected, they need stronger cybersecurity protocols, regular system audits, and employee awareness programs to safeguard their operations and protect consumer data.

Perhaps one of the least discussed yet increasingly significant risks is **consumer behaviour and perception**. Today's consumers demand more convenience, variety, and ready-to-eat options than ever before. At the same time, misinformation about food safety, farming practices, and processing technologies spreads rapidly on social media, often influencing buying decisions and causing undue panic. A minor quality deviation can quickly escalate into a major brand reputation crisis. Furthermore, improper handling of food at the household level—such as leaving perishables at room temperature, improper washing of produce, or cross-contamination—contributes to many foodborne illnesses that are wrongly blamed on the supply chain. Building consumer education, transparent communication, and trust-based relationships has become essential for food companies wishing to maintain brand loyalty.

The final stage of the supply chain—distribution and retail—brings its own set of challenges. Poor cold chain management remains one of the biggest hazards, especially in countries with high temperatures. Breaks in refrigeration during transport, storage, or display can rapidly multiply pathogens and shorten shelf life. Inadequate cleaning of storage facilities, exposure to pests, and improper stock rotation practices further compound the issue. Retailers also face pressures to reduce costs, increase turnover, and manage large inventories, which can sometimes lead to lapses in food safety monitoring. Stronger auditing systems, investment in modern refrigeration technology, and better staff training can significantly reduce these risks.

While the list of hazards may seem daunting, the good news is that many of these risks can be managed with the right combination of policy, technology, and collaboration. Governments must strengthen surveillance systems, update regulations, and ensure that food safety standards keep pace with industry innovations. Food companies, on their part, must embrace transparency and invest in traceability tools such as QR-based tracking, blockchain-enabled documentation, and AI-driven monitoring systems. Farmers need greater support in adopting good agricultural practices (GAP), good animal husbandry practices (GAHP), and environmental sustainability measures. Processors and distributors must commit to stringent hygiene, routine audits, and continuous workforce training. Consumers have a role too—choosing reputable brands, following proper food handling guidelines, and staying informed about food safety issues.

Ultimately, maintaining a safe and reliable food supply chain is not the responsibility of a single stakeholder. It is a shared obligation that spans the entire journey—from the soils where crops grow and the farms where animals are raised, to the factories where food is processed and the homes where it is finally consumed. In an era of growing global pressures, population expansion, and environmental challenges, safeguarding the food supply chain is both a necessity and a long-term investment in public health, economic stability, and societal well-being. The risks are real and evolving, but with collective effort, innovation, and accountability, today's food system can continue to feed the world safely and sustainably.

# Recent Advances in Use of Feed Additives in Poultry

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**Feed additives:**

Materials that are administered to the animal or poultry to enhance the effectiveness of nutrients and exert their effect in the gut or the gut cell wall Types of feed additives: Antibiotics, Probiotics, Oligosaccharides, Antioxidants, Emulsifiers, Binders, Organic acids, Enzymes, Phytogenics, Others.

**Antibiotics :** Antibiotics produced by other microorganisms, fungi that protect the growth of beneficial bacteria.

- Reduce the number of pathogenic bacteria (E. coli, Salmonella sp., etc.), prevent the infection of the digestive tract
- Increase the absorptive capacity of the small intestine (decrease the thickness of the intestinal wall)
- Reduce the competition of bacteria with the host (bacteria ferment the nutrients before digestion)
- They have been used mainly in pig and poultry nutrition
- Their widespread use could cause the ability of certain strains to be resistant to many antibiotics
- Therefore in the EU the use of antibiotic growth promoters has been restricted since 2000.

**Probiotics:** live microbial food supplement containing mostly lactic acid producing bacteria they act by reducing the pH in the intestine, reducing the numbers of harmful bacteria (competitive exclusion)enhance immune competence are heat sensitive (pelleting) reduces the growth of beneficial microbes.

**Prebiotics/Oligosaccharides;** (2-20 monosacharides) that modify the balance of themicrofloral population by promoting the growth of the beneficial bacteria Can be fermented by the favourable bacteria by decreasing the attachment of harmful bacteria with the gut wall.

**Examples**

- Galactooligosaccharides (GOS) (legume seeds)
- Fructooligosaccharides (FOS) (cereal grains)
- Mannanoligosaccharides (MOS) (yeast cell walls).

**Antioxidants:** There are a variety of sources of reactive oxygen species (free radicals) in normal metabolism as well as those coming directly from feed ingredients. Oxidative stress can disrupt normal cellular function, damage tissues (also associated with the development of cancers) and reduce health status. Antioxidants bind these molecules/free radicals and reduce their potential cell damage.

**Examples** Ethoxyquin, BHA, BHT, Selenium, Vitamin E .

**Emulsifiers:** Inefficient digestion and absorption of fat occurs in young chickens due to a low level of natural lipase production. In chickens the activity and net duodenal secretion of lipase increases as the chick ages . A low rate of bile salt synthesis in young

***Highlight Points:***

*Modern intensive poultry production has achieved phenomenal gains in the efficient and economical production of high quality and safe chicken meat, eggs and poultry bioproducts.*

*At the same time as making gains in production and efficiency, the industry has had to maximise the health and well-being of the birds and minimise the impact of the industry on the environment. The use of* ***feed additives*** *has been an important part of achieving this success*

*The diet of animals and humans contain a wide variety of additives. However, in poultry diets these additives are primarily included to improve the efficiency of the bird's growth and/or laying capacity, prevent disease and improve feed utilisation.*

*Any additives used in feed must be approved for use and then used as directed with respect to inclusion levels and duration of feeding.*

chicks further confounds the problem of fat digestion  Dietary supplementation of bile salt reportedly improved fat utilization in chicks but the strategy may not be economically viable. Therefore, cheaper emulsifying agents or detergents which transform a hydrophobic surface into a hydrophilic one have been used alternatively to increase fat digestibility in young chicks albeit with variable results  Emulsifiers like soy lecithin promote incorporation of fatty acids into micelles and increase fat digestibility in chicks. Synthetic emulsifiers like Poly-oxy ethylene glycol  Mono- and di-oleates have also been tried in pigs Glycerol poly ethylene glycol -Ricin-oleate.

**Binders:** It's naturally occurring alumino silicate mined & processed according to tightly controlled specification.  Highly absorptive material that holds 1.3 times its weight in the water.  A micro granule with more than 300 million particles per kg.  A feed additive with GRAS status (Generally recognized as safe.)  To compensate the unpredictability of ingredients and the relationship of ingredients to each and to production process. To produce a more durable& palatable, high quality pellet with minimum production expenses. VIN Con / VIN Bind improves performance by enhancing the natural binding properties of feed through greater absorption and even distribution of moisture and heat during pelleting process.  This produces a better pellet by promoting better gelatinization and denaturation of feed ingredients. Vin-con unlocks the natural pelleting characteristics of the feed ingredients in the pellet mill by more evenly distributing heat & moisture, thus better moisture management with heat unable starches to gelatinize, resulting in improved pellet durability & higher quality of feed.

**Organic Acids:** Efficient digestion in chickens depends on the secretion of Sufficient acid in the gut.  Organic acids have been used for decades in feed preservation, protecting feed from microbial and fungal destruction and increase the preservation effect of fermented feed, e.g. silages. Example -lactic acid, formic acid, fumaric acid, citric acid, propionic acid etc.)  It has also been used as antimicrobial feed additives for long times. The objective of dietary acidification is the inhibition of intestinal bacteria of those both pathogenic and competing with the host for available nutrients and reduction of possibly toxic bacterial metabolites, e.g. ammonia and amines.  Acidification increases gastric proteolysis, protein and amino acid digestibility and utilization of minerals and thus improving performance of the chicken  Among organic acids, propionic acid (PA) is an effective element used as antimicrobial feed additive as well as preservatives. Although it is useful as additive, it is extensively used as feed preservatives and less as feed additives.  Propionic acid (PA) is a naturally occurring carboxylic acid. It was derived from the Greek words protos = "first" and pion = "fat," because it was the smallest H (CH2)n COOH acid that

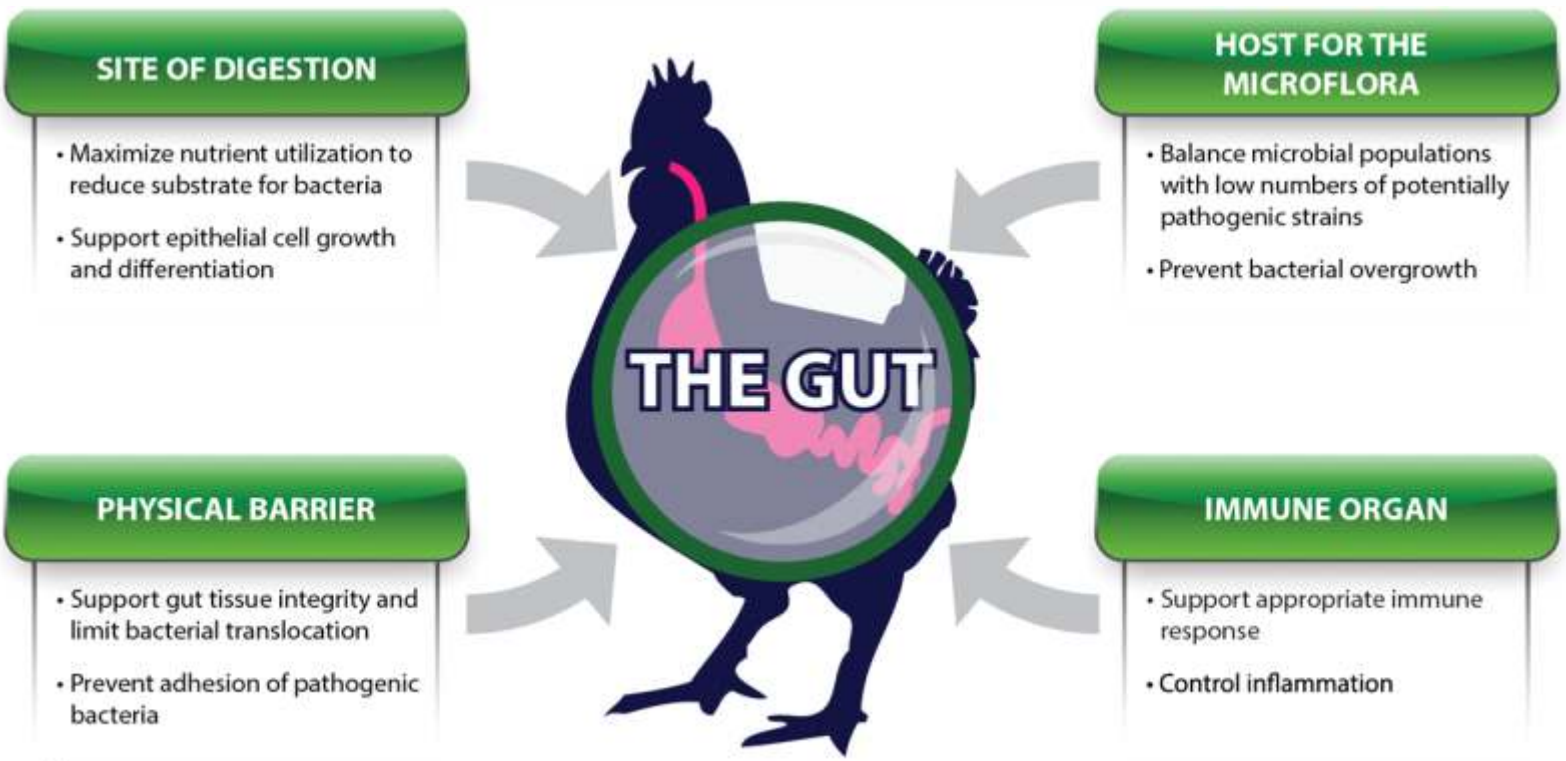


Figure 1

exhibited the properties of the other fatty acids Propionic acid inhibits the growth of mold and some bacteria. As a result, most PA produced is used as a preservative for both animal feed It can be used to modify synthetic cellulose fibers. It is also used to make pesticides and pharmaceuticals. The esters of PA are sometimes used as solvents or artificial flavorings

