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Monthly Magazine for Feed Industry

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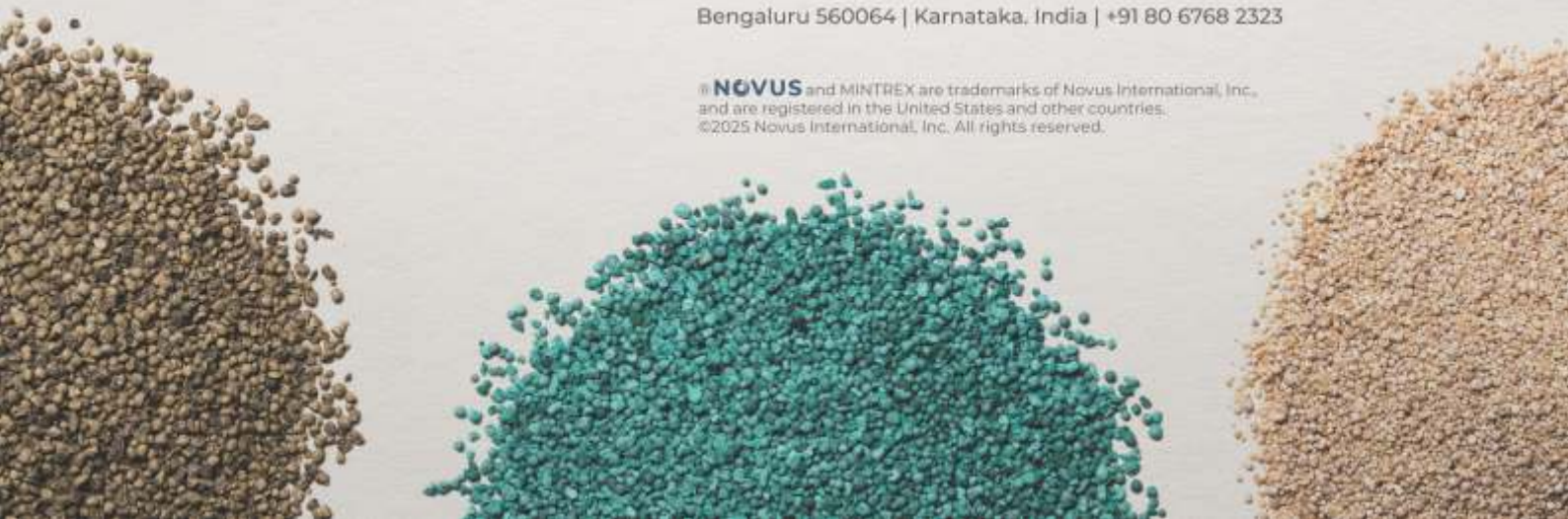

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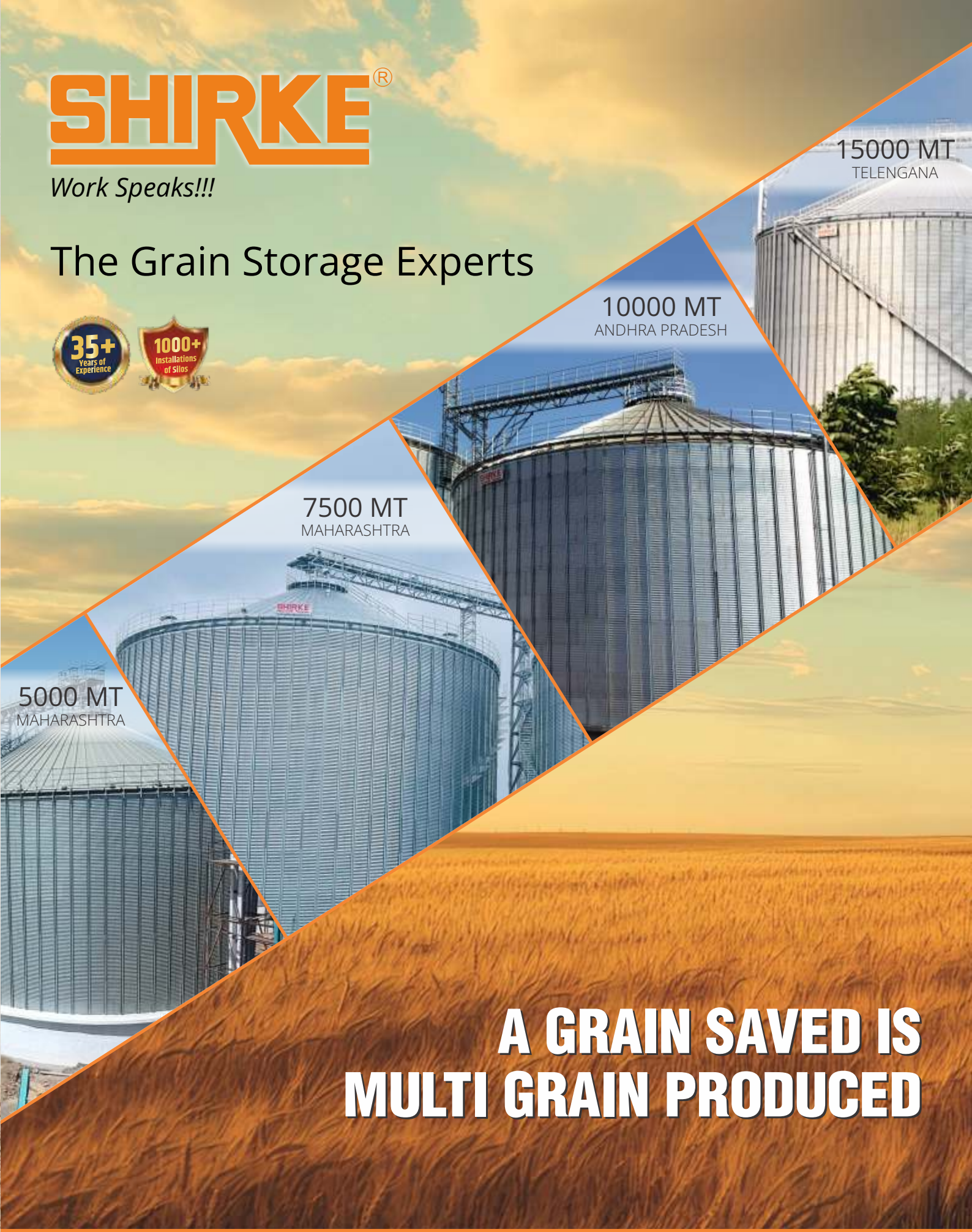

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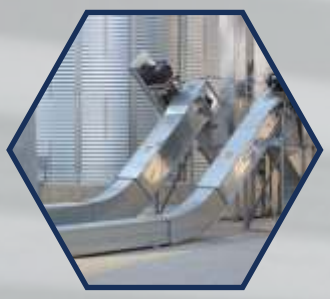

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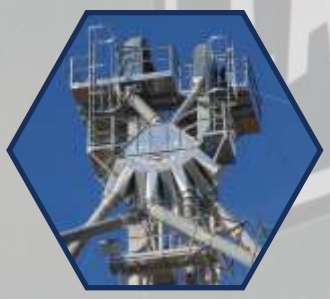

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From GRAIN to GAIN - Boosting Feed Milling Efficiency

by **Dr. Pradeep Krishnan,** Evonik Methionine SEA Pte Ltd

Dr. Pradeep Krishnan

As the demand for high-quality and sustainable animal protein continues to rise due to a growing global population, the animal protein industry faces significant pressure to enhance animal performance and efficiency. One of the most critical factors influencing this performance is feed quality, particularly the dosing accuracy and mixing homogeneity of feed ingredients. By prioritizing these aspects, feed producers can achieve uniform animal performance and maximize the efficiency of their nutrient investments.

The Challenge of Feed Variability

In an industry striving for optimal animal performance, feed variability poses a significant challenge. Factors such as environmental conditions and supply chain disruptions often dominate discussions about efficiency. As scientific advancements in animal nutrition continue, the variety of available micro-ingredients is on the rise. Incorporating a diverse range of micro-ingredients into feed formulations allow for precise adjustments tailored to specific species and age groups that enhance the cost-effectiveness and performance of animals. However, feed variability-especially due to inaccurate dosing and uneven mixing of critical micro-ingredients can lead to inconsistent body weight and performance among livestock. This inconsistency not only wastes resources but can also result in financial losses for producers.

