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think Grain think Feed

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Monthly Magazine for Feed Industry

Advancing Nutrigenomics in Livestock Nutrition

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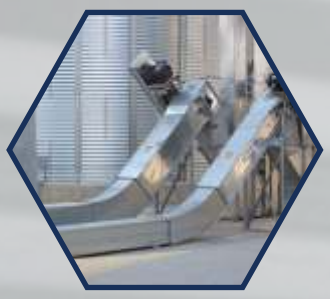

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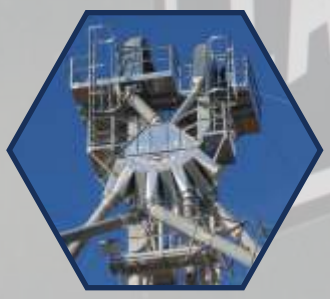

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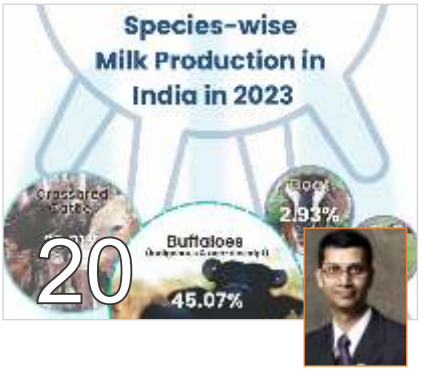
Monthly Magazine for Feed Technology

Contents



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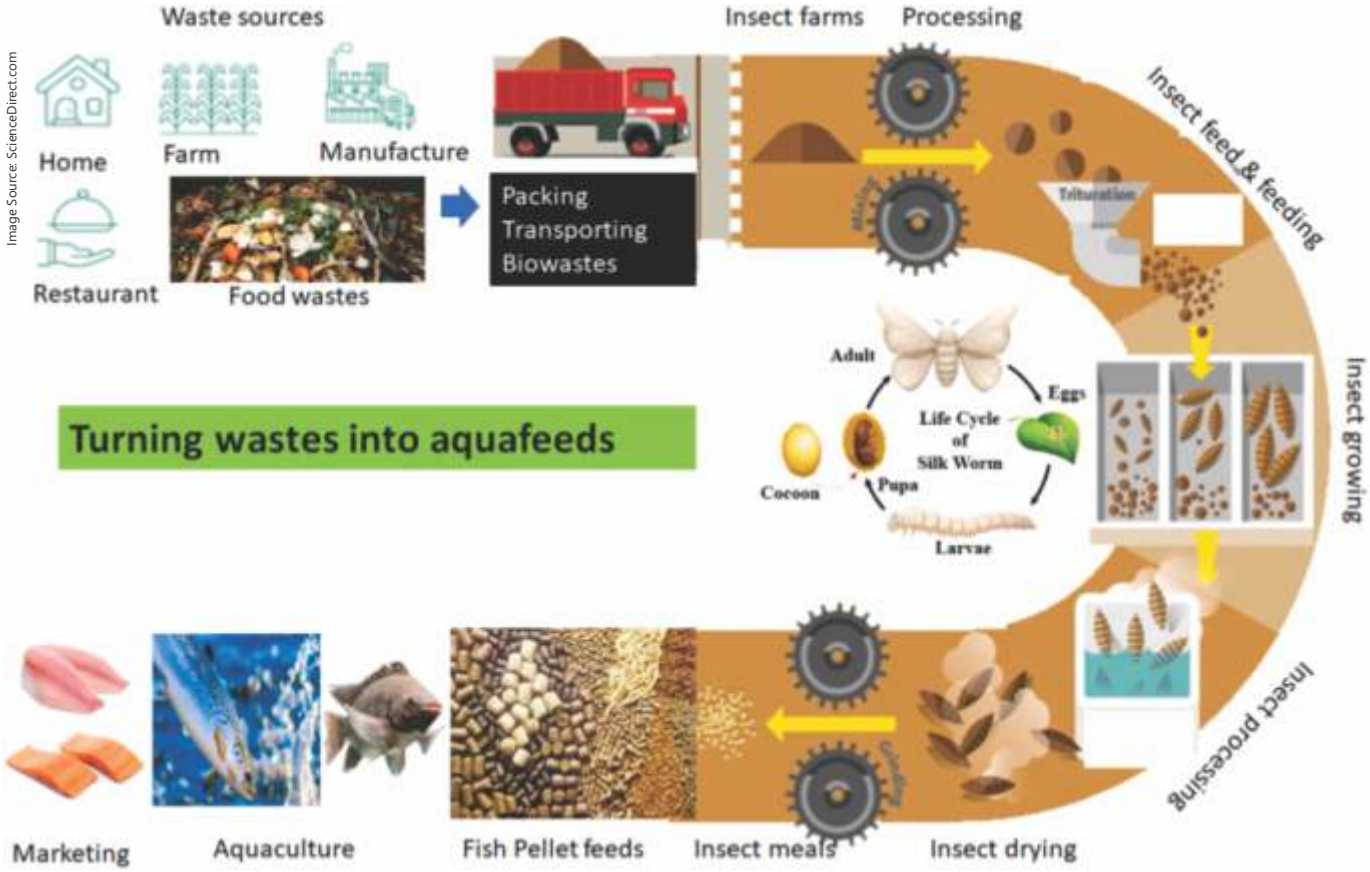