**Enzymes:** Enzymes are proteins that facilitate specific chemical reactions; following this the enzyme will disassociate and be available to assist in further reactions. Although animals and their associated gut microflora produce numerous enzymes, they are not necessarily able to produce sufficient quantities of specific enzymes to reduce anti-nutritional factors in feed that limit digestion. Some cereal grains (rye, barley, wheat, sorghum) have soluble long chains of sugar units (referred to as soluble non-starch polysaccharides – NSP) that can entrap large amounts of water during digestion and form very viscous (thick gel-like) gut contents. Enzymes that are harvested from microbial fermentation and added to feeds can break these bonds between sugar units of NSP and significantly reduce the gut content viscosity. As a result of advances in biotechnology, more effective enzyme preparations can be produced relatively inexpensively Supplement the insufficient enzyme secretion of young animals (amylase, protease, lipase etc.) Can improve the availability of plant storage polysaccharides (starch, oils and proteins) by degrading the cell wall content like cellulose by the enzyme cellulase (5-10% improvement can be achieved in poultry and pig trials) Destroy ant-nutritive materials that interfere with the digestion and utilisation of nutrients (glucanase, xylanase destroy cereal cell wall compounds, β-glucans and arabinoxylans) Phytase releases phosphorous and other minerals from phytic acid in cereals and oilseeds (greater availability of minerals, less need for inorganic phosphorous, beneficial effect on the environment).

**Phytogenic Feed Additives:** In recent years, phytogenic feed additives have attracted increasing interest as an alternative feeding strategy to replace antibiotic growth promoters. Extracts from sage, thyme and rosemary and the blend of carvacrol, cinnam aldehyde and capsaicin improved feed digestibility in broilers The positive effects of plant extracts on nutrient digestibility to the appetite and digestion-stimulating properties and antimicrobial effects Increased feed intake and digestive secretions are also observed in animals offered phytobiotic-supplemented feed (Windisch and Kroismayr, 2006). The primary mode of action of phytogenic feed additives arises from beneficially affecting the ecosystem of gastrointestinal micro biota through controlling potential pathogens. Ground thyme has been shown to inhibit the growth of S. typhimurium when added to media ( Karapinar Aktug, 1986). The essential oil of the thyme has been shown to inhibit the growth of the E. coli in media (Marino et al., 1999). Increased feed intake and digestive secretions are also observed in animals offered phytobiotic-supplemented feed (Windisch and Kroismayr, 2006). The primary mode of action of phytogenic feed additives arises from beneficially affecting the ecosystem of gastrointestinal micro biota through controlling potential pathogens. Ground thyme has been shown to inhibit the growth of S. typhimurium when added to media ( Karapinar Aktug, 1986). The essential oil of the thyme has been shown to inhibit the growth of the E. coli in media (Marino et al., 1999).

**Other feed additives:**

**NPN materials:** (urea, ammonium salts) can be used in ruminant animal nutrition mostly in low milk producing cows, beef cattle Strict rules for using them hence limited uses

**Toxin binders:** used for binding mycotoxins (zearalenon (F2); T2 toxin; ochratoxin, deoxynivalenol (DON), fumonisins, aflatoxin etc.), decrease their absorption Aluminium silicates (bentonit) Glucomannans (yeast cell wall extracts) Bind also some minerals and nutrients

**Flavory materials :** Sugars, vanilla, canella, and Skim milk Powder etc.) Increase the feed intake Can be effective mostly in young intensively growing animals Their effect depends on the flavour sensation of different animal species

**Crystallinene amino acids: –** L – lysine – DL – methionine – In the near future threonine, tryptophan and arginine will also be available in the feed industry – for ruminants must be fed in by pass form (covering by fatty acids, protecting against the bacterial degradation) – can be optimise the amino acid composition of food proteins – can be decreased the protein content of diets – the price of compound feeds can be cheaper – decrease the N-excretion.

**Colour materials:** carotenoids (zeaxanthin, lutein, licophin, capsanthin etc.) – Egg yolk coloration – Using is synthetic colour compounds is limited in the EU.

# Precision Feeding of Farm Animals

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## Introduction

In contemporary livestock production, the cost of feed represents the largest portion of operational expenses—typically accounting for 60–70% of the total production costs. The effectiveness with which animals transform feed into meat, milk, or eggs has a direct impact on the profitability of farms. Conventional feeding techniques usually employ standardized diets for an entire group or herd. However, this method does not take into account the differences among animals in terms of body weight, health status, milk production, and growth rate—even among those of the same breed or age category.

Such a uniform feeding strategy often results in:

Some animals being underfed, which leads to reduced productivity.

Others being overfed, causing nutrient waste and environmental pollution through their waste.

To address this inefficiency, researchers have introduced precision feeding (PF) — an adaptive feeding strategy that continuously modifies the composition and amount of feed to suit each animal's nutritional needs. As described by Pomar et al. (2014), precision feeding is "the practice of supplying the precise quantity of nutrients an animal requires, at the optimal time, using real-time data."

## Concept and Principle of Precision Feeding

The idea of precision feeding is based on the concept that nutrient requirements are not static; they change daily depending on:

- Environmental temperature,
- Stage of production (growth, lactation, reproduction),
- Health status,
- Feed composition, and
- Individual variability.

**Precision feeding systems function through three main stages:**

1. **Measurement (Data Collection):** Sensors and smart devices record animal parameters such as body weight,feed intake, milk yield, rumination time, and even physiological parameters like heart rate and body temperature.
2. **Decision (Data Processing and Modeling):** Specialized software or mathematical models analyse the collected data to estimate the animal's

nutrient requirements. Algorithms then decide how much and what type of feed should be offered.

3. **Action (Feed Delivery and Feedback):** Automated feeders dispense the correct amount of feed based on the model's output. Continuous monitoring ensures that adjustments can be made instantly if the animal's performance changes.

This **closed-loop feedback system** ensures that nutrient intake and utilization are constantly optimized, resulting in minimal feed wastage and maximum performance.

### Technological Components of Precision Feeding

Several technologies enable precision feeding to function effectively:

| Technology | Function |
|---|---|
| **RFID (Radio Frequency Identification)** | Identifies individual animals as they approach feeding stations. |
| **Automatic Feeders** | Deliver feed portions accurately based on individual requirements. |
| **Sensors (Rumen, Temperature, Activity)** | Monitor rumen pH, chewing behavior, body temperature, and movement. |
| **Near-Infrared Reflectance Spectroscopy (NIRS)** | Analyzes the nutrient content of feed ingredients rapidly. |
| **Cameras and Image Sensors** | Measure body condition score and growth patterns automatically. |
| **Cloud-based Data Systems** | Store and process large volumes of animal data for decision-making. |

According to **Halachmi and Guarino (2016)**, the integration of these tools with digital platforms transforms livestock farms into **smart feeding ecosystems**, where nutrition decisions are automated and continuously optimized.

### Applications in Different Livestock Species

#### 1. Dairy Cattle

- In dairy farms, precision feeding is used along with **automated milking systems (AMS)**. Sensors record **rumination activity, milk yield, and composition, while** feed stations adjust rations to each cow's energy and protein needs.
  For example:\
- Early-lactation cows are given more bypass protein and minerals.
- High-yielding cows receive higher-energy concentrate feeds.

Research shows that precision-fed dairy cows maintain milk yield while reducing nitrogen excretion by up to **25%**, leading to **lower ammonia emissions** and a more sustainable environment.

#### 2. Swine (Pigs)

Pigs have highly variable growth rates, even within the same pen. Precision feeding systems use **individual feeding stations** equipped with **RFID and automatic weighing platforms**. Each pig's growth curve is monitored daily, and the diet composition is adjusted accordingly.

**Pomar et al. (2014)** demonstrated that:

- Feed cost can be reduced by **10–15%,**
- Nitrogen excretion drops by **30%**, and
- Growth uniformity improves significantly.

In breeding sows, electronic feeders help manage **body condition**, preventing over-conditioning during gestation and underfeeding during lactation.

#### 3. Poultry

In broilers and layers, sensors measure **body weight and feeding frequency**, and automatic feeders adjust diet composition.
For instance:

- Broilers nearing market weight receive lower-protein diets to reduce nitrogen output.
- Layers receive precise calcium and phosphorus supplementation to support shell formation.

Precision feeding allows **split-sex feeding**, where males and females are fed differently to match their growth potential.

#### 4. Sheep and Goats

Small ruminants often graze on uneven pasture, making it difficult to monitor intake. Portable feeding stations with RFID sensors and automated concentrate dispensers have made **individualized feeding possible**, even under field conditions. Precision feeding in goats and ewes improves body condition and prevents **metabolic disorders** like ketosis and pregnancy toxemia.

#### 5. Aquaculture

In fish farming, sensors detect **oxygen concentration, water temperature, and feeding activity.** Automatic feeders

release feed only when fish are actively feeding, reducing waste and maintaining water quality. This approach enhances feed conversion and lowers environmental pollution in aquaculture systems.

### Benefits of Precision Feeding

| Area | Advantages |
|---|---|
| **Nutritional Efficiency** | Delivers nutrients based on real-time needs, minimizing overfeeding. |
| **Economic Benefit** | Reduces feed costs and increases productivity per unit of feed. |
| **Environmental Protection** | Decreases nitrogen and phosphorus emissions into soil and water. |
| **Animal Welfare** | Detects early health or metabolic issues via changes in feeding behavior. |
| **Sustainability** | Promotes resource efficiency and reduces greenhouse gas emissions. |

**Berckmans (2017)** noted that precision feeding can improve **feed efficiency by 10–20%** while reducing **environmental nutrient losses** by up to **35%**, contributing to global climate-smart farming initiatives.

### Challenges and Limitations

Despite its advantages, precision feeding faces several challenges:

- **Maintenance and calibration** issues for high-tech equipment.
- **High investment cost** for sensors and automation systems.
- **Technical skill requirement** for data interpretation.
- **Lack of locally developed models** for indigenous breeds in tropical regions.
- Limited connectivity in rural farms affecting data transmission.

Addressing these constraints requires **public–private partnerships**, farmer training programs, and development of **low-cost regional technologies.**

### Future Perspectives

The future of precision feeding is closely linked with **digital livestock farming** and **nutrigenomics**. Researchers are developing:

- **Blockchain-based feed traceability systems** to ensure feed safety.
- **Real-time biosensors and wearable devices** for nutrient monitoring.
- **Artificial intelligence (AI)** models that predict feed response patterns.
- **Integration of nutrigenomics** to personalize diets based on animal genetics.

By connecting precision feeding with **sustainability metrics**, future livestock systems will produce more food using fewer natural resources.

### Conclusion

Precision feeding is a cornerstone of **modern, sustainable livestock production**. It integrates biological science with digital innovation to achieve efficient, eco-friendly, and individualized nutrition.