Understanding Mixing Homogeneity and Dosing Accuracy

Mixing homogeneity, expressed as coefficient of variation (CV) refers to the uniform distribution of nutrients within a batch of feed, while dosing accuracy ensures consistent nutrient levels across different batches.

Together, they are crucial for ensuring that each animal receives the same nutrientlevels, which leads to consistent performance across a flock. For instance, even the smallest discrepancies of certain critical micro-ingredientssupplemented in tiny proportions can lead to significant consequences.

Several factors can influence these two elements. The physical properties of the ingredients, the type of raw materials used, and the equipment employed in the dosing and mixing process all play vital roles. For instance, liquid componentsintroduce added complexity to the mixing process, leading to inconsistent mix and requiring more frequent cleaning of equipment. In contrast, dry ingredients typically allow for quicker mixing times and greater flexibility.

Factors Influencing Mixing Homogeneity

1. Physical Properties of Ingredients: The size, shape, and density of feed components can affect how well they mix. Ingredients that are too fine may clump together, while those that are too coarse may not blend properly.
2. Type of Raw Material: The choice between liquid and dry components is critical. While liquid components can offer certain benefits, they often lead to challenges in achieving uniformity.
3. Equipment and Maintenance: The type of mixing equipment used, along with its maintenance, significantly impacts mixing efficiency. Regular checks and updates can help maintain optimal performance.

The Cost of Inefficiency

One common but costly approach to ensuring nutrient availability is to increase the safety margin of nutrients in feed formulations. While this method may seem straightforward, it often leads to increased costs. For example, adding an extra INR 20 per metric ton of feed in a mill producing 100,000 metric tons annually could result in a staggering profit loss of INR 20,000,00 each year.

Instead of relying on safety margins, focusing on precision dosing and homogenous mixing practices can lead to significant savings and better overall performance.

The Challenge of Micro-Ingredient Handling

In the fast-paced realm of animal nutrition, the smallest components can make the biggest difference. Essential micro-ingredients like amino acids, vitamins, and minerals are crucial in formulating high-quality animal feed, and their precise handling can significantly impact both feed quality and production costs. In larger feed mills and integrated livestock systems, incorporating the essential micro-ingredients directly into the production process offers substantial economic benefits. This method allows for fine-tuning of least-cost formulations tailored to the specific needs of various animal species and age groups. However, while this direct dosing approach minimizes the volume and cost of premixes, it also increases the complexity of ingredient management.

As scientific research continues to unveil the benefits of additional micro-ingredients, the number of components handled in feed production is on the rise. This can lead to labor-intensive processes, particularly when it comes to dosing, which can become a

bottleneck and a significant cost driver.

Unlocking Efficiency in Animal Feed Production

As the demand for more efficient and effective feed production rises, innovative solutions are helping feed manufacturers optimize their processes. Experts in animal nutrition continue to develop a suite of modular and flexible solutions aimed at improving feed mill productivity and quality. These offerings include advanced equipment for automated dosing, remote inventory management systems, and comprehensive mixing evaluations.

Leveraging Feed Technology Solutions

Advancements in feed technology offer promising solutions to the challenges of mixing homogeneity and dosing accuracy. Here are some key strategies:

1. Automated Dosing Systems: Fully automated dosing solutions streamline the handling of micro-ingredients, ensuring precise measurements and efficient transportation from bulk storage to mixing lines. This technology not only enhances accuracy but also reduces manual labor, allowing feed mill employees to focus on other critical tasks.
2. Remote Inventory Management: Cutting-edge inventory management systems monitor filling levels of storage silos in real-time. By analyzing usage patterns and forecasting needs, these systems ensure timely replenishment, preventing production delays and optimizing equipment utilization.
3. Batch Analysis Tools: To guarantee the uniform distribution of micro-ingredients in feed, specialized statistical testing procedures evaluate mixing homogeneity. By assessing samples from production batches, manufacturers can minimize variability and ensure consistent quality, ultimately leading to better animal performance and cost savings.
4. Onsite Evaluations for Continuous Improvement: In addition to advanced technology, onsite surveys and evaluations provide valuable insights into existing processes. Experts conduct thorough assessments of dosing and mixing lines, identifying optimization opportunities that can enhance efficiency and reduce waste. These evaluations can lead to actionable recommendations for process improvements, ensuring that every step of the production cycle is as effective as possible.

The Benefits of Optimized Micro-Ingredient Management

By adopting and integrating these innovative solutions, feed manufacturers can expect a range of benefits:

- Improved Quality and Consistency: Enhanced handling and dosing accuracy lead to better feed quality, ensuring livestock receive the nutrients they need for optimal growth and performance.
- Cost Savings: Streamlined processes minimize labor costs and reduce product loss, contributing to a healthier bottom line.
- Tailored Support: Customized consulting services help businesses identify specific needs and develop targeted strategies for improvement.

Conclusion

In the world of animal nutrition, the effective management of micro-ingredients is essential for maintaining competitiveness and profitability. By leveraging advanced technology and expert consulting, feed manufacturers can enhance their processes, ensuring high-quality feed production that meets the evolving demands of the industry. As the industry continues to adapt to growing demands, prioritizing these practices will be vital for success in the competitive landscape of animal protein production. With the right tools and support, the path to greater efficiency and success in animal nutrition is clearer than ever.

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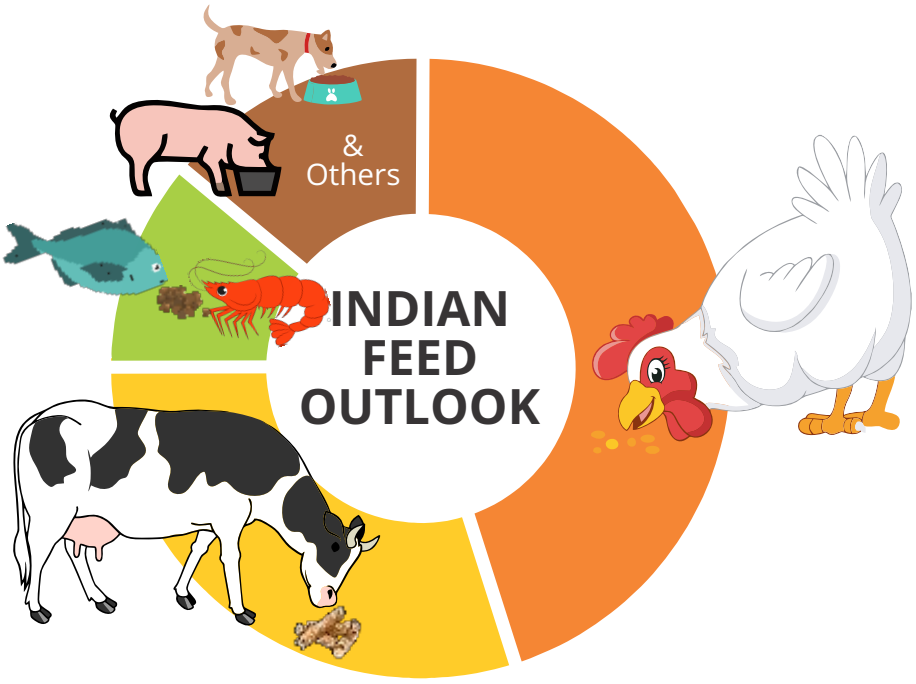

Japfa India on Navigating Market Challenges and Scaling Feed Operations

Dr. Amiya Dharmapada Nath

With an annual production exceeding 50 million metric tons (MMT), the Indian animal feed sector presents significant growth potential. Poultry continues to dominate the compound feed market, accounting for nearly 45% of the share in 2024, according to Mordor Intelligence. However, the aquaculture sector is rapidly gaining momentum, followed by cattle feed and other livestock segments. Meanwhile, India's pet food industry, though still in its early stages, is witnessing exponential growth and evolving consumer demand.

To explore the current landscape and future prospects of this dynamic sector, TGTF connected with Dr. Amiya Dharmapada Nath, Head of Animal Feed Business & Vice President, and Dr. Dilip L. Waghmare, DGM – Nutrition, at Japfa Comfeed India. In this exclusive e-interview, they share insights into their professional journeys, the evolving opportunities in India's feed industry, their recent expansions, and how they are navigating market uncertainties and emerging trends. Here are the edited excerpts from the conversation.

Could you take us through your professional journey?

Dr. Nath: My professional journey began in education — I taught chemistry at a school for two years after graduation. It instilled in me patience, discipline, and the value of shaping minds. I then spent three years as a chemist in an edible oil refinery, which introduced me to large-scale industrial operations and sparked my interest in food systems.