Technology Transfer of Insect Protein for Fish Feed

In a significant step towards fostering sustainable aquaculture, the ICAR-Central Marine Fisheries Research Institute (CMFRI) has signed a Memorandum of Understanding (MoU) with Ms Bhairav Renderers, Coimbatore, Tamil Nadu, to transfer its technology for producing fish feed using Black Soldier Fly Larvae (BSFL). The collaboration aims to equip Indian fish farmers with the tools necessary to boost productivity while minimizing the ecological impact of their operations.

Dr. Grinson George, Director of ICAR-CMFRI, stated that this technology transfer is a significant milestone in their efforts to promote sustainable practices in aquaculture.

Shri Senthil Kumar, CEO of Bhairav Renderers, mentioned that the partnership with ICAR-CMFRI will provide fish farmers with a sustainable and affordable alternative, benefiting both their bottom line and the overall health of the ecosystem.

As the global demand for seafood continues to grow, the aquaculture industry faces increasing pressure to find sustainable, affordable, and nutritious alternatives to conventional fishmeal, which is often derived from wild-caught fish. Overfishing and environmental concerns surrounding the use of fishmeal have raised alarms about the long-term sustainability of traditional aquaculture feed practices. In response to these challenges, ICAR-CMFRI's technology harnesses the power of BSFL, which is rich in protein, essential amino acids, and fats, making it an excellent source of nutrition for farmed fish.

Bhairav Renderers will begin producing insect protein feed on an industrial scale, initially targeting the Tamil Nadu market and gradually expanding its reach.

Source: ICAR-Central Marine Fisheries Research Institute, Kochi

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Building Bridges: How Dutch Agriculture Supports India's Growth and Innovation

Think Grain Think Feed had the opportunity to engage in a candid conversation with Mr. Michiel van Erkel, the Agriculture Counselor at the Embassy of the Netherlands in India and Sri Lanka, during Poultry India. In this insightful discussion, Mr. Erkel shared his perspectives on the role of Dutch expertise in supporting the growth of India's livestock sector and the future plans for fostering deeper agricultural cooperation between the two countries. Below are the key excerpts from the interview.

Having spent your entire career in the Netherlands before taking the Agriculture Counselor role in India, how has your experience been in transitioning between these two agricultural landscapes?

I've been in India for four years now. My career began as a civil servant, with a significant portion of it spent outside of agriculture. However, I've always maintained a broad perspective, and working in agriculture here has been nothing short of a fantastic adventure. India is a growth market, and I have witnessed this firsthand,

especially in the poultry sector. Events like Poultry India showcase this vibrancy—every year, the exhibition grows, with new innovations and Dutch companies treating it as a family reunion. It's gratifying to see Dutch companies thriving in India with minimal intervention on my part.

How does the Indian farming system compare with Dutch agriculture?

The Indian system is distinct, dominated by small and medium-sized farmers, unlike the highly efficient Dutch model. The Netherlands, despite its size being comparable to Kerala and a smaller population than Delhi, is the world's second-largest agricultural exporter. Cooperatives have played a vital role in our success. Our farmers realized the power of unity early on, forming cooperatives that strengthened their market presence. I see similar efforts in India through Farmer Producer Organizations (FPOs), such as Amul and Sahyadri Farms.

Adapting the Dutch model to India's context, with its vast number of smallholders, is challenging. Consolidation will take decades, but the drive towards stronger cooperatives and processing industries is encouraging. It's essential to tailor solutions to India's realities while leveraging Dutch experience. Of course, in the poultry sector, we also see many family-owned, well-established companies operating vertically across the entire chain. Many of these have formed successful partnerships and businesses with Dutch providers of technology and knowledge.

What role do Dutch companies play in supporting Indian agriculture?

Dutch companies bring experience in areas like farm management, feed management, and vocational training. For example, while innovations showcased at Poultry India are impressive, they can feel unattainable for smallholders. Our goal is to bridge this gap by providing farmers with knowledge and technology to create sustainable ecosystems. At the same time, we work together with Dutch companies and the Indian sector on financial solutions, either here in India or from international sources.

We also support vocational training to empower smallholders. Dutch partnerships with entities like Omnivore, which invests in solutions