By providing the right nutrient, in the right amount, to the right animal, precision feeding reduces waste, enhances productivity, and promotes animal welfare.
As technology becomes more affordable and accessible, precision feeding will transform livestock nutrition into a smart, data-driven, and sustainable discipline for the future.

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# Protecting Ethno-Veterinary Knowledge through Intellectual Property Rights

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## Introduction

Ethno-veterinary medicine encompasses traditional practices, beliefs, and knowledge systems used by local communities to maintain animal health and productivity. These practices include herbal formulations, ritualistic healing, and management techniques adapted to specific ecological conditions (McCorkle, 1986). However, with globalization and commercial interest in bioresources, traditional healers and communities face the risk of exploitation without recognition or compensation. Intellectual Property Rights (IPRs) offer tools to protect these intangible assets by recognizing their ownership and preventing unauthorized use (WIPO, 2015).

## Importance of Protecting Ethno-Veterinary Knowledge

Ethno-veterinary knowledge contributes significantly to sustainable livestock management, biodiversity conservation, and affordable animal healthcare, particularly in rural areas (Mathias-Mundy & McCorkle, 1989). Despite its value, this knowledge is often undocumented and vulnerable to misappropriation. Pharmaceutical industries frequently draw from traditional practices for product development, sometimes without acknowledging or compensating source communities (Sharma et al., 2019). Protecting EVK ensures:

- **Recognition** of indigenous innovations.
- **Prevention** of biopiracy and misuse.
- **Encouragement** for documentation and research collaboration.
- **Sustainable** use of local biodiversity and traditional wisdom.

## Intellectual Property Rights and Traditional Knowledge

Intellectual Property Rights encompass legal mechanisms like patents, copyrights, trademarks, and geographical indications (GIs) designed to protect creative works and inventions (WIPO, 2020). For traditional knowledge, however, conventional IPR systems may not fully apply, as such knowledge is often collective, orally transmitted, and ancient (Posey & Dutfield, 1996). Nonetheless, several approaches have emerged:

### a. Sui Generis Systems

These are customized legal systems designed specifically for protecting traditional knowledge. They can recognize community ownership and ensure benefit-sharing (Correa, 2001).

### b. Geographical Indications (GI)

GI protection links traditional veterinary formulations or practices to their place of origin, preserving both cultural identity

and product authenticity (Das, 2010).

**c. Traditional Knowledge Digital Libraries (TKDL)**

Databases like India's TKDL document traditional medicinal formulations, including veterinary uses, to prevent wrongful patent claims (Gupta, 2013).

**d. Access and Benefit-Sharing (ABS) under the Convention on Biological Diversity (CBD)**

The CBD (1992) and the Nagoya Protocol (2010) require prior informed consent and equitable sharing of benefits arising from the use of genetic resources and associated traditional knowledge.

**National and International Legal Frameworks**

Several international agreements recognize the value of protecting indigenous knowledge:

- **Convention on Biological Diversity (CBD, 1992) –** Recognizes sovereign rights over biological resources and promotes equitable benefit sharing.
- **Nagoya Protocol (2010) –** Establishes legal certainty for access to genetic resources and associated knowledge.
- **World Intellectual Property Organization (WIPO) –** Promotes guidelines for protecting traditional knowledge through the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC).
- **Indian Legal Framework –** The Biological Diversity Act (2002) and the Protection of Plant Varieties and Farmers' Rights Act (2001) provide national-level protection mechanisms relevant to EVK (Prakash & Singh, 2017).

**Strategies for Safeguarding Ethno-Veterinary Knowledge**

1. **Documentation and Digitization:** Recording traditional veterinary practices in community databases or libraries to preserve and verify authenticity.
2. **Community-Based IPR Ownership:** Empowering local communities to collectively own and manage their knowledge rights.
3. **Benefit-Sharing Agreements:** Ensuring fair compensation when traditional knowledge leads to commercial products.
4. **Capacity Building:** Training rural healers and farmers about legal rights, IPR systems, and documentation.
5. **Policy Integration:** Encouraging government programs to integrate EVK into livestock extension and research systems (Mathias, 2004).

**Conclusion**

Protecting ethno-veterinary knowledge through IPR frameworks ensures justice for indigenous communities while promoting sustainable use of natural resources. Effective protection requires a combination of legal recognition, community participation, and ethical research practices. Establishing databases, promoting benefit-sharing, and adopting sui generis laws can help safeguard EVK from exploitation, ensuring it remains a living heritage contributing to modern veterinary science and rural livelihoods.


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# Poultry Products as a Source of Foodborne Salmonellosis

**Manoj Kumar Singh[1] and Jinu Manoj[2]**
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## Introduction

Foodborne salmonellosis is one of the most significant and widespread bacterial foodborne diseases globally. It is caused by the ingestion of food contaminated with Salmonella species, which are Gram-negative, facultative anaerobic bacteria belonging to the family Enterobacteriaceae. The infection primarily affects the intestinal tract, leading to clinical symptoms such as diarrhea, fever and vomiting. Salmonella organisms are responsible for a wide range of acute and chronic diseases in both humans and animals. The disease continues to pose a major challenge to the poultry industry worldwide due to its economic impact and public health implications.

## Salmonellosis in Poultry Production

Poultry serves as a key reservoir for Salmonella and represents a major source of human salmonellosis. Salmonella enterica serovars, particularly S. Typhimurium, are frequently implicated in poultry-related human infections. The rapid growth of the poultry industry has increased the risk of salmonellosis outbreaks. In India, the poultry sector is expanding at an annual rate of 8-10%, driven by rising demand for poultry meat and eggs. However, these products have often been implicated in large-scale foodborne outbreaks associated with S. Typhimurium. The widespread consumption of poultry meat and eggs has increased human exposure to Salmonella, especially in regions where food safety regulations and cooking practices are inadequate.

## Reservoirs and Sources of Infection

Poultry and poultry derived products play a pivotal role in the transmission of Salmonella to humans and are among the most frequently implicated sources of foodborne salmonellosis worldwide. The pathogen is transmitted mainly through the ingestion of contaminated poultry derived foods such as raw or undercooked eggs and poultry meat. Contamination can originate from infected animals or humans during handling and processing. Chicken meat and eggs have been consistently associated with major outbreaks caused by Salmonella enterica serovars such as S. Typhimurium and S. Enteritidis. In addition to animal reservoirs, Salmonella can be present in feedstuffs, leading to infection or asymptomatic intestinal carriage particularly in poultry. Carrier birds are of major concern because they can spread the infection between flocks,

contaminate food products and contribute to zoonotic transmission.

The contamination of poultry products can occur at multiple points along the production chain, from farm to processing and retail. During primary production, birds may become infected through contaminated feed, water, litter or contact with carrier birds and rodents. Once colonized, Salmonella can persist in the intestinal tract and be shed in feces, leading to contamination of feathers, shells and the surrounding environment. In broiler production, improper slaughtering and processing practices contribute significantly to carcass contamination. Cross-contamination can occur through the use of contaminated equipment, surfaces or water during defeathering, evisceration or chilling. Similarly, eggs can become contaminated either internally, through vertical transmission from infected hens to the developing embryo or externally, when fecal matter contacts the shell surface.

**Pathogenesis and Transmission**

Although Salmonella can cause disease in poultry, it's greater significance lies in its role as a foodborne pathogen affecting humans. The bacteria primarily colonize the digestive tract, especially the cecum and are shed through feces, leading to environmental contamination. The pathogenicity of Salmonella depends on its invasive capabilities and its ability to survive and multiply within host macrophages. This enables the organism to persist in the host and facilitates vertical transmission from infected hens to their offspring. Surviving embryos can become lifelong carriers, while embryonic mortality can lead to the contamination of eggs. Horizontal transmission occurs through contaminated litter, water, feed, feces, dust, equipment, insects, fomites, infected birds and rodents. Wild birds, other animals, and farm personnel also contribute to the spread. Hatcheries play a particularly critical role in maintaining infection cycles, with S. Typhimurium being one of the most prevalent zoonotic serovars detected in breeding and commercial flocks.

**Prevention and Control Strategies**

The prevention and control of salmonellosis require a comprehensive farm-to-fork approach that integrates biosecurity, surveillance, vaccination and hygiene management. Implementation of the Hazard Analysis and Critical Control Points (HACCP) system is essential to identify and mitigate risks throughout the production chain. Poultry products are therefore recognized as critical control points in the epidemiology of Salmonella infections. Ensuring food safety requires strict adherence to hygienic processing, effective biosecurity measures at the farm level, and consumer education regarding proper cooking and handling of poultry products. Reducing the prevalence of Salmonella in poultry not only enhances flock health and productivity but also plays a vital role in safeguarding public health and food security.

**The key preventive measures include**

- Sourcing birds from trusted suppliers with certified breeding and hatching facilities.
- Restricting farm access and limiting visitors.
- Using protective clothing and sanitized footwear.
- Maintaining strict cleaning and disinfection routines for all equipment and housing.
- Controlling rodents, wild birds and insects.
- Training farm workers in personal hygiene, including proper hand and foot sanitation.

**Conclusions**

Salmonella remains a persistent threat to both poultry production and public health. Its ability to survive in the environment, spread through multiple routes and resistance to control efforts underscores the importance of integrated prevention strategies. Through rigorous biosecurity, hygiene and monitoring practices, the poultry industry can minimize Salmonella contamination ensuring safer food for consumers and improved productivity for producers.


# 17th Poultry India Expo 2025; Curtain Raiser Press Meet – 2025

**The curtain raiser press meet for the 17th Edition of Poultry India Expo 2025 was successfully held in Hyderabad today.**


**The curtain raiser press meet for the 17th Edition of Poultry India Expo 2025 was successfully held in Hyderabad today.** The event marked the formal announcement of South Asia's biggest poultry exhibition, which will be held from November 26 to 28, 2025, at Hitex, Hitech City, Hyderabad, with Poultry Knowledge Day scheduled for November 25 at HICC Novotel.

Addressing the media, Uday Singh Bayas, President of the Indian Poultry Equipment Manufacturers Association (IPEMA – Poultry India), shared that **the expo aims to highlight the latest developments in poultry management, health, nutrition, breeding, feed manufacturing, and production technologies.**

- He further mentioned that **this year's expo is expected to attract over 45,000 participants from 35 to 50 countries, with 500 exhibitors showcasing world-class products and innovations.**


- Delegations from various international ministries, including the Ministry of Agriculture from Uganda, are expected to visit the event to understand India's rapid growth as the second-largest egg producer and fourth-largest chicken producer globally.

Uday Singh Bayas also emphasized that India's poultry industry reflects the vision of Atmanirbhar Bharat and aligns with Viksit Bharat@2047, as envisioned by Prime Minister Narendra Modi. He highlighted the **health benefits of poultry products, noting that promoting egg and chicken consumption can help address undernutrition and underweight issues in rural India due to their rich protein content.**

**The press meet saw the presence of several key industry representatives and dignitaries, including:**

- **K. G. Anand, General Manager, Venkateshwara Hatcheries Ltd**
- **Chitturi Suresh Rayadu, Special Invitee and Managing Director, Srinivasa Farma Pvt Ltd**
- **Dr. K. Balaswamy, President, National Egg & Chicken Promotion Council (NECPC)**
- **K. Mohan Reddy, President, Telangana Poultry Federation (TPF)**
- **V. Narasimha Reddy, Vice President, Telangana Poultry Federation (TPF)**
- **M. K. Vyas, President, Indian Poultry**

President), Chakradhar Rao (Founder President), M.Srikanth (Treasurer) and Natarajan (Secretary).