During this time, I pursued an MBA and completed a course in corporate law. The real shift came when I entered the livestock sector, starting in a junior

role at Japfa. Through hard work and a continuous learning mindset, I moved into leadership and today serve as Vice President, overseeing the entire feed business for Japfa India.

Recently, I completed a Doctorate in Strategic Management from SSBM, Geneva. My thesis — "Navigating Uncertainty Towards Sustainable Feed Production for Indian Poultry and Cattle Farmers" — is a reflection of my professional experiences translated into academic research.

What drives me is the sector's direct impact on food security, farmer livelihoods, and rural development. From ground-level operations to strategic leadership, my mission remains the same: enable sustainable growth and empower India's farmers.

Dr. Waghmare: After completing HSC from Bhiwandi, Thane, I graduated from Bombay Veterinary College in 2004. I completed my post-graduation in Poultry Science in 2006 and began my career with Japfa Comfeed India Pvt. Ltd. in 2007 as an Assistant Manager – Quality Control. Over the years, I advanced through multiple roles, including QC Manager (2015) and Senior Manager – Nutrition (2017), marking the beginning of my journey as a poultry nutritionist. Today, I serve as DGM – Poultry Nutrition, overseeing feed formulation for both commercial and breeder segments across India.

Japfa has a strong presence in poultry and is diversifying into cattle and aqua feed. What's the current scale and your outlook for these sectors?

Dr. Nath: Japfa India has a robust poultry ecosystem built over three decades — from feed production (39,000 MT/month across plants) to integration across breeder farms, hatcheries, contract farming, and processed chicken retail. This "feed-to-fork" approach ensures quality and market access for farmers.

In cattle feed, we see major opportunities driven by India's rising milk demand and the shift towards nutritionally balanced feed. Our goal is to replicate the trust and scale we've built in poultry.

Aqua feed — both fish and shrimp — is a fast-growing sector, with India being among top seafood exporters. Our Kharagpur aqua feed plant is operational, with more capacity coming up. Farmers are responding well to our technical support and consistent product quality, which positions us strongly in these emerging segments.

What is your vision for Japfa's integrated operations in India? Are there any expansion plans?

Dr. Nath: Our vision is to build an integrated protein ecosystem across poultry, dairy, aquaculture, and piggery — from feed to farming to food. We aim to be seen not just as a feed manufacturer, but as a rural development partner and sustainability champion.

Recent capital investments of nearly USD 40 million have gone into feed mill expansions, a new cattle feed facility, and our aqua feed plant at Kharagpur. Upcoming plans include:

- Additional aqua feed capacity in Andhra Pradesh
- Expansion of cattle feed in dairy-intensive regions
- Modernization of poultry integration units

Our integrated model is designed to deliver synergies across species and geographies while keeping farmer prosperity and sustainability at the core.

Dr. Dilip L. Waghmare

How does Japfa navigate global market uncertainties and ensure business resilience?

Dr. Nath: Volatility in raw materials, trade policies, climate, and consumer behavior demands a structured, adaptive approach. At Japfa India, our strategy rests on three key pillars:

1. Raw Material Risk Management:

   We track global trends, diversify sourcing, and adopt least-cost formulations without compromising quality.
2. Operational Efficiency & Integration:

   Investments in

automation, modern feed mills, and end-to-end integration ensure quality, cost control, and resilience to external shocks.

3. Sustainability & Farmer Engagement:

   We partner with farmers through training, advisory services, and promote balanced nutrition. Simultaneously, we align with global sustainability practices — optimizing energy use, reducing feed wastage, and pursuing relevant certifications.

Our multinational structure helps us bring innovations from other markets, like aqua feed advancements from Indonesia or cattle feed insights from China, into India. This synergy between global knowledge and local execution strengthens our long-term resilience.

Procurement is central to feed operations. How does Japfa manage procurement to balance cost, quality, and risk?

Dr. Nath: Feed makes up 60–80% of total livestock production cost. At Japfa, we take a strategic approach:

- Diversified Sourcing: We source maize, soybean meal, rice bran, etc., across states to minimize geographic risk.
- Supplier Partnerships & Digital Traceability: Ensures consistent quality and compliance with both BIS and internal global benchmarks.
- Global Advantage: Being part of the Japfa Group allows us to benchmark prices internationally, explore alternative ingredients like DDGS, and manage contracts effectively.
- Proactive Risk Management: We balance spot and forward contracts, monitor government policies (e.g., ethanol policies impacting corn supply), and collaborate closely with nutrition teams to ensure cost-effective yet optimal formulations.

This blend of global discipline and local agility ensures reliable, affordable, and quality feed for our customers, even during volatility.

How does Japfa ensure regulatory compliance and contribute to shaping industry standards?

Dr. Nath: Regulatory alignment is non-negotiable for us. We comply rigorously with FSSAI on food safety norms, ensure feed formulations and labelling practices align with BIS standards, and follow all state-level feed and veterinary regulations. All our feed mills undergo regular audits and maintain traceability protocols. Certifications include:

- ISO 9001:2015 (Quality Management)
- ISO 22000:2018 (Food Safety)
- HACCP
- NABL & ILAC-MRA accreditation (Labs in Supa & Kharagpur)
- BIS license for cattle feed
- GMP implementation
- Progress towards ISO 50001 (Energy Management), ISO 45001 (Occupational Health & Safety), and ISO 14001 (Environmental Management)

Beyond compliance, we actively participate in industry bodies, advocating for science-based regulations, responsible sourcing, and certification transparency. We aim to be a thought leader — not just adhering to standards but helping shape them for a more sustainable sector.

What recent R&D initiatives has Japfa India undertaken? How do these innovations enhance product performance and competitiveness?

Dr. Waghmare: As a technology-driven company, Japfa continuously invests in innovation. One key advancement is our formulation-to-packing integration, linking feed formulation software to SAP and PLC systems in our mills. This minimizes human error and ensures precision in production.

We've recently launched operations in cattle feed (West India) and aqua feed (East India), leveraging global expertise from our teams in China and Indonesia.

A notable product innovation is the 2.5 mm pellet starter feed for broilers (12–24 days), aimed at improving early growth performance and reducing feed wastage. Birds have shown a strong positive response in terms of feed intake and body weight

gain.

The new pellet feed has led to better feed intake, higher early body weights, and reduced feed wastage due to larger particle size. Birds consume feed faster, minimizing energy loss and improving feed efficiency. These benefits contribute to both improved flock performance and cost savings—making our products more competitive in the market.

Has Japfa experimented with alternative raw materials recently? What were the outcomes?

Dr. Waghmare: Yes, leveraging our NABL-accredited labs, we routinely analyze and test alternative raw materials. One such material is Rice DDGS, which we have incorporated into layer feed.

By limiting inclusion to 6%, we observed positive outcomes in cost savings without compromising performance—despite literature suggesting up to 15% inclusion. However, the key challenge remains the variation in nutritional content, which depends on the source of grain and production methods. With careful quality control, Rice DDGS has proven to be a viable, sustainable option.

How do you evaluate feed performance and digestibility in field conditions?

Dr. Waghmare: We assess feed effectiveness using a combination of:

1. Performance Metrics

- Feed Intake
- Average Daily Gain (ADG)
- Feed Conversion Ratio (FCR)
- Egg Production or Milk Yield
- Reproductive and Health Parameters

2. Digestibility Assessments: To understand how efficiently animals break down and absorb nutrients from the feed.

- Fecal Output Method:

Using internal markers to estimate digestibility

- Near-Infrared Reflectance Spectroscopy (NIRS) Analysis: Portable, rapid nutrient analysis
- Lab Sampling: Feed and feces tested for nutrient breakdown

3. Experimental Design

Controlled on-farm trials with replicates and randomization to minimize bias.

4. Data & Farmer Feedback

Data is tracked using digital tools; farmer insights on palatability, performance, and ease of use are invaluable in evaluating success in real-world conditions.

In a competitive feed market, how can customers differentiate high-quality feed?

Dr. Waghmare: Key indicators include:

- Nutritional Profile: Balanced protein, fat, fiber, moisture, and mineral content aligned with species needs. (Tip: Compare the feed's nutrient profile against the Nutrient Requirements from organizations like NRC (National Research Council) guidelines for specific animals).
- Ingredient Transparency: Use of high-quality inputs; absence of fillers or banned substances.
- Functional Additives: Inclusion of vitamins & minerals, enzymes, probiotics/prebiotics, antioxidants, organic acids, and mycotoxin binders.
- Safety Standards: Free from contaminants like mycotoxins, heavy metals, chemical residues, and pathogens. (Tip: Consider third-party laboratory test reports, certifications e.g., GMP+, ISO 22000, HACCP).
- Digestibility & Efficiency: Better FCR and visible performance improvements.
- Physical Traits: Consistent texture, color, smell, and packaging.
- Certifications: ISO 22000, GMP+, BIS, HACCP, etc., assure quality.
- Customer Trust: Brand reputation, technical support, and proven on-field performance.

Could you share current industry estimates for feed production in India and how you see demand evolving?

Dr. Nath: While exact numbers vary, based on available data and internal estimates:

- Poultry Feed: ~25–30 MMT annually
- Poultry Meat Production: ~5 MMT
- Aqua Feed: Estimated at ~5.5 MMT, with a market size of USD 3.25B in 2025 projected to reach USD 4.57B by 2030 (7% CAGR)
- Cattle Feed: ~15 MMT; valued at USD 4.5–5B
- Total Compound Feed (all species): Over 50 MMT, projected to grow at 6–7% CAGR

Demand Outlook:

- Poultry Feed: Expected growth of 4–8% annually, driven by rising protein consumption and improved infrastructure.
- Aqua Feed: High growth (7%+ CAGR), especially with export opportunities.
- Cattle Feed: Moderate but steady growth due to increasing formalization and productivity focus in dairy.

Risks to Watch:

Raw material price volatility, climate-related impacts, and policy shifts (e.g., maize diverted to ethanol). We monitor these closely and adapt production and investment plans accordingly.

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Keys to Success in Mini Dairy Farming

by **Dr. T. M. Gowrisankar,** Independent Animal Nutritionist & Animal Feed Consultant

Dr. T. M. Gowrisankar

Practical Guidelines for Sustainable and Profitable Operation

Mini dairy farms are increasingly being recognized as a viable model for small and medium-scale dairy entrepreneurs in India. When managed well, they offer a balance between profitability, sustainability, and manageable operational scale. However, to succeed, farmers must adhere to key principles involving land use, animal management, feed production, health care, and overall farm planning.

This article outlines essential components for building and running a successful mini dairy farm, drawing on best practices adapted to Indian conditions.

Foundational Requirements

Two baseline conditions are necessary for the long-term success and viability of a commercial mini dairy farm:

- Minimum 3 acres of land with reliable water access to grow adequate green fodder.
- Minimum daily milk production of 300 litres per farm to achieve economies of scale.

Farm Size and Labour Considerations

- An optimal herd size is either:
  - 20 cows in milk, each producing ~15 litres/day, or
  - 15 cows in milk, each producing ~20 litres/day.
- Family labour involvement is highly recommended to reduce costs and ensure hands-on supervision.
- Ideally, the farm owner should reside on the farm for close monitoring of animal health, feeding, and productivity.

High-yielding cows (>20 litres/day) are generally not recommended for mini farms due to increased risk of metabolic disorders, mastitis, and fertility issues.

Cow Induction Strategy

Introducing animals into the farm should follow a staggered, sustainable process:

1. Begin with 1/3 or 1/4 of the total planned herd, preferably first-lactation heifer cows.
2. Introduce the 2nd and 3rd batches at 3–4 month intervals.
3. Once established, focus on raising

your own heifer calves with good genetics.
Target:

- Average daily weight gain of 400g or more.
- First conception by ~18 months of age.

This reduces reliance on external cow purchases and improves long-term herd quality.

Maintain a system where old or low-yielding cows (4th/5th lactation or problem cows) are sold and replaced with in-farm raised pregnant heifers.

If external purchase is necessary, buy first-lactation cows at a price equivalent to what was received from selling 4th-lactation cows.

Green Fodder Cultivation

Green fodder is the backbone of economical and efficient dairy production.

- 1 acre of land with adequate water can support 5–7 crossbred cows producing 15–20 litres of milk/day.
- Based on this, land allocation for a 20-cow herd should ensure fodder self-sufficiency to minimize feed costs and improve:
  - Milk yield and quality
  - Cow fertility and health

Suggested land division per acre for fodder cultivation:

- 25 cents – CO4/CO 5 (Cumbu Napier hybrid)
- 25 cents – Super Napier (hybrid grass)
- 25 cents – COFS 29 (Multicut Fodder Sorghum)
- 25 cents – Desmanthus (leguminous fodder)

Tip: Begin silage making for year-round green fodder availability.

Essential Equipment for Daily Operations

- Brush cutter
- Chaff cutter
- Milking machines
- Cow mats
- Foggers and sprinklers
- Jet sprayers

These tools ensure efficiency, hygiene, and better cow comfort.

Animal Health Management

A robust health protocol is non-negotiable for any dairy operation:

- Foot-and-Mouth Disease (FMD) vaccination every 4 months for all cows, including pregnant animals.
- Calf deworming: Monthly up to 6 months of age, then every 2–3 months.
- Cow deworming: Immediately post-calving.

Reproductive Management and Calving

- Focus on timely heat detection and artificial insemination using quality semen from proven sires.
- Adopt modern, non-invasive pregnancy diagnosis techniques (e.g., IDEXX kits).
- Pay close attention during calving, feeding, and milking times to reduce stress and improve outcomes.
- Milking machines, used twice a day, improve efficiency. Start milking with the highest yielding cows and end with the lowest.

Mastitis Prevention

- Prevent cows from lying down for at least 30–60 minutes post-milking.
- Use antiseptic spray and teat dip solutions after milking.
- Dry teats using a clean cloth or tissue.
- Buy cows only from farms with no history of mastitis.

Mineral Nutrition

Daily supplementation with quality mineral mixtures containing calcium, phosphorus, and trace elements is essential for:

- Higher milk yield
- Improved milk quality
- Stronger immunity
- Enhanced reproductive performance

Recommended dose: 30–50 grams per cow per day.

Feeding Management

- Feed 30–40 kg of green fodder per cow per day to reduce production costs.
- Use balanced compound cattle feed, rather than individual raw ingredients.

Feeding recommendations:

- 1 kg of concentrate for maintenance
- 400 g of concentrate per litre of milk produced

Adjust feed quantity based on body weight, milk yield, fat %, pregnancy status, and quality/availability of green and dry fodder—preferably under the guidance of a **veterinarian or dairy nutritionist.**

This precision feeding approach optimizes costs and improves sustainability.

Record Keeping and Performance Goals

- Maintain daily records of

milk yield, feeding, and calving.

- Set targets:
  - One calf per cow every 12–14 months
  - Use sexed semen for better female calf ratio
  - Maintain 60–70% cows in milk and pregnant at all times
  - Aim for at least 1/3 of cows in advanced pregnancy (7th–9th month) at any time

Limit herd size to 30–35 milking cows to ensure manageable labour needs given the current shortage of skilled workers.

Silage Making: Preserving Fodder for Year-Round Feeding

Silage is a practical solution for ensuring year-round green fodder availability.

Silage Process (using fodder maize as an example):

1. Harvest maize at dough stage (30–35% dry matter).
2. Chop the crop into small pieces.
3. Wilt to reduce moisture content to ~30–40%.
4. Pack tightly in airtight conditions (silo, pit, or bag).
5. Allow anaerobic fermentation to preserve nutrients.
6. Seal thoroughly to prevent spoilage.

Benefits of Silage:

- Nutrient preservation
- Year-round availability
- Improved milk production and quality

Best Practices:

- Monitor moisture content and prevent contamination.
- Maintain airtight storage conditions.
- Conduct regular quality checks.

Challenges in Silage Making

While silage offers numerous benefits for year-round green fodder availability and improved dairy productivity, successful silage making requires careful attention to certain key challenges. Addressing these proactively ensures high-quality silage and reduces losses.

1. Moisture Management

- Challenge: Excess moisture leads to poor fermentation, while too little can result in dry, unpalatable silage.
- Best Practice: Ensure the crop is wilted properly to maintain optimal moisture content (30–40%) before ensiling.

2. Contamination Risk

- Challenge: Soil, water, or organic debris contamination can introduce harmful bacteria and molds.
- Best Practice: Chop and handle fodder on clean surfaces and avoid contact with soil during harvesting and filling.

3. Inadequate Compaction

- Challenge: Poor packing leads to air pockets, which disrupt anaerobic fermentation and cause spoilage.
- Best Practice: Compact the silage tightly during filling to eliminate air and promote proper fermentation.

4. Improper Sealing

- Challenge: Incomplete sealing allows oxygen to enter, encouraging mold growth and nutrient loss.
- Best Practice: Use durable, airtight covers or bags and ensure edges are well-sealed with weights (like tires or sandbags) or soil.