**The gathering concluded with a note of optimism about India's growing influence in the global poultry sector and the promising opportunities the upcoming expo will offer.**

**Journalists Association (IPJA)**

- **Naveen Pasuparthy, President, Karnataka Poultry Farmers & Breeders Association (KPFBA)**
- **Singaraj K., President, Tamil Nadu Poultry Farmers Association (TNPFA)**
- **Valsan P., Secretary, All India Poultry Products Exporters Association**
- **Dr. Ravinder Reddy, Secretary, Telangana Poultry Breeders Association (TPBA)**
- **Gurram Chandra Shekhar Reddy, Chairman, NECC Hyderabad Zone**
- **V. Bhasker Rao, General Secretary, Telangana Poultry Federation (TPF)**

The press-meet was Presided over by IPEMA's President Uday Sing Bayas, along side Anil Dhumal (Founder


# Green Muscle Disease

## Reducing the Incidence in Broiler Flocks

*Dr. S.F. Bilgili, Graduate Program Officer, Department of Poultry Science, Auburn University*
*Dr. Joseph Hess, Extension Specialist and Associate Professor, Auburn University*

**Executive Summary**
Green Muscle Disease (or Deep Pectoral Myopathy, DPM) is a degenerative disease of the minor pectoral muscles (i.e. the tenders), which is characterized by atrophy and necrosis. The condition arises when the muscle fibers become deficient in oxygen and is associated with sudden and excessive wing flap. The development of the disease can be split into three categories. Category 1 is the acute inflammatory lesion in which the deep pectoral muscle is very red and hemorrhagic. Category 2 describes the stage at which the lesion in the inner fillet becomes well defined and is sometimes circumscribed by a hemorrhagic ring. Category 3 describes the progressive degeneration and greening of damaged tissue. Although the incidence of DPM is increased in heavy broilers, it can occur at any age or weight and is dependent upon the management and husbandry systems employed. Identifying and eliminating the management issues which contribute to wing flapping and the development of the condition is key to reducing the incidence of DPM.

**Introduction**
Green Muscle Disease is a hidden problem in modern-day broiler chickens. Green Muscle Disease (or Oregon Disease) is a common name given to a degenerative muscle disease known as Deep Pectoral Myopathy (DPM). The condition is characterized by necrosis and atrophy of the tenders (i.e. supracoracoideus or minor pectoral muscles). The lesions often affect both tenders and vary in color, progressing from a pinkish hemorrhagic appearance to a gray-greenish discoloration as illustrated in **Figure 1**.

**Figure 1:** Deep Pectoral Myopathy

DPM was first described in mature breeder turkeys and broiler breeders but is being seen more in meat-type chickens, especially those selected for breast muscle development. The affected muscles are discarded during de-boning, resulting in saleable yield losses. However, the major issue with DPM is that if the birds are marketed as whole carcasses or parts, the problem is rarely detected during processing, resulting in consumer complaints and making the cause of the problem difficult to identify.

The condition is not associated with any infectious agent and therefore has no public health significance other than by affecting the aesthetic appearance of the meat.

**DPM is rarely detectable during processing if the birds are marketed as whole carcasses or parts.**

**Why Does DPM Target Broiler Breast Muscles?**
- The pectoral muscles in avian species are associated with flight and the deep and superficial pectorals work in synergy, one to raise the wing and the other to lower it.
- The anatomy of these muscles is, however, intrinsically different in that the inner fillet has a tough outer sheath which is made up of dense fibrous tissue and is inelastic.
- The outer or major muscle is simply surrounded by loose connective tissue that moves easily over the muscle surface as the muscle profile changes.

Contraction of the major pectoral muscles (the breast fillet) and the minor pectoral muscles (the tender) are responsible for the up- and down-strokes of the wings. During contraction, these muscles expand with increased blood supply (i.e. muscle pumping). The expansion of the minor pectoral muscle, by as much as 25% in volume, is problematic because this muscle is confined in a 'tight compartment', sandwiched between bone (the sternum) and the large breast fillet. The minor pectoral muscle is also encased in a rigid fibrous sheath which restricts increases in muscle volume. Therefore, when intramuscular pressure increases to levels above circulating blood pressure, the blood supply flowing into the muscle stops and, with continued muscle activity, oxygen deficiency rapidly develops and lack of oxygen (ischaemic necrosis) of the muscle fibers occurs. There is also an additive effect as the muscle pH falls. Typically the middle third of the muscle is involved. In experimental studies, relatively short periods of wing flap are enough to induce these degenerative changes.

**Recognition and Identification of the Development Stages in DPM**

In response to complaints of DPM from the processing plant and/or customers, an investigation should be organized. This should include the identification of the category of DPM (fresh or old) at the processing plant. This information can then be correlated to husbandry management practices.

**Category 1:** The acute inflammatory lesion in which the deep pectoral muscle is very red and hemorrhagic. Hemorrhages also appear on the fibrous sheath (see **Figure 2**). There is an obvious suffusion of serous fluid in the area of the damage making it appear wet. This stage is likely to be associated with a handling event (e.g. catching) and will be present for about 48 hours.

**Figure 2:** Early Acute Pectoral Myopathy

**Category 2:** At this stage the lesion in the inner fillet has become well defined and is sometimes circumscribed by a hemorrhagic ring (see **Figure 3**). The affected areas are pale pink to plumb colored and there are clear changes consistent with early coagulative necrosis of the muscle, when the tissue texture becomes fibrous. This is sometimes described as 'fish flesh'. This stage will continue for a few days after the initial event or incident.

**Figure 3:** Pectoral Myopathy - developing lesions

**Category 3:** This stage reveals the progressive degeneration and greening of the damaged tissue (see **Figure 4**). Often, only the middle part of the fillet is involved and the progressive greening is in parallel with the loss of cellular structure, so that a 'putty like' consistency develops within the lesion. This green, necrotic area will persist and through time will gradually reduce in size as it is reabsorbed so that the symmetry of the breast is lost in some older birds. The green color is produced by the breakdown of hemoglobin and myoglobin to bile salts.

**Figure 4:** Aged Pectoral Myopathy

**Factors affecting the occurrence of DPM**

The pectoral muscles make up nearly a quarter of the total liveweight in current-day meat chickens. Rearing broiler chickens to heavy market weights can increase the probability for occurrence of DPM. Incidence is dependant on management and husbandry systems and not simply bodyweight as birds at any age or weight can be affected.

*DPM is associated with the following factors:*

- Excessive wing flapping
- Heavy market bodyweight
- Sex: incidence can be higher in males compared to females
- High white meat yield
- Rapid growth rate

**The desirable efficiency in growth and anatomy of today's broiler brings with it the possibility of DPM development.**

Commercially raised broiler chickens are kept relatively comfortable and inactive during the growing period. Consequently, the pectoral muscles are not exercised enough to increase efficiency of the circulatory supply to the muscles and to allow the expansion of the surrounding fibrous sheath. It is doubtful that even a subtle amount of wing activity would help improve circulation or develop the sheath adequately.

Few, if any, processing plants actually track or document the incidence of DPM on a regular basis. Detection of DPM on whole carcasses and parts is extremely difficult as lesions are not visible during carcass inspection or sorting. As birds also exhibit no symptoms, finding affected live birds in a flock and treating them is not possible.

The key to avoiding the DPM lies with preventative management. Controlling the incidence of DPM hinges upon identifying and eliminating certain flock management issues that contribute to the development of the condition.

**The key to reducing the incidence of DPM lies in management of the broiler flock and minimizing wing flapping.**

To avoid the occurrence of DPM, the following flock management guidelines **(Table 1)** are suggested as starting points to investigate and minimize any unnecessary wing activity.

**Table 1:** Flock Management Guidelines to Minimize Unnecessary Wing Activity

| Do Not Stress or Frighten Birds | Limit Sudden and Excessive Wing Exercise | Control Overall Flock Flightiness |
|---|---|---|
| Do not allow other animals in or around the house. | Avoid excessive human activity in the house, especially if the birds are flighty. | Bird activity and flightiness increases with increasing natural day length. |
| Eliminate novel sounds (buzzing security lights, sudden use of noisy ventilation fans, tractor/ generator operation in/ near houses). | Avoid walking birds too fast, especially when migration barriers (nets, pipes or fences) are used; this may cause the birds to pile up. | Birds respond to increased light intensity with increased activity. Blue curtains may help calm the flocks in curtain-sided facilities. |
| Limit weighing or penning birds.<br><br>Weigh birds in a bucket (or similar) instead of by legs. | Train personnel for gentle bird handling techniques during catching.<br><br>Do not catch birds by their wings. | In environmentally controlled houses, avoid sudden and excessive increases in light intensity with dimmers - especially under low light intensity (<3 lux) conditions. |
| Avoid excitement induced by frequent thinning of flocks. | Keep birds comfortable during transport to the processing plant. Low crate stocking densities can cause problems. Prevent any unnecessary bird movements when crated.<br><br>Automatic catching systems can exacerbate wing flapping depending on the system used. | Avoid extended periods (>3-4 hours) of feed and/or water withdrawal. |
| In tunnel ventilated houses use migration fences approximately 100 ft (30 m) apart. | | Intermittent lighting programs can be a potential problem due to frequent bird stimulation. |
| | | Ensure that stocking density, feeder and drinker space are adequate. |
| | Minimize birds perching on swinging equipment such as feed tracks which allow birds to flap. | A dawn to dusk type dimmer offers a gradual increase in lux. |

**Conclusion: Reducing DPM is a broiler management responsibility.**

## About the Authors

**Dr S.F. Bilgili** is Professor and Extension Scientist in the Department of Poultry Science at Auburn University, Alabama, USA. His current responsibilities include developing and implementing outreach and research programs in the areas of broiler processing technology, slaughter and processing efficiency, broiler carcass quality and meat yield, food safety and animal welfare. He has authored or co-authored numerous articles in scientific and trade journals and serves on several industry and academic committees. He is currently Chairman of the National Chicken Council Animal Welfare Scientific Advisory Committee.

**Dr Joseph Hess** is an Extension Specialist and Associate Professor in the Poultry Science Department at Auburn University, Alabama, USA. His research focuses on practical aspects of management and nutrition in broilers and broiler breeders and he engages in practical research projects that can provide immediate feedback to the industry in terms of poultry performance, product quality or feed technology. He is a member of the Poultry Science Association, the Southern Poultry Science Society, the Alabama Poultry & Egg Association and works closely with the Alabama Feed & Grain Association.

*Aviagen provides customers with detailed Product Performance Objectives, Management Manuals and Nutrition Specifications as the basis for managing their flocks. Successful production of day old chicks or grown broilers depends also on the understanding and attention to detail in the day-to-day management of stock. This document is produced by Aviagen's Technical Transfer Department as one of an ongoing series. These give background information on various topics to provide an understanding of the principles which are essential to successful management of both breeders and broilers. While the principles should have a broad relevance to most regions and production strategies, certain aspects may be directed to more specific situations*

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# INFAH Hosts Successful 14th AGM & Appoints New Managing Committee

The Indian Federation of Animal Health Companies (INFAH), the united progressive force of companies working towards animal healthcare, is delighted to announce the resounding success of its 14th Annual General Meeting (AGM). The event, held on Thursday, September 18, 2025, at the Vivanta By Taj, Navi Mumbai, was marked by insightful discussions, strategic deliberations, and invaluable networking opportunities, bringing together the stalwarts of the Indian animal health industry.

The day commenced with a warm and inspiring Welcome Address by the President, Dr. Shirish Nigam, who set the tone for the event by focusing on the timely and vital theme of 'Resilient Animal Agriculture for Viksit Bharat' (Developed India).