5. Storage Conditions

- Challenge: Exposure to moisture, pests, or fluctuating temperatures can degrade silage quality.
- Best Practice: Store silage in shaded, protected areas and regularly inspect for leaks or damage.

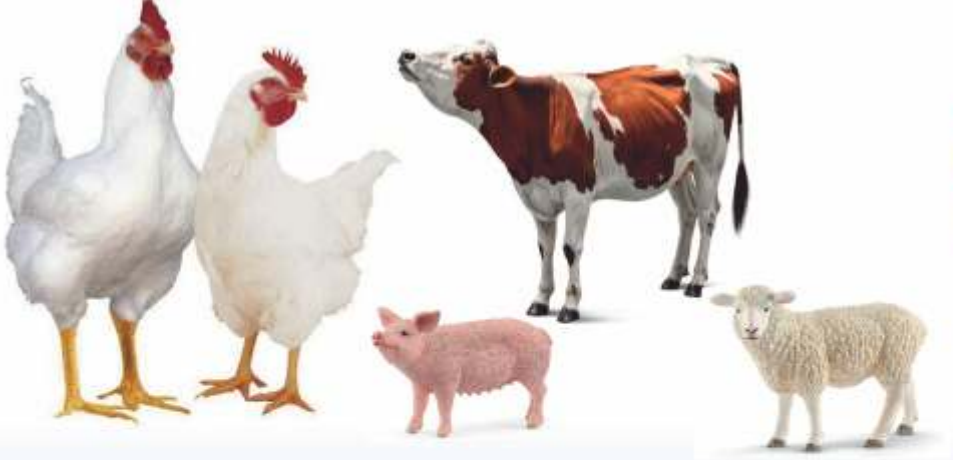
6. Lack of Monitoring

- Challenge: Farmers often skip regular quality checks, leading to undetected spoilage or nutrient degradation.
- Best Practice: Periodically open small sections to assess silage smell, texture, and color; test nutrient content if possible.

Final Thoughts

Mini dairy farms can be profitable and sustainable if managed with attention to detail, proper planning, and commitment to best practices. However, one growing concern among farmers is the lack of skilled labour, which hinders scaling up operations. This challenge calls for collective action and innovation across stakeholders to support the government's goal of doubling farmer incomes.

By following these practical guidelines, dairy farmers can enhance productivity, animal welfare, and long-term profitability in mini dairy operations across India.



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- Toxin Binder

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- Premix (Layer)

Amino Acids

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- L-Valine
- L-Threonine
- L-Lysine Hcl
- L-Tryptophan

Vitamins

- Vitamin - A
- Vitamin - B
- Vitamin - D
- Vitamin - K
- Vitamin - E
- Vitamin - C

Minerals

- *ZINC SULPHATE*
- *ZINC OXIDE*
- *FERROUS SULPHATE*
- *MANGANESE SULPHATE*
- *MANGANESE OXIDE*
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Unlocking Hidden Nutrition in Corn-Soy Diets: Efficacy of Modified GH11 XYLANASE for Broilers

by **Dr. Koushik De,** Sales Director, Poultry-SCA, NOVUS


Dr. Koushik De

In India, most broiler diets rely heavily on corn and soybean meal, with corn often making up two-thirds of the formulation. While these ingredients offer significant energy and protein, broilers face physiological limitations: due to limited endogenous enzyme production and gastrointestinal inefficiencies, they cannot fully digest or extract nutrients from the diet. Consequently, a significant portion of feed energy remains unutilized, leading to reduced feed efficiency and economic losses.

To address this, exogenous enzymes—particularly xylanases—are commonly used to break down non-starch polysaccharides (NSPs), which are otherwise indigestible and hinder nutrient absorption. However, corn presents a unique challenge due to its NSP composition and high inclusion rates in feed formulations.

The Role of NSPs in Corn-Soy Diets

Although corn contains less total NSP than soybean meal, its high inclusion amplifies its overall anti-nutritional effect. NSPs such as arabinoxylans, β-glucans, mannans, and galactomannans in corn-soy diets can interfere with nutrient utilization by increasing intestinal viscosity and limiting the release of entrapped nutrients. These inefficiencies may account for the loss of up to 400–450 kcal/kg of metabolizable energy, primarily from fat, protein, and starch.

While the efficacy of xylanase in wheat- and rye-based diets is well-established (2), its utility in corn-heavy diets has been less certain. This is largely due to the structural characteristics of NSPs in corn, which tend to be more insoluble and less responsive to standard xylanases.

GH11 Xylanase: A Structural

Figure 1: Evolution of Xylanase Technology

Advantage

Feed represents the single largest cost in poultry production, accounting for up to 70% of total costs. As a result, reducing feed costs without compromising performance remains a top priority for the industry. Xylanase is one effective way to achieve lower feed costs by reducing viscosity and releasing nutrients.

Xylanases are categorized into glycoside hydrolase families based on their structure and activity—primarily GH10 and GH11. GH10 xylanases are effective in breaking down soluble xylans and reducing viscosity in wheat-based diets, but often show limited action in corn-based diets where NSPs are predominantly insoluble.

In contrast, GH11 xylanases are characterized by a single catalytic domain and have been shown to degrade both soluble and insoluble xylans. Their structural conformation allows greater activity on insoluble substrates, making them more suitable for corn-soy diets where unlocking energy from insoluble NSPs is critical.

Some modified GH11 xylanases - endo-1,4-beta-xylanase, derived from a unique gene in a naturally occurring fungal microorganism, features a starch binding domain as a secondary binding site for greater catalytic activity, supports degrading of both soluble and insoluble xylans and offers consistent results (as shown in Figure 1).

Its thermostability, low-pH resistance, and pump-like structure help ensure the enzyme performs reliably across feed manufacturing and in vivo conditions. Unlike traditional GH10 enzymes, this modified GH11 xylanase was specifically optimized through trials using corn-based diets, making it a better fit for markets like India.

Comparative Enzyme Efficacy

Recent studies comparing different xylanase types have highlighted significant differences in the speed and extent of NSP degradation.

Figure 2: Comparative Degradation of Insoluble Xylans by Xylanase Enzymes (Corn, Rice Bran, Sorghum Substrates)

The dotted circumference in each pie chart represents elapsed time in hours. Each segment illustrates the proportion of insoluble xylan degraded within that time frame.

Source: BRI (A NOVUS Subsidiary) Internal Study

Figure 3: Body Weight Gain at 42 Day

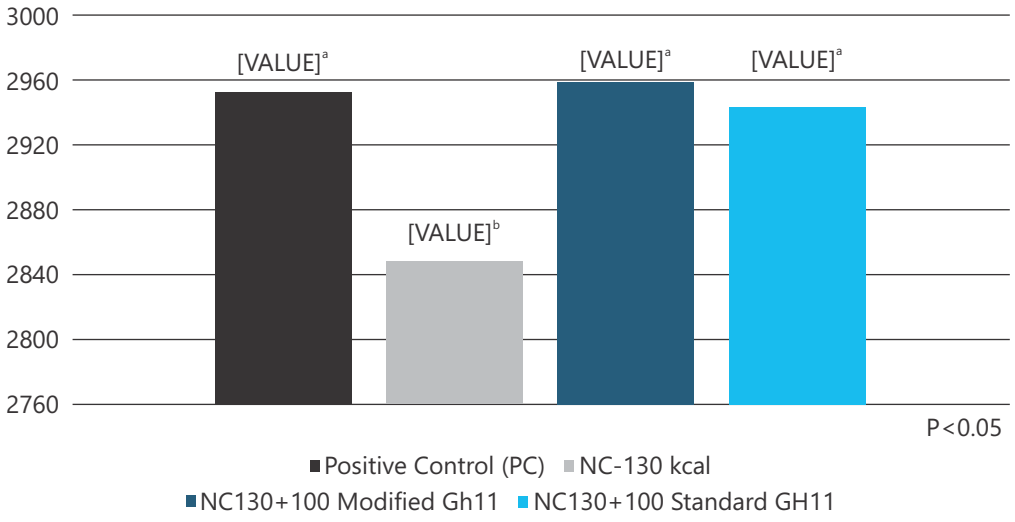
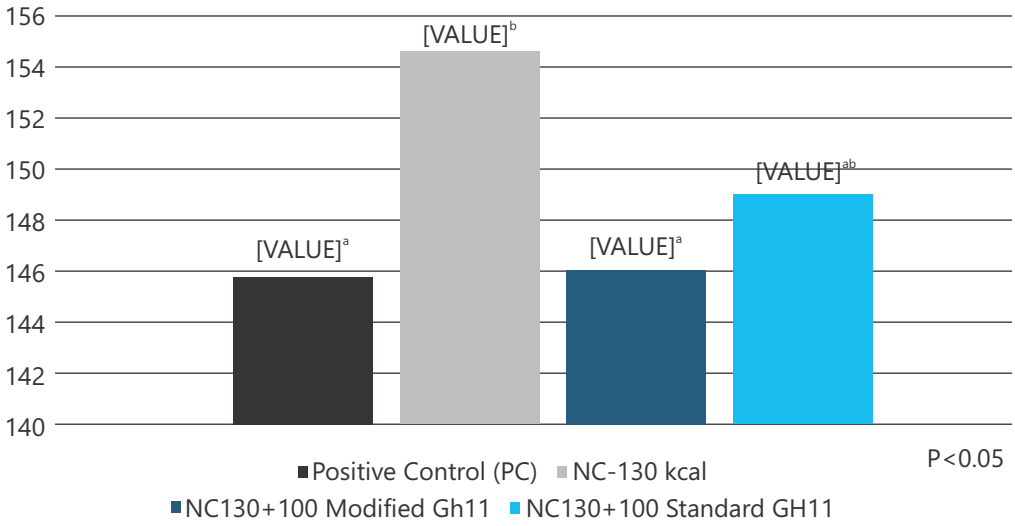


Figure 4:Corrected FCR (Same Body Weight) at 42 Day



In a comparative hydrolysis study using substrates like corn, rice bran, and sorghum, one commercially available GH10 enzyme degraded 10% of insoluble xylans in five hours. A commercial GH11 enzyme reached 20% degradation in the same time frame. Meanwhile, a modified GH11 xylanase achieved 20% degradation in just one hour, indicating a more rapid and potentially more effective mode of action in the gastrointestinal tract (as shown in Figure 2).

Rapid enzymatic action is especially relevant in poultry, where feed retention time in the gut is limited. Enzymes must act quickly to release entrapped nutrients before excretion.

Broiler Trial Insights: Performance Under Reduced Energy Conditions

In a 2024 performance trial conducted under Indian field conditions, 432 Cobb broilers were fed a corn–soybean meal diet with 130 kcal/kg less metabolizable energy than the standard formulation over a 42-period period. Birds were divided into two groups: one received a standard GH11 xylanase, while the other was fed a modified GH11 xylanase, both at 100 grams/ton of feed.

At 42 days, the group receiving the modified GH11 xylanase showed improved performance metrics, including higher body weights (BW) and lower feed conversion ratios (FCR), despite the reduction in dietary energy (as shown in figure 3 & 4). These findings suggest that strategic enzyme selection can mitigate the negative effects of lower energy density in feed, supporting both consistent performance and cost efficiency.

Conclusion: Enzyme Selection for Corn-Soy Optimization

As feed costs continue to dominate the economics of poultry production, maximizing nutrient utilization remains a top priority. Xylanases, particularly those from the GH11 family with enhanced activity on insoluble xylans, offer promising solutions for improving nutrient availability in corn-soy diets.

Not all xylanases are equally effective in all diets, and enzyme choice should reflect the specific challenges posed by local feed formulations. When tailored appropriately, xylanase supplementation can support improved feed efficiency, consistent growth performance, and better overall return on investment in poultry production.

Disclaimer: Modified GH11 xylanase is released by NOVUS. For more information, please connect with team at Manjula.Shankar@novusint.com.

References are available upon request.

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AMINO ACID

- DL-Methionine
- L-Lysine Hcl
- L-Threonine
- L-Tryptophan
- L-Valine
- L-Isoleucine

FEED SUPPLEMENT

- Choline Chloride (CCL)
  Liquid 75% /Powder 60%
- Toxin Binder
- Betain Hcl
- Acidifier
- Phytase
- Multienzyme
- Glycerine

VITAMINS

- VITAMIN - A
- VITAMIN - B
- VITAMIN - D
- VITAMIN - K
- VITAMIN - E
- VITAMIN - C

BULK PRODUCTS

- Di Calcium Phosphate (DCP)
- Monocalcium Phosphate (MCP)
- Sodium Bicarbonate
- Premix (Layer)
- Premix (Broiler)

ANTIBIOTICS

- Chlortetracycline (CTC)
- Tylosin Phosphate 10%
- Tiamulin10,45,80%
- Enrofloxacin
- Florfenicol
- Azithromycin

MEALS

- Zinc Sulphate
- Zinc Oxide
- Copper Sulphate
- Magnesium Sulphate
- Manganese Sulphate
- Cobalt Sulphate
- Ferrous Sulphate
- Sodium Selenite

MEALS

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- Chicken Meal Supplement
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Towards Reduced Antibiotic Usage in Poultry Production: How Can Probiotics Help?

by **Sanjay Mallikarjunappa,** Technical Services Manager, Animal Health and Nutrition, Novonesis South Asia

Dr. Sanjay Mallikarjunappa

Dr. Sanjay Mallikarjunappa is part of Novonesis South Asia Animal Health and Nutrition team working as Technical Services and Account Manager. He is a graduate of Bangalore Veterinary College and obtained his Ph.D. in Animal Biosciences from University of Guelph, Canada.

The use of antibiotics in poultry production dates back several decades, with applications for therapeutic, metaphylactic, and growth-promoting purposes. As modern poultry production navigates growing concerns related to antimicrobial resistance, antibiotic residues, and increasing consumer awareness, identifying effective strategies to reduce reliance on antibiotics has become a key industry priority.

The Role of Gut Health in Antibiotic Reduction

Most disease challenges in poultry production are intestinal in nature, with antibiotics commonly used to manage enteric pathogens. These include infections such as necrotic enteritis, colibacillosis, and salmonellosis, among others. However, sustaining bird health and performance while minimizing—or eliminating—antibiotic usage requires a focus on gut health optimization.

Gut health encompasses several factors: a balanced microbiota, controlled inflammation, and robust gut barrier integrity. Together, these support efficient feed digestion and nutrient absorption. Any disruption to this homeostasis can compromise bird performance, increase susceptibility to disease, and reduce profitability.

Probiotics as an Alternative Approach

Direct-fed microbials (DFMs), or probiotics, offer a viable strategy to support gut health and reduce the need for antibiotics. Novonesis, a global player in microbial solutions, has developed a library of over 50,000 bacterial strains, including a triple-strain Bacillus-based probiotic comprising two strains of Bacillus subtilis and one of Bacillus amyloliquefaciens. This probiotic has demonstrated efficacy in enhancing performance, improving gut microbiome stability, digestive

immunity, and reducing pathogen load—thereby supporting reduced antibiotic use.

Field Study: Reduced Antibiotic Use and Mortality

In a large-scale commercial study involving 72 broiler flocks (Ross 308; total of 1.8 million birds), the impact of the triple-strain Bacillus probiotic on antibiotic usage was evaluated. When compared with 36 control flocks (no probiotic), flocks supplemented with the probiotic (36 flocks) showed a 26% reduction in antibiotic usage, along with a 0.39% decrease in mortality (Figure 1).

Mechanism of Action: Pathogen Inhibition and Gut Protection

Under disease challenge conditions, such as those caused by enteric pathogens, antibiotics are typically used to manage infection. However, probiotics can provide gut protection that lessens this dependence.

This was demonstrated in two experimental challenge studies:

1. **Clostridium perfringens Challenge**

   In a U.S. trial using Ross 308 broilers, birds were orally challenged with C. perfringens (1×10^9 CFU/ml by Gavage). The group supplemented with the triple-strain Bacillus probiotic (1.6×10^6 CFU/g of feed) showed a 24% reduction in mortality and a 9% decrease in intestinal lesions compared to the non-probiotic control group.

2. **Salmonella typhimurium Challenge**

   In an Australian study with layer birds, those supplemented with the triple-strain probiotic and challenged with Salmonella typhimurium exhibited lower fecal shedding of Salmonella four weeks post-infection, compared to the challenged control group. Additionally, organ colonization and meat condemnation risk were reduced in the probiotic group (Figures 2 & 3).