The AGM featured a packed schedule of thought-provoking keynote addresses from esteemed industry leaders who shared their expert perspectives on critical facets of the sector:

- Mr. Ajay Srivastava, Founder of Global Trade Research Initiative, on "Trade & Tariffs".
- Dr. R S Sodhi, President of the Indian Dairy Association, on "Dairy Industry – Opportunities & Challenges".
- Dr. P B N Prasad, former Drug Controller General of India, on "Regulatory Reforms for Viksit Bharat".
- Dr. Saundraya Rajesh, Founder & President of the AVTAR group, on "Enabling Inclusion: Powering a Future-Ready Organisation."

The annual report, along with reports on the Companion Animal Healthcare Market, 3rd edition of Nutritimes and Antimicrobial Usage (AMU) in Indian Animal Healthcare during 2023-2024 report, were published. The Companion Animal report was prepared by the Companion Animal Subcommittee, led by Dr. Vinayak Surve, its Chairman. The Nutritimes was prepared by the Feed Supplement Subcommittee, led by Mr. Satish Pasrija, its Chairman. The Therapeutic Subcommittee, under the leadership of its Chairman, Dr. Arun Atrey, prepared the AMU report. These publications were shared with member companies and guests in the presence of Managing Committee members.

Key proceedings of the General Body Meeting included the presentation of the General Secretary's Report by Dr. Aman Sayed, a thorough review of the AGM proceedings and necessary approvals presented by Dr. Manoj Sood, and an engaging Open Forum that facilitated valuable feedback and interactive dialogue among members.

A major highlight of the day was the prestigious INFAH Awards 2024-25 ceremony, where the Federation had the honour of felicitating Dr. D K Dey and Dr. Sandeep Karkhanis for their outstanding and impactful contributions to the animal health industry. The session was concluded with a gracious Vote of Thanks from Ms. Ashwini Deshpande.

**New Leadership Appointed**

In a significant announcement during the AGM, the newly elected Managing Committee members for the forthcoming term from 2025 to 2027 were introduced. Following the AGM, the Office Bearers were officially appointed at the Managing Committee meeting held on October 19, 2025.

The newly appointed Office Bearers and Executive Members of the INFAH Managing Committee are:

"We are immensely proud of the successful conclusion of our 14th AGM under the leadership of Dr Shirish Nigam and Team INFAH," said Mr. Vijay Teng, the newly appointed President of INFAH. "The exchange of ideas on topics critical to national development, from trade policies and regulatory reforms to industry challenges and workplace inclusion, has positioned INFAH to drive the agenda for a Resilient Animal Agriculture sector in its journey towards a Viksit Bharat. We are excited to lead the Federation into a new year of collaborative efforts and growth."

INFAH extends a heartfelt thank you to all the distinguished speakers, dedicated members, and supportive partners for making this event a grand success. The Federation looks forward to another term of collaborative engagement to advance the welfare of animals and contribute to the nation's food security and economy.

**About INFAH:**

The Indian Federation of Animal Health Companies (INFAH) is the united progressive force of companies dedicated to animal healthcare in India. INFAH plays a critical role in promoting ethical practices, enhancing the animal health industry's value, and collaborating with policymakers to shape a robust and progressive regulatory framework for the sector.

| Designation | Name |
|---|---|
| President | Mr. Vijay Teng |
| Vice President | Dr. Sayed Aman |
| General Secretary | Dr. Manoj Sood |
| Joint Secretary | Dr. Vinayak Surve |
| Treasurer | Dr. Mubeen Patel |
| Immediate Past President & Executive Member | Dr. Shirish Nigam |
| Past President & Executive Member | Dr. Arun Atrey |
| Past President & Executive Member | Mr. Satish Pasrija |
| Past President & Executive Member | Dr. Vijay Makhija |
| Executive Member | Dr. Anup Kalra |
| Executive Member | Ms. Ashwini Deshpande |
| Executive Member | Dr. Pratibha Mandloi |
| Executive Member | Mr. Vikram Baranwal |


INFAH
14th Annual General Meeting


Meeting
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14th Annual


Dr. Sandeep Karkhanis
INFAH


Dr. D K Dey
INFAH

# IPEMA – Poultry India strengthens unity and growth at the 36th AGM of the Poultry Federation of India

The Indian Poultry Equipment Manufacturers' Association (IPEMA) – Poultry India had the honour of supporting the **36th Annual General Meeting of the Poultry Federation of India (PFI)**, held at Ramada by Wyndham, Lucknow on October 8–9, 2025. The two-day event, themed "Survive & Thrive in Difficult Times," brought together leading stakeholders, policymakers, industry experts,



and representatives from across India's vibrant poultry sector.

The AGM was presided over by **Mr. Ranpal Dhanda**, President, PFI, alongside **Mr. Sanjeev Gupta (Vice President–HQ), Mr. Ravinder Singh Sandhu (Secretary), Mr. Ricky Thaper (Joint Secretary),** and **Mr. Rahul Khatri (Treasurer)**. The sessions featured insightful presentations, technical discussions, and panel dialogues addressing current challenges and strategies for sustainable industry growth.

**IPEMA–Poultry India's Participation and Recognition**

During the AGM, on Day 1, Mr. Uday Singh Bayas, **President, IPEMA – Poultry India,** highlighted the pivotal role of global exhibitions such as the Poultry India Expo in uniting diverse stakeholders on a common platform for innovation, collaboration, and capacity building.

IPEMA–Poultry India was also **honoured with a memento of recognition** by the Poultry Federation of India for its continued contribution to the growth, innovation, and sustainability of India's poultry industry.

He emphasized that the upcoming expo aligns with Prime Minister Narendra Modi's "Viksit Bharat 2047" vision — fostering a self-reliant and globally respected poultry ecosystem built on innovation, sustainability, and inclusive growth.

"The Poultry India Expo is not just an exhibition; it is a movement — a platform that unites farmers, entrepreneurs, breeders, feed manufacturers, veterinarians, and students to exchange ideas, build collaborations, and shape the future of our industry," said Mr. Bayas.

"Together, we can strengthen India's poultry sector and make Poultry India Expo 2025 a proud milestone for our nation."

**Invitation to Dignitaries and Upcoming Poultry India Expo 2025**

On Day 2 of the AGM, Mr. Uday Singh Bayas, President, IPEMA – Poultry India, had the privilege of personally inviting distinguished dignitaries at the AGM to the upcoming 17th edition of the Poultry India Expo 2025, scheduled from **25–28 November 2025** at **HITEX, Hyderabad**. The invitees included:

- **Prof. S. P. Singh Baghel**, Hon'ble MoS for Animal Husbandry (Chief Guest)
- **Shri Mahipal Dhanda**, Hon'ble Minister of Education, Government of Haryana
- **Shri Brijesh Pathak**, Hon'ble Deputy Chief Minister, Government of Uttar Pradesh


Mr. Uday Singh Bayas was also part of the panel discussion on **Day 2 – October 9**, where he had the opportunity to discuss the magnitude and scale of the Poultry India Expo and how the event has been shaping the future of the poultry industry.


**Invitation to Poultry India Expo 2025**

IPEMA – Poultry India warmly invites all stakeholders, industry professionals, entrepreneurs, farmers, academicians, and policymakers to be part of the **17th Poultry India Expo 2025**. The upcoming edition promises to be the **largest and most impactful yet**, featuring **500+ exhibitors from over 50 countries**, welcoming **more than 50,000 visitors**, and spanning **seven exhibition halls across 35,000 square meters.**

The expo will showcase **cutting-edge technologies, innovations, and sustainable solutions** driving the future of poultry farming and agribusiness in India. It serves as a **premier platform for networking, knowledge exchange, and collaboration,** reinforcing India's vision for a **self-reliant and globally competitive poultry ecosystem.**

Join us in **Hyderabad from 25–28 November 2025** to experience the evolution of India's poultry industry — where **innovation meets opportunity.**

# RODEC Pharma Ltd. APPOINTS DR. SRIJIT TRIPATHI as General Manager - Techno Marketing

Mr. Mukesh Gupta, Managing Director RODEC and Dr. Maneesh Gupta Strategic Advisor to RODEC welcoming Dr. Srijit Tripathi on his appointment in RODEC as General Manager.

In a significant move designed to strengthen its leadership in the veterinary pharmaceutical sector, **Rodec Pharma Ltd.**, a leading veterinary and animal health company headquartered in Ghaziabad, has announced the appointment of **Dr. Srijit Tripathi as General Manager – Techno Marketing**. With over a decade of experience in the animal health industry, Dr. Tripathi brings to RODEC a proven track record in International and domestic market from his prior tenures at Vetline and Ayurvet Limited, where he led strategic technical, marketing, product development and scientific outreach initiatives.

Dr. Tripathi holds an MVSc in Veterinary Medicine from G. B. Pant University of Agriculture & Technology. Throughout his career, he has contributed in diverse roles and has represented his organizations at various national and international platforms, delivering seminars and expert talks across the industry. He has also published multiple papers and articles in reputable veterinary journals and industry magazines. His reputation as a thought leader in the field, combined with hands-on marketing and technical expertise, is expected to amplify RODEC's efforts in bridging research with market demands. In his new role, he will oversee the technical marketing strategy, liaise with research and development teams and strengthen RODEC's scientific engagement across the industry.

RODEC Pharma was founded by its visionary Managing Director Mr. Mukesh Gupta in **1998** and is headquartered in the Meerut Road industrial area of Ghaziabad. RODEC is well known for its wide range of veterinary health products including analgesics, antibiotics, hormonal formulations, feed supplements, and therapeutics, and services a pan-India network of dealers and practitioners. The company has also introduced innovative and conceptual research-based products and focuses on developing the poultry business as well. With Dr. Tripathi's appointment, the company aims to accelerate innovation, reinforce scientific credibility, and deepen its global reach across the livestock, Poultry and other related sectors. His addition to the leadership team underscores Rodec's commitment to combining scientific excellence with market effectiveness in achieving its vision — **"Healthy Animal, Wealthy Nation."**

# South Asia's Largest Poultry Exhibition Announced

The curtain raiser press meet for the 17th Edition of Poultry India Expo 2025 was successfully conducted in Hyderabad on November 5, 2025, officially announcing South Asia's largest poultry exhibition. The expo will take place from November 26–28, 2025, at HITEX, Hitech City, Hyderabad, with Poultry Knowledge Day scheduled for November 25 at HICC Novotel.

Addressing the media, Uday Singh Bayas, president of the Indian Poultry Equipment Manufacturers Association (IPEMA – Poultry India), highlighted that this year's expo will showcase the latest advancements in poultry management, health, nutrition, breeding, feed manufacturing and production technologies.

He noted that the 2025 edition is expected to draw over 45,000 participants from 35 to 50 countries, with 500 exhibitors presenting world-class products and innovations. Delegations from multiple international ministries—including representatives from the Ministry of Agriculture, Uganda—are expected to attend, reflecting global interest in India's rapid rise as the world's second-largest egg producer and fourth-largest chicken producer.

Bayas emphasized that India's poultry industry embodies the spirit of Atmanirbhar Bharat and aligns with Viksit Bharat@2047, envisioned by Prime Minister Narendra Modi. He underscored the nutritional importance of poultry products, noting that increased egg and chicken consumption can help combat undernutrition and underweight prevalence in rural communities due to their high protein content.

The press meet was attended by key representatives and dignitaries from across the poultry sector, including:

- K. G. Anand, general manager, Venkateshwara Hatcheries Ltd
- Chitturi Suresh Rayadu, special invitee & managing director, Srinivasa Farma Pvt Ltd
- Dr. K. Balaswamy, president, National Egg & Chicken Promotion Council (NECPC)
- K. Mohan Reddy, president, Telangana Poultry Federation (TPF)
- V. Narasimha Reddy, vice president, Telangana Poultry Federation (TPF)
- M. K. Vyas, president, Indian Poultry Journalists Association (IPJA)
- Naveen Pasuparthy, president, Karnataka Poultry Farmers & Breeders Association (KPFBA)
- Singaraj K., president, Tamil Nadu Poultry Farmers Association (TNPFA)
- Valsan P., secretary, All India Poultry Products Exporters Association
- Dr. Ravinder Reddy, secretary, Telangana Poultry Breeders Association (TPBA)
- Gurram Chandra Shekhar Reddy, chairman, NECC Hyderabad Zone
- V. Bhasker Rao, general secretary, Telangana Poultry Federation (TPF)

# Successful Cluster Meeting Held in Varanasi Highlights Advancements in Broiler Farming, Management, and Sustainable Poultry Practices

Varanasi, India — The recently concluded Cluster Meeting in Varanasi marked another significant step toward strengthening knowledge exchange, improving farm efficiency, and promoting sustainable growth within the poultry sector. The event witnessed exceptional participation from farmers, integrators, technical professionals, and industry stakeholders who came together for an in-depth and interactive learning experience.

Designed as a practical knowledge-sharing platform, the meeting centered around the theme **"Broiler Farming – Management, Biosecurity and Disease Prevention for Profitability."** The session focused on addressing real-world challenges faced by poultry farmers and explored strategies that enable more robust operations, improved flock health, and higher productivity. Attendees actively engaged in discussions, case analyses, and collaborative problem-solving, reflecting their strong interest in adopting modern, science-based practices.

A key highlight of the event was the presence of **Mr. Praneeth Rao, Director,** whose guidance and insights added immense value to the session. In his address, Mr. Rao emphasized the critical need for strengthening management protocols and implementing stringent biosecurity measures to safeguard bird health and ensure consistent profitability. He spoke about the dynamic nature of the poultry industry, the ongoing need for adaptation, and the role of continuous training in empowering farmers to make informed operational decisions.

Mr. Rao's session encouraged participants to reflect on current challenges such as disease outbreaks, fluctuating climatic conditions, rising input costs, and evolving market needs. He also reiterated the importance of preventive health programs, scientific brooding, optimal nutrition, and sound farm hygiene practices. His focus on **sustainable profitability**, rather than short-term gains, resonated strongly with participants who are looking to reinforce resilience in their operations.

Throughout the meeting, technical experts shared actionable insights on broiler management, disease diagnostics, vaccination protocols, and daily monitoring procedures. Several practical demonstrations were conducted to illustrate the impact of temperature regulation, ventilation, litter management, water quality, and feed optimization on broiler performance. The interactive format enabled participants to ask questions, discuss farm experiences, and gain clarity on best practices tailored to the local conditions of Eastern Uttar Pradesh.

The session on **biosecurity** proved particularly impactful, as experts addressed the rising threat of infectious diseases and antibiotic resistance. Practical steps such as controlled farm entry, proper disinfection procedures, equipment sanitation, pest control, and early disease detection were demonstrated. Participants were encouraged to adopt a preventive mindset rather than relying on corrective actions alone, thereby improving flock health outcomes and reducing economic losses.

Another area of focus was **disease prevention and health management**, where veterinarians discussed the importance of timely vaccination schedules, immune-boosting strategies, and regular farm audits. Real-world examples of disease patterns seen in the region helped farmers understand risk factors and strengthen their preparedness.

The Cluster Meeting also served as a platform for discussing emerging opportunities in the poultry sector. As consumer preferences evolve and demand for high-quality protein increases, the poultry industry continues to play a crucial role in supporting food security and rural livelihoods. Participants were briefed on evolving market trends, improved production technologies, and the potential for diversification within poultry enterprises.

A notable aspect of the event was the spirit of collaboration and collective learning. Farmers shared their experiences regarding seasonal challenges, performance variations, management adaptations, and innovative local solutions they have implemented over the years. These discussions reinforced the value of peer-to-peer learning and community-based knowledge dissemination.

Speaking at the event, Mr. Rao acknowledged the commitment and hard work of the poultry farming community in the region. He highlighted that such cluster meetings are essential to unifying efforts, aligning strategies, and reinforcing a shared vision for excellence. He also emphasized the organization's ongoing commitment to supporting farmers through training programs, field visits, advisory services, and continuous technical assistance.

Participants expressed their appreciation for the initiative, noting that the program provided them with practical guidance that can be directly implemented on their farms. Many shared that the meeting enhanced their understanding of risk management, profitability drivers, and the importance of adopting new technologies and disciplined farm practices.

The Varanasi Cluster Meeting reaffirmed the organization's mission to facilitate knowledge-sharing and support poultry farmers in building efficient, profitable, and sustainable broiler operations. By fostering constructive dialogue and delivering actionable insights, the event contributed to advancing the capabilities of the poultry community in the region.

Such gatherings continue to play an important role in shaping the future of the industry—enabling farmers to stay informed, strengthen operations, and work collectively toward higher standards of performance and productivity. The success of this meeting has further motivated the organization to conduct similar programs across other regions, ensuring that more farmers benefit from updated knowledge, expert guidance, and collaborative learning opportunities.

As the poultry sector evolves, initiatives like these help bridge knowledge gaps, encourage innovation, and reinforce a shared commitment to excellence. The organization expresses its gratitude to all participants, experts, and team members whose active involvement made the Varanasi Cluster Meeting a remarkable success.

# As demand for poultry meat and eggs continues to rise, manufacturers of processing machinery are stepping up their game to provide farmers with the newest technology. By Michael Barker

With the tight margins of modern farming, everyone across the supply chain is seeking every possible opportunity to gain an edge. The ability to produce the highest-quality products as efficiently as possible and with the fewest rejects is king, and fortunately, the rapid evolution of technology is offering a welcome helping hand.

It means that poultry processing machinery is big business, and if the analysts are to be believed, there's going to be plenty of new tech for farmers to get their hands on in the years ahead. According to a new report this summer by Precedence Research, the global poultry processing equipment market is projected to hit a whopping $7.7bn in value by 2034, representing a huge leap from the $4.45bn it reached in 2024. The growing production and consumption of poultry meat across the world – as the popularity of protein shows no sign of relenting – is credited as a key driver of market growth.

A further report, by Coherent Market Insights (CMI), notes that better awareness of the fact that poultry meat is a rich source of proteins, vitamins and minerals, is a major market driver. What's more, the rise of ready-to-cook and ready-to-eat foods are gaining huge popularity, resulting in significant growth of processed chicken, nuggets, patties and other value-added products in both the retail and foodservice sectors. "All these factors have compelled poultry processors to focus on productivity and throughput with automated cutting-edge equipment," the report states. "Advanced technologies allow high yields while maintaining food safety and quality standards. Moreover, automation helps overcome difficulties arising from labour shortages and wage inflation."

From naturally or artificially flavoured chicken products such as barbecue wings or tandoori options, to breaded nuggets and tenders, precise marination, tumbling and massaging equipment is needed in addition to accurate and variable portioning tech. All of that has to be done with food safety and labelling regulations front of mind.

CMI says that one of the major opportunities for the poultry processing equipment market is the ongoing technological advancements in machinery and automated solutions. That is seeing manufacturers constantly innovating and developing newer generations of fully automated lines for the slaughtering, scalding, plucking, evisceration, de-feathering, chilling, cutting and de-boning of poultry. "Technologies such as robotics, artificial intelligence (AI) and Internet of Things are enabling the next stage of Industry 4.0 transformations in the sector," it states.

**AI takes centre stage**

Artificial intelligence is the hottest of topics across almost every sphere of life in 2025, and the egg and poultry meat sectors are no different, as manufacturers bring a range of solutions to market that has the technology at its core.

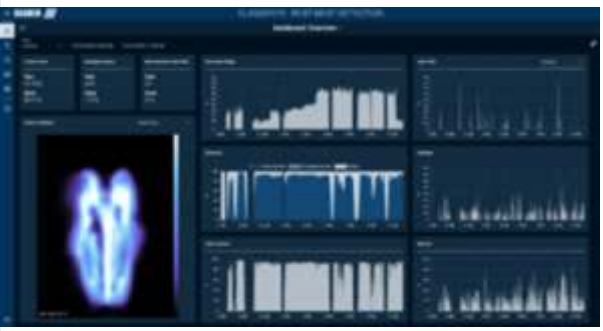
One such example is Sanovo's new Farm Intelligence Unit, which is an AI-powered system launched in October that is designed to transform how egg producers detect defects and manage flock health. Based on the logic that manual egg checks with the human eye cannot catch all the cracks, leaks or dirty egg shells early in the process, the Farm Intelligence Unit – which has a capacity of up to 72,000 eggs per hour – uses advanced vision technology and real-time data to uncover rejections earlier in the process. The approach sees every egg scanned and analysed automatically, with cracks, dirt, leakers and size variations detected early and before they reach the grader. That gives producers better control over flock health, product quality, and batch profitability, according to Sanovo, which highlighted other benefits as labour savings and cleaner packing lines.

AI vision systems are fast becoming a major feature of poultry processing sites, and are boosting efficiency across a wide range of functions. Meyn's Multi Vision Quality Grading System for poultry features four camera tubes fitted with powerful, non-flashing LED lights for clear, detailed images. Together, the cameras provide a 360-degree view, offering superior defect detection accuracy while minimising false downgrades and manual rework. The system is able to detect defects including empty shackles, one-leg birds, broken wings, skin flaws, meat damage, burns, and bruises – even in hard-

to-see areas like wing pits and groins.

**Vision for the future**

According to Baader, vision systems are an important component in the current digital transformation sweeping across the industry, with AI-driven systems bringing a new level of flexibility and precision, and enabling processors to make real-time decisions based on accurate, consistent data. "As companies embrace advanced technologies like automation, real-time analytics, and AI-enhanced vision systems, they are unlocking new levels of productivity, quality, and profitability," says Michael Gillespie, global product manager for platforms, automation and software at Baader. "Digital solutions are no longer just a future consideration; they are a current driver of performance and competitive advantage."



Gillespie notes that traditionally, vision systems have been used post-chilling to assess whole bird quality, offering valuable insights – but only at the very end of the process.

That is now changing, he says, with AI-powered vision systems like Baader's ClassifEYE redefining what is possible, enabling real-time data capture and smarter, data-driven decisions throughout the entire production line.

ClassifEYE is designed to use AI to detect process anomalies and quality defects with consistent accuracy, and it works by first capturing high-resolution images at key locations, then using AI algorithms to analyse the images using pre-trained models and real-time data. The results are delivered instantly through intuitive dashboards, allowing staff to act fast.

The system is designed to be flexible and scalable as operations grow. "Any processor looking to enhance production control can start with a single computing unit and scale up to 24 cameras – either all at once or incrementally, depending on operational needs," Gillespie says. "And of course, we ensure that all data is protected using robust, industry-standard security protocols, safeguarding operations from the factory floor to the cloud."

New systems are now becoming available across the whole spectrum of poultry meat and eggs. In September, Moba launched a new Vision Weighing system for the unwashed egg market, combining AI and machine learning to determine egg weight with exceptional accuracy, and without contact and moving parts.