These benefits are linked to the specific properties of the Bacillus subtilis strains in the formulation, which:

- Form a protective biofilm on the gut mucosa, blocking pathogen adherence (Figure 2)
- Compete with pathogens for nutrients and space
- Secrete antimicrobial lipopeptides (Figure 3)

Figure 1:Antibiotic usage and mortality comparison (Field study)

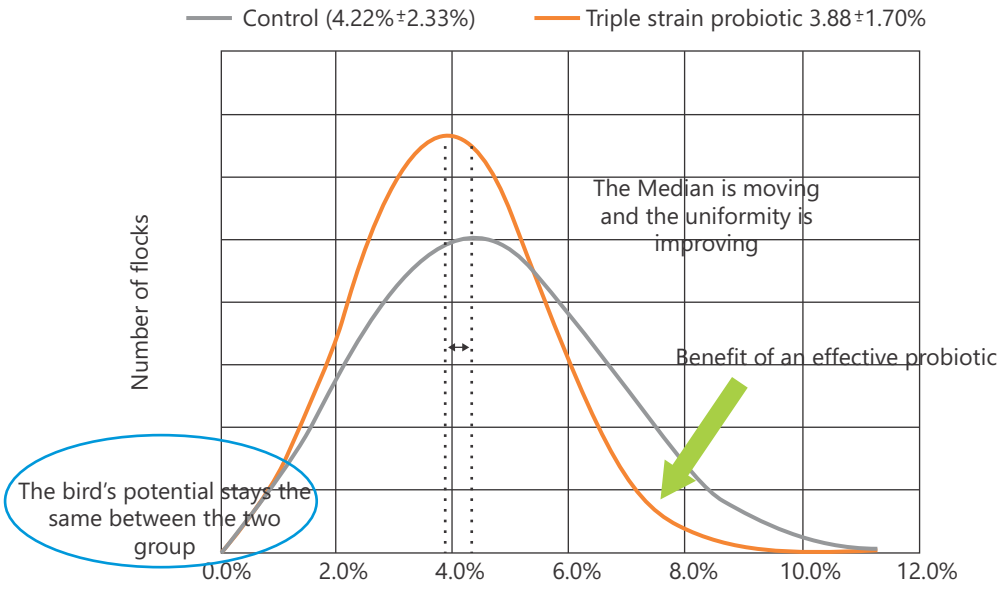
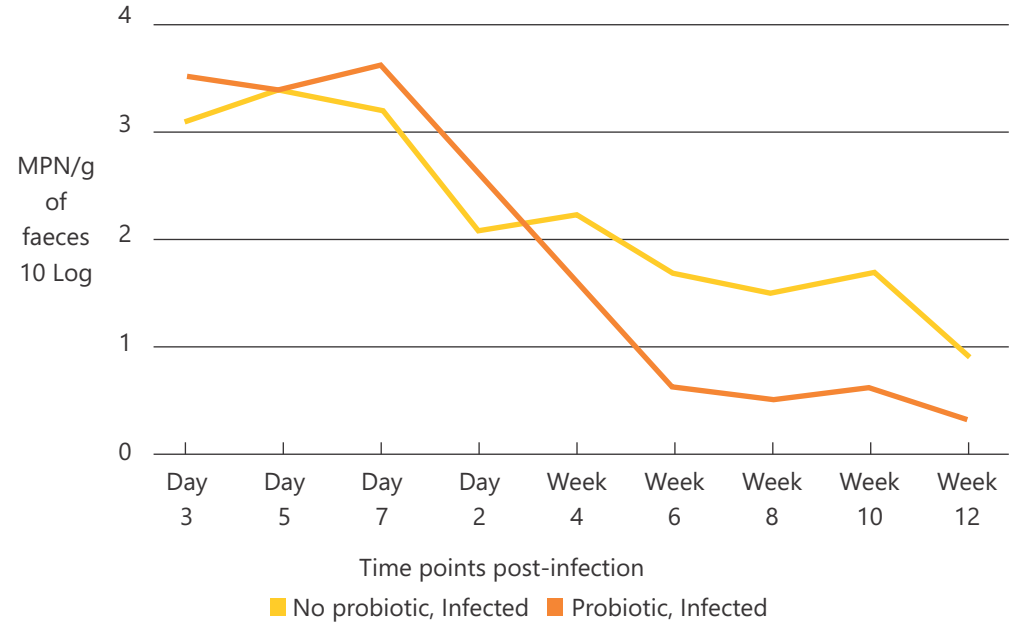


Figure 2: Salmonella shedding in feces



- Modulate immune responses, including reducing pro-inflammatory cytokine activity

The result is a competitive exclusion effect that limits the colonization of pathogens such as E. coli, Salmonella, and Clostridium spp., thereby supporting reduced antibiotic intervention.

Additionally, probiotics help restore microbial balance by minimizing dysbiosis, which is often associated with both enteric infections and excessive antibiotic use.

Additional Benefits: Feed Flexibility and Digestive Support

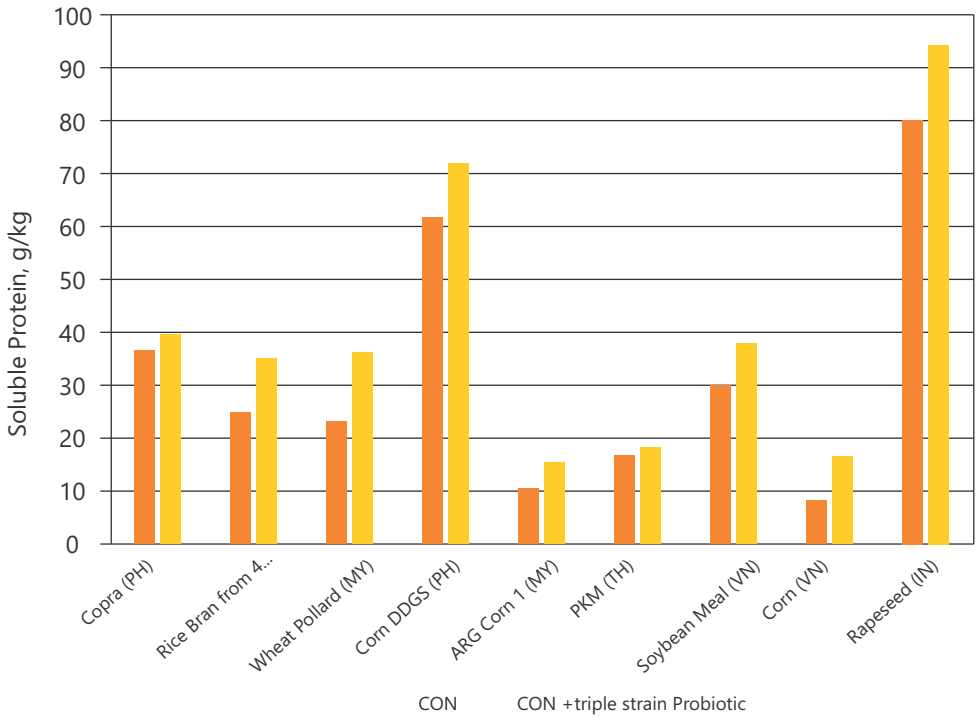
Beyond pathogen control, the triple-strain Bacillus probiotic also supports improved nutrient digestibility—enabling the use of alternative or lower-cost feed ingredients.

Initial in vitro assays using various feed substrates showed that probiotic inclusion led to increased energy and protein release compared to control diets (Figure 4). This is attributed to the production of digestive enzymes such as xylanases, cellulases, proteases, and lipases, which enhance the breakdown of complex feed components.

A meta-analysis of 20 broiler trials further indicated an average 3-point improvement in feed conversion ratio (FCR) and a 51-gram increase in final body weight in birds supplemented with the triple-strain probiotic.

Figure 3: Formation of biofilm by Bacillus subtilis that coat the epithelial lining

Figure 4:In vitro nutrient release with and without probiotic



Conclusion

While "No Antibiotics Ever" (NAE) programs are not yet universally adopted, they are gaining traction globally. In this evolving landscape, probiotics are increasingly vital tools in helping poultry producers reduce antibiotic use without compromising productivity.

Through proven pathogen inhibition, enhanced digestive performance, and support for gut health, the triple-strain Bacillus probiotic offers a practical and science-backed approach to sustainable poultry production. Safe for feed use and compatible with biosecurity and food safety programs, it is a valuable addition to any antibiotic reduction strategy.

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Ludhiana: BISA Turns Flood Crisis into Opportunity to Test Water-Tolerant Maize Hybrids

The Ladhowal station of the Borlaug Institute for South Asia (BISA) in Ludhiana has turned this year's monsoon floods into a field laboratory to test waterlogging-tolerant maize hybrids. The station is a collaboration between the Indian Council of Agricultural Research (ICAR) and Mexico-based CIMMYT (International Maize and Wheat Improvement Center).