Moba says the absence of moving parts offers enhanced reliability, while the technology as a whole brings simplified cleaning and maintenance procedures, reduced dependency on manual labour, and high precision that directly boosts egg producers' profit margins. The weighing system can upgrade Moba's AI-based Vision Shell Inspector, which can spot cracks not visible to the human eye. "We are driven by the continuous urge from our customers to optimise and challenge the status quo," said Luco Reitsema, senior product manager at Moba. "Our Vision Shell Inspector is transforming operations for egg producers, delivering unrivalled efficiency, food safety, and performance."

**Intelligent thinking**

Intelligence is the buzzword for modern poultry processing machinery, with Marel pointing out that the 'i' in its Nuova-i and VC-i evisceration machinery stands for 'intelligence' – in other words, the process is about more than just a touchscreen on a machine. "It's an internal 'brain' that ties together control, automatic adjustments, performance monitoring, connectivity, and system alerts," the company says.

The manufacturer's idea was to create an HMI (human-machine interface) that is straightforward to use and requires no more than half an hour's instruction. The machine is backed by SmartBase software, and digital control means users simply choose 'recipes' which define the specific processes for a variety of flocks, with settings easily switched between flocks. For example, when concept chickens with longer legs come in, the recipe adapts height or guides accordingly. "Every operator knows what to do," says product technologist Eva van der Velde. "When a heavy flock arrives, you simply select the right recipe on the touchscreen. The machine settings then adjust themselves. When light birds come in, you press the small-chicken icon to activate the corresponding settings; it is as simple as that. This works wonderfully, and performance stays incredibly stable."

Across the sector, exciting new developments are set to continue apace. And producers will welcome every additional tool in their arsenal as they look to get ahead. It simply wouldn't be intelligent not to.

**Convenience drives egg processing market**

Increasing demand for ready-to-eat and convenience foods is driving the growth of the egg processing market, offering opportunities for innovative producers.

That's according to a 2025 report by The Business Research Company,

which notes that the consumption of ready-to-eat and convenience foods has become more prevalent as convenience and time saving have gained importance.

The global egg processing market size is expected to see steady growth in the next few years, rising from a value of $29.3bn in 2024 to $34.9bn in 2029, the report states.

"The growth in the forecast period can be attributed to sustainable egg production practices, customised product solutions, government initiatives for nutrition, plant-based alternatives, and globalisation of food supply chains," it states. "Major trends include technological integration in processing, advancements in packaging solutions, investment in research and development, collaborations in the food industry, online retail, and direct-to-consumer channels."

With the likes of Noble Foods and Griffiths Family Foods making inroads into the value-added egg market in recent times, it's no surprise that there's expected to be greater demand for innovative egg processing machinery in the years ahead.

## Mysuru Zilla Panchayat Launches Initiative to Boost Backyard Poultry Farming Among Women SHGs

Mysuru: In a major push toward rural women's empowerment and livelihood generation, the Mysuru Zilla Panchayat has finalized an ambitious plan to roll out the Kukkuta Sanjeevini scheme across the district. The initiative, which was earlier announced in the Karnataka state budget for 2024–25, aims to promote backyard poultry farming by supporting women's self-help groups (SHGs) with essential infrastructure, financial assistance, and technical guidance.

Under the scheme, the government will distribute six-week-old chicks to selected SHGs, enabling them to begin small-scale poultry farming without the initial burden of hatchery expenses. In addition, funds from the MGNREGA programme will be utilized to construct poultry sheds, ensuring that groups have a secure and hygienic space to rear their birds. The Department of Animal Husbandry and Veterinary Services will further extend subsidies and technical support, covering areas such as bird health, vaccination, feed management, and best rearing practices.

The Kukkuta Sanjeevini scheme has been designed as a comprehensive livelihood intervention under the Karnataka Rural Livelihood Mission (KSRLM). Beyond economic upliftment, it places strong emphasis on gender empowerment, aiming to strengthen the financial independence of rural women and boost their participation in local economic activities.

Officials stated that backyard poultry farming is ideally suited for women in rural settings as it requires minimal investment, little space, and can be easily managed alongside household responsibilities. By integrating modern support systems with traditional poultry rearing methods, the scheme intends to create a sustainable and income-generating model for thousands of women.

A key component of the initiative is its connection with the government's nutrition and food security programmes. The eggs produced by participating SHGs are expected to meet local demand for the midday meal scheme in government schools. Women's groups will also be able to supply eggs to nearby anganwadis, with prices being fixed by the government to ensure fair income for farmers and stable costs for public welfare institutions.

In addition to contributing to nutrition schemes, SHGs will be encouraged to sell their produce in local markets, thereby supporting local food systems and improving access to fresh poultry products within rural communities. Officials believe this multi-channel market linkage will boost income and ensure the long-term viability of backyard poultry units.

The Mysuru Zilla Panchayat has already shortlisted 225 women's SHGs across all taluks for the first phase of the scheme. These include groups from T Narasipura, Mysuru, Nanjangud, Sargur, KR Nagar, Hunsur, Periyapatna, HD Kote, and Saligrame. The selection process ensures representation from all regions, with each taluk being asked to identify between five and 25 eligible SHGs, depending on local interest and infrastructure availability.

To streamline implementation, the Zilla Panchayat has directed taluk panchayat executive officers to work closely with village-level officials to identify more SHGs that have the willingness and capacity to adopt backyard poultry farming. Priority will be given to groups that demonstrate strong participation, cooperative functioning, and readiness to engage in livelihood activities.

Women's self-help groups consisting of five to ten members have been invited to formally submit proposals to avail the scheme's benefits. These proposals will undergo review to assess feasibility, readiness, and alignment with the scheme's objectives. The final selection will

be followed by training sessions conducted by veterinary officers and livelihood mission coordinators.

Officials also plan to engage gram panchayat-level institutions to identify additional groups interested in taking up poultry farming. Through community awareness programmes, the administration hopes to encourage more rural women to participate, highlighting the financial stability and nutritional benefits associated with backyard poultry rearing.

The initiative is expected to generate steady income for women, improve household nutritional standards, and create new employment opportunities within rural communities. By integrating multiple government schemes—MGNREGA, KSRLM, and the Animal Husbandry Department—the district administration aims to build a well-coordinated framework that supports rural entrepreneurship and strengthens the local poultry ecosystem.

The Mysuru ZP believes that Kukkuta Sanjeevini could eventually serve as a model for other districts, demonstrating how coordinated government efforts can empower women while simultaneously addressing nutrition security and local market needs.

## Northern Ireland Introduces Mandatory Housing Order to Shield Poultry from Avian Influenza

Northern Ireland will enforce compulsory housing requirements for all kept birds and poultry beginning **00:01 on Thursday, 6 November 2025**, as authorities intensify efforts to prevent the spread of **highly pathogenic avian influenza (HPAI)**.

The decision follows two recently identified suspect cases of bird flu at commercial poultry units near **Pomeroy** and **Lisnaskea**, prompting the Department of Agriculture, Environment and Rural Affairs (DAERA) to strengthen disease-control efforts.

The new **Housing Order** will apply to all bird keepers — including owners of commercial flocks, backyard keepers, hobbyists and pet-bird owners — who will now be legally required to **keep their birds indoors or securely isolated from wild birds**, which are known carriers of avian influenza.
This measure builds on the **Avian Influenza Prevention Zone (AIPZ)** declared across Northern Ireland on **1 November 2025.**

In addition to housing requirements, DAERA has also placed a **ban on gatherings** of:

- Galliformes, such as chickens, turkeys, pheasants, partridges, quail, and guinea fowl
- Anseriformes, including ducks, geese and swans
- Any poultry
  These restrictions aim to reduce contact between birds and minimise further disease risk.

A similar housing mandate is being introduced simultaneously by the **Department of Agriculture, Food and the Marine (DAFM)** in the Republic of Ireland to ensure a coordinated, cross-border response.

**Minister: Essential to Protect a £600 Million Industry**

Announcing the measures, DAERA Minister **Andrew Muir** said the decision was necessary to safeguard Northern Ireland's significant poultry and egg sector.

"I have taken the decision to introduce housing measures for all poultry and captive birds, alongside a ban on certain bird gatherings. I welcome that a similar order will be implemented in Ireland. This coordinated approach will help protect industry on both sides of the border during the remainder of the HPAI season," he said.

He stressed that the agri-food sector is a major pillar of Northern Ireland's economy and warned that any widespread outbreak could have serious consequences.

"Poultry and egg production contribute more than **£600 million** to our economy. We must take every possible step to support industry efforts to keep HPAI out," he added.

Since the beginning of November, poultry keepers have already been required to follow strict biosecurity procedures under the AIPZ. The new housing order now elevates legal responsibilities for all keepers, regardless of flock size.

**Chief Veterinary Officer Warns of Serious Consequences**

Northern Ireland's Chief Veterinary Officer **Brian Dooher** urged all bird owners to take the new measures seriously.

"I am urging all flock keepers to take action now and strengthen biosecurity to reduce the risk of this virus reaching their birds," he said. "The housing order will apply to everyone — not just commercial farmers. Backyard and hobby keepers must also ensure their birds are sheltered or kept separate from wild birds from 6 November."

Dooher explained that avian influenza outbreaks can have **devastating impacts** on flock owners, the poultry sector, export trade and the wider economy. He encouraged keepers to prepare immediately to comply with the new rules.

# Editorial Calendar 2026

| | | | |
|---|---|---|---|
| Publishing Month: **January**<br>Article Deadline :<br>**18th, Dec. 2025**<br>Advertising Deadline :<br>**20th, Dec. 2025**<br>Focus :<br>**Opportunities and Challenges** | Publishing Month: **February**<br>Article Deadline :<br>**18th, Jan. 2026**<br>Advertising Deadline :<br>**20th, Jan. 2026**<br>Focus :<br>**Budget** | Publishing Month: **March**<br>Article Deadline :<br>**18th, Feb. 2026**<br>Advertising Deadline :<br>**20th, Feb. 2026**<br>Focus :<br>**Disease Prevention** | Publishing Month: **April**<br>Article Deadline :<br>**18th, March 2026**<br>Advertising Deadline :<br>**20th, March 2026**<br>Focus :<br>**Summer Stress Management** |
| Publishing Month: **May**<br>Article Deadline :<br>**18th, April 2026**<br>Advertising Deadline :<br>**20th, April 2026**<br>Focus :<br>**Cold Chain** | Publishing Month: **June**<br>Article Deadline :<br>**18th, May 2026**<br>Advertising Deadline :<br>**20th, May 2026**<br>Focus :<br>**Nutrition** | Publishing Month: **July**<br>Article Deadline :<br>**18th, June 2026**<br>Advertising Deadline :<br>**20th, June 2026**<br>Focus :<br>**Biosecurity** | Publishing Month: **August**<br>Article Deadline :<br>**18th, July 2026**<br>Advertising Deadline :<br>**20th, July 2026**<br>Focus :<br>**Sustainability** |
| Publishing Month: **September**<br>Article Deadline :<br>**18th, August 2026**<br>Advertising Deadline :<br>**20th, August 2026**<br>Focus :<br>**Egg Production & Processing** | Publishing Month: **October**<br>Article Deadline :<br>**18th, September 2026**<br>Advertising Deadline :<br>**20th, September 2026**<br>Focus :<br>**Processing & Packaging** | Publishing Month: **November**<br>Article Deadline :<br>**18th, October 2026**<br>Advertising Deadline :<br>**20th, October 2026**<br>Focus :<br>**Winter Stress** | Publishing Month: **December**<br>Article Deadline :<br>**18th, November 2026**<br>Advertising Deadline :<br>**20th, November 2026**<br>Focus :<br>**Food Safety** |

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| Front Opening | 20,000 | 300 | ☐ | Back Opening | 18,000 | 275 | ☐ | | | | |

# EGG
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## Prices of November 2025

| Name Of Zone / Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NECC SUGGESTED EGG PRICES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ahmedabad | 605 | 605 | 605 | 605 | 605 | 605 | 605 | 605 | 605 | 605 | 605 | 605 | 615 | 620 | 625 | 630 | 640 | 645 | 650 | 660 | 665 | 670 | 675 | 675 | 675 | 675 | 675 | 675 | 675 | - | 634.66 |
| Ajmer | 603 | 593 | 593 | 593 | 605 | 605 | 605 | 605 | 605 | 605 | 600 | 611 | 621 | 623 | 625 | 631 | 638 | 645 | 651 | 665 | 668 | 668 | 668 | 668 | 651 | 651 | 640 | 640 | 658 | - | 628.76 |
| Barwala | 596 | 596 | 596 | 596 | 601 | 603 | 603 | 603 | 603 | 603 | 603 | 608 | 615 | 618 | 621 | 626 | 635 | 642 | 649 | 662 | 666 | 666 | 666 | 666 | 650 | 650 | 650 | 650 | 657 | - | 627.59 |
| Bengaluru (CC) | 595 | 595 | 595 | 595 | 600 | 605 | 610 | 615 | 620 | 625 | 625 | 630 | 635 | 640 | 645 | 650 | 655 | 660 | 665 | 670 | 675 | 675 | 675 | 675 | 675 | 675 | 675 | 675 | 675 | 675 | 642.67 |
| Brahmapur (OD) | 600 | 590 | 590 | 590 | 605 | 605 | 620 | 620 | 620 | 620 | 620 | 625 | 625 | 635 | 635 | 640 | 645 | 645 | 655 | 660 | 665 | 665 | 670 | 670 | 670 | 650 | 650 | 640 | 650 | 660 | 634.50 |
| Chennai (CC) | 600 | 600 | 600 | 600 | 610 | 610 | 620 | 620 | 630 | 630 | 630 | 640 | 640 | 650 | 660 | 660 | 670 | 670 | 670 | 670 | 680 | 680 | 680 | 680 | 680 | 680 | 680 | 680 | 670 | 670 | 648.67 |
| Chittoor | 593 | 593 | 593 | 593 | 603 | 603 | 613 | 613 | 623 | 623 | 623 | 633 | 633 | 643 | 653 | 653 | 663 | 663 | 663 | 663 | 673 | 673 | 673 | 673 | 673 | 673 | 673 | 673 | 663 | 663 | 641.67 |
| Delhi (CC) | 623 | 623 | 623 | 623 | 630 | 635 | 635 | 635 | 635 | 635 | 635 | 635 | 650 | 650 | 660 | 665 | 670 | 680 | 680 | 700 | 700 | 700 | 700 | 700 | 690 | 680 | 680 | 680 | 690 | 690 | 661.07 |
| E.Godavari | 580 | 580 | 580 | 580 | 585 | 590 | 595 | 600 | 600 | 600 | 600 | 600 | 605 | 610 | 615 | 620 | 625 | 625 | 630 | 638 | 645 | 645 | 645 | 645 | 645 | 645 | 645 | 615 | 620 | 625 | 614.43 |
| Hospet | 535 | 535 | 535 | 535 | 540 | 545 | 550 | 555 | 560 | 565 | 565 | 570 | 575 | 580 | 585 | 590 | 595 | 600 | 605 | 610 | 615 | 615 | 615 | 615 | 615 | 615 | 615 | 615 | 615 | 615 | 582.67 |
| Hyderabad | 570 | 570 | 570 | 570 | 570 | 575 | 580 | 585 | 590 | 590 | 590 | 590 | 595 | 600 | 605 | 610 | 615 | 620 | 625 | 630 | 635 | 640 | 645 | 650 | 650 | 650 | 650 | 630 | 630 | 630 | 608.67 |
| Jabalpur | 595 | 595 | 595 | 595 | 605 | 605 | 605 | 605 | 605 | 605 | 605 | 605 | 615 | 625 | 635 | 645 | 655 | 660 | 665 | 680 | 690 | 695 | 695 | 695 | 665 | 665 | 655 | 655 | 655 | 665 | 637.83 |
| Kolkata (WB) | 650 | 635 | 635 | 635 | 655 | 655 | 665 | 665 | 665 | 665 | 665 | 675 | 675 | 685 | 685 | 685 | 690 | 690 | 705 | 710 | 710 | 710 | 715 | 715 | 715 | 690 | 680 | 670 | 675 | 680 | 678.33 |
| Ludhiana | 598 | 598 | 598 | 598 | 598 | 603 | 603 | 603 | 603 | 603 | 603 | 603 | 609 | 613 | 615 | 623 | 628 | 637 | 643 | 653 | 665 | 665 | 665 | 665 | 665 | 650 | 650 | 650 | 650 | 658 | 627.17 |
| Mumbai (CC) | 635 | 635 | 625 | 625 | 630 | 640 | 645 | 650 | 655 | 655 | 655 | 655 | 660 | 665 | 670 | 675 | 685 | 690 | 695 | 700 | 705 | 710 | 715 | 720 | 720 | 710 | 700 | 700 | 690 | 695 | 673.67 |
| Mysuru | 595 | 595 | 595 | 595 | 600 | 605 | 612 | 617 | 622 | 627 | 627 | 632 | 638 | 643 | 648 | 653 | 658 | 662 | 667 | 670 | 675 | 675 | 675 | 675 | 675 | 675 | - | 675 | 675 | 675 | 642.62 |
| Namakkal | 540 | 540 | 540 | 540 | 545 | 550 | 555 | 560 | 565 | 570 | 570 | 575 | 580 | 585 | 590 | 595 | 600 | 600 | 605 | 605 | 610 | 610 | 610 | 610 | 610 | 610 | 610 | 610 | 610 | 610 | 583.67 |
| Pune | 631 | 631 | 631 | 631 | 631 | 641 | 645 | 651 | 651 | 651 | 651 | 651 | 656 | 661 | 666 | 671 | 680 | 690 | 701 | 710 | 710 | 715 | 715 | 720 | 720 | 720 | 710 | 700 | 700 | - | 673.83 |
| Raipur | 585 | 575 | 560 | 560 | 565 | 560 | 585 | 590 | 595 | 595 | 595 | 595 | 605 | 620 | 620 | 630 | 645 | 655 | 660 | 670 | 675 | 675 | 675 | 675 | 675 | 665 | 655 | 655 | 655 | 660 | 624.33 |
| Surat | 610 | 610 | 610 | 610 | 610 | 615 | 625 | 610 | 630 | 630 | 630 | 635 | 640 | 645 | 650 | 655 | 660 | 665 | 670 | 675 | 685 | 695 | 695 | 695 | 695 | 695 | 695 | 685 | 685 | - | 652.07 |
| Vijayawada | 575 | 575 | 575 | 575 | 575 | 585 | 585 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 625 | 625 | 635 | 640 | 650 | 660 | 660 | 660 | 660 | 660 | 660 | 660 | 660 | 640 | 640 | 650 | 621.00 |
| Vizag | 570 | 570 | 570 | 570 | 570 | 575 | 580 | 585 | 585 | 585 | 585 | 585 | 590 | 595 | 600 | 605 | 610 | 610 | 615 | 625 | 635 | 635 | 635 | 635 | 635 | 635 | 635 | 610 | 610 | 615 | 602.00 |
| W.Godavari | 580 | 580 | 580 | 580 | 585 | 590 | 595 | 600 | 600 | 600 | 600 | 600 | 605 | 610 | 615 | 620 | 625 | 625 | 630 | 638 | 645 | 645 | 645 | 645 | 645 | 645 | 645 | 615 | 620 | 625 | 614.43 |
| Warangal | 572 | 572 | 572 | 572 | 572 | 577 | 582 | 582 | 592 | 592 | 592 | 592 | 597 | 602 | 607 | 612 | 617 | 622 | 627 | 632 | 637 | 642 | 647 | 652 | 652 | 652 | 652 | 632 | 632 | 632 | 610.50 |
| **Prevailing Prices** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Allahabad (CC) | 629 | 629 | 619 | 619 | 619 | 633 | 638 | 638 | 638 | 638 | 638 | 638 | 652 | 657 | 662 | 671 | 686 | 690 | 690 | 700 | 705 | 705 | 700 | 700 | 690 | 690 | 681 | 676 | 695 | 700 | 664.20 |
| Bhopal | 610 | 600 | 600 | 600 | 600 | 610 | 610 | 615 | 615 | 615 | 615 | 615 | 615 | 640 | 645 | 660 | 670 | 675 | 675 | 690 | 695 | 700 | 700 | 700 | 700 | 670 | 670 | 650 | 650 | - | 645.17 |
| Indore (CC) | 595 | 595 | 595 | 595 | 600 | 605 | 610 | 615 | 615 | 615 | 615 | 620 | 630 | 650 | 650 | 660 | 665 | 665 | 675 | 680 | 685 | 685 | 685 | 685 | 675 | 660 | 655 | 650 | 660 | - | 641.03 |
| Kanpur (CC) | 629 | 629 | 629 | 629 | 629 | 643 | 643 | 643 | 643 | 643 | 643 | 643 | 657 | 657 | 657 | 671 | 671 | 686 | 685 | 700 | 700 | 700 | 700 | 700 | 690 | 690 | 676 | 676 | 686 | 686 | 664.47 |
| Luknow (CC) | 648 | 648 | 648 | 648 | 648 | 667 | 667 | 667 | 667 | 667 | 667 | 667 | 676 | 676 | 677 | 690 | 693 | 700 | 700 | 714 | 714 | 714 | 714 | 714 | 714 | 714 | 700 | 700 | 710 | 710 | 684.63 |
| Muzaffurpur (CC) | 655 | 655 | 655 | 655 | 660 | 665 | 665 | 665 | 665 | 665 | 665 | 668 | 675 | 678 | 681 | 685 | 695 | 700 | 710 | 723 | 726 | 726 | 726 | 726 | 726 | 710 | 710 | 710 | 717 | - | 688.34 |
| Nagpur | 610 | 610 | 570 | 600 | 600 | 600 | 620 | 625 | 625 | 625 | 625 | 630 | 630 | 640 | 650 | 650 | 655 | 675 | 690 | 701 | 710 | 710 | 710 | 710 | 710 | 680 | 680 | 675 | 660 | 660 | 651.20 |
| Patna | 655 | 655 | 655 | 655 | 660 | 665 | 665 | 665 | 665 | 665 | 665 | 668 | 675 | 678 | 681 | 685 | 695 | 700 | 710 | 723 | 726 | 726 | 726 | 726 | 726 | 710 | 710 | 710 | 717 | - | 688.34 |
| Ranchi (CC) | 633 | 633 | 633 | 633 | 642 | 642 | 642 | 642 | 642 | 657 | 657 | 657 | 667 | 667 | 667 | 680 | 686 | 686 | 704 | 704 | 714 | 714 | 726 | 726 | 726 | 725 | 714 | 704 | 704 | 704 | 677.70 |
| Varanasi (CC) | 640 | 640 | 640 | 640 | 640 | 646 | 650 | 650 | 650 | 650 | 650 | 650 | 660 | 667 | 677 | 683 | 693 | 700 | 707 | 710 | 713 | 713 | 713 | 713 | 707 | 707 | 707 | 707 | 700 | 700 | 677.43 |

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