After the Sutlej river overflowed, over 400 mm of water submerged the institute's fields. Instead of treating the floods as a disaster, BISA researchers saw it as a unique live-testing opportunity, said Dr. Pardeep Sagwal, station coordinator and lead agronomist. Normally, such waterlogging conditions must be artificially simulated, but the natural flooding provided real-world conditions to test hybrid performance.

BISA is currently trialing nine maize hybrids, four of which are specifically developed for waterlogging tolerance. Traditional maize lacks parenchyma cells, unlike paddy, and cannot survive inundation beyond 24 hours, after which it begins to rot.

Over the past two years, BISA scientists have been working with wild maize varieties known for their flood tolerance to breed new hybrids. However, the main challenge is ensuring these hybrids not only survive waterlogging but also deliver good yield performance under normal conditions.

This initiative reflects a growing focus on developing climate-resilient crops as extreme weather events become more frequent. By turning a flood crisis into an experimental asset, BISA is making strides in preparing Indian agriculture for a more uncertain climate future.

Animal Feed Industry Faces Pressure from Ethanol and Shrimp Tariff Challenges

The Indian animal feed industry is under growing pressure due to rising competition for corn from the ethanol sector and the adverse impact of US tariffs on shrimp exports. With the US imposing 50% tariffs on Indian shrimp—largely exported due to low domestic consumption—feed manufacturers are bracing for reduced demand, especially as shrimp feed is 2–3 times costlier than poultry feed.

Divya Kumar Gulati, President of the Compound Livestock Feed Manufacturers Association (CLFMA), urged the Indian government to pursue more Free Trade Agreements (FTAs) like the recent UK deal, to offset export losses and open new markets.

The livestock feed industry, growing at 6–8% annually, is facing raw material shortages, particularly corn. Corn comprises 50–55% of poultry feed formulations. India's feed industry currently produces 60 million tonnes, with poultry feed accounting for 40 million tonnes—requiring about 20–22 million tonnes of corn. However, with total corn production at 36–37 million tonnes, and 9–10 million tonnes diverted for ethanol (E20) production, there's little left for feed after fulfilling food and starch demands.

To address this, the government has diverted 5.2 million tonnes of rice for ethanol use, but Gulati warns this is a short-term fix. He anticipates a raw material shortage within 1–2 years unless new strategies are implemented.

Highlighting contrast, Gulati noted poultry thrives on domestic consumption—95% live market and full local egg consumption—unlike shrimp, which relies heavily on exports and thus remains vulnerable to global trade shifts.

India Emerges as Top Rapeseed Meal Supplier to China Amid Canadian Tariffs

India has become the largest supplier of rapeseed meal to China between April and August 2025, filling the gap left by Canada after heavy Chinese tariffs halted its exports. According to the USDA's September Oilseeds: World Markets and Trade report, China imposed preliminary anti-dumping duties of nearly 76% on Canadian rapeseed in August, following earlier 100% tariffs on rapeseed meal and oil in March. These measures now cover all Canadian canola products.

As a result, Chinese feed buyers—especially in aquaculture, where rapeseed meal serves as a cost-effective fish meal substitute—have turned to India. Canada, once the dominant supplier, saw its exports drop sharply, creating an opportunity that India quickly capitalized on. The shift is aided by weaker domestic demand in India, as livestock feeders increasingly use dried distillers' grains due to the country's rising ethanol blend rate.

The Solvent Extractors' Association of India reported nearly 100,000 tonnes of rapeseed meal exports to China in July alone.

Despite this shift, China's total rapeseed meal imports for 2025–26 are expected to reach only 2.6 million tonnes—a three-year low, though 400,000 tonnes higher than previously forecast.

Rapeseed imports are also under pressure. With Canadian supplies constrained by tariffs and Australian exports absent since 2020 due to blackleg disease, China's 2025–26 rapeseed imports are projected at 4.1 million tonnes—a four-year low and 700,000 tonnes below earlier estimates.

India's growing role highlights shifting global trade flows as geopolitical and phytosanitary issues reshape agricultural markets.

Indian Shrimp Finds New Lifeline in China After US Tariffs

Following the imposition of a 50% tariff on Indian shrimp by the United States—introduced by former President Donald Trump in response to India's oil imports from Russia—Indian shrimp exporters are rapidly shifting focus to China and other Asian markets to sustain their businesses.

The new duty has severely affected India's price competitiveness in the US, making Indian shrimp costlier than exports from Ecuador, Vietnam, and Indonesia. As a result, exporters are finding China to be a promising alternative, with strong domestic demand and active forward contracting by Chinese importers.

"The tariff shock has turned out to be a blessing in disguise," said Shaji Baby John, Chairman of Kings Infra Ventures, noting that China—previously the second-largest importer—is now poised to become India's top shrimp buyer. Chinese processors prefer Indian shrimp for re-export to duty-free markets, further boosting demand.

Exporters are now diversifying their markets, expanding shipments to Europe, Japan, the UAE, and South Korea, while also promoting sales in domestic hubs like Delhi-NCR, Bengaluru, and Hyderabad.

According to the Commerce Ministry, India exported USD 7.39 billion worth of marine products in FY25, with USD 2.68 billion going to the US, up from USD 2.5 billion in FY24. However, the increased tariff—now totaling 33.26%—makes Indian shrimp less competitive compared to Ecuador's 15%.

India's Oilmeal Exports Dip 12% in August Amid Soybean Meal Slowdown

India's oilmeal exports fell by 12.1% in August 2025, driven by a sharp decline in soybean meal shipments, according to the Solvent Extractors' Association of India (SEA). Total exports in August stood at 2.76 lakh tonnes (lt), down from 3.14 lt in August 2024. Soybean meal exports dropped to 80,233 tonnes from 1.56 lt last year.

Cumulatively, oilmeal exports during April–August 2025-26 declined 4% to 17.93 lt, compared to 18.68 lt in the same period last year. SEA's Executive Director, BV Mehta, attributed the fall to price pressures in the Indian market, making exports less competitive against cheaper American soymeal. Domestic soybean acreage also shrank by 5.81 lakh hectares, impacting supply.

Soybean meal is losing share to DDGS (distillers dried grains with solubles) in poultry feed, as DDGS production rises alongside India's ethanol expansion.

In contrast, rapeseed meal exports rose by 3.5% to 9.15 lt in April–August 2025-26. Strong domestic demand for mustard oil, particularly kachighani, boosted crushing activity, increasing meal supply. China emerged as a major buyer, importing 3.68 lt, driven by India's price advantage at USD 200/tonne versus Hamburg's USD 236/tonne.

SEA urged the government to lift the export ban on de-oiled ricebran, in place since July 2023, citing price drops and surplus availability due to rising DDGS supply.

Top importers:

- China: 3.75 lt (mostly rapeseed meal)
- South Korea: 2.09 lt
- Bangladesh: 1.78 lt
- Germany: 1.35 lt
- France: 53,074 tonnes

Uttarakhand Approves INR 10/Kg Poultry Feed Subsidy to Boost Hill Economy

In a major move to strengthen the rural economy and reduce migration from hill regions, the Uttarakhand government has approved a subsidy of INR 10 per kg on poultry feed for farmers. Cleared in a recent cabinet meeting, the subsidy will benefit 1,597 poultry units operating across nine hill districts: Almora, Chamoli, Uttarkashi, Pithoragarh, Champawat, Pauri, Bageshwar, Tehri, and Rudraprayag.

Currently, 816 units function under the Broiler Farm Scheme and 781 under the Kukkut Ghati (Poultry Valley) Scheme. Farmers in these areas have long faced challenges due to higher feed costs compared to the plains, which increased production expenses and reduced profitability. The new subsidy aims to make poultry farming more viable, encourage new units, and generate self-employment opportunities—especially in remote and border villages supplying poultry and eggs to the ITBP.

A total of INR 2.83 crore has been earmarked for the scheme.

Other Cabinet Decisions:

- A Special Purpose Vehicle (SPV), Dehradun City Transport Limited, will be formed to enhance Dehradun's traffic infrastructure.
- 9.918 hectares of land will be transferred to the District Development Authority in Udham Singh Nagar for residential and commercial development.
- Two new posts will be created in the Advocate General's office at the Nainital High Court.
- Approval was granted to table the 9th annual report of the Uttarakhand Right to Service Act in the Legislative Assembly.
- Exemption from procurement rules was approved for expenses related to the Northern Zonal Regional Conference held in Dehradun in April.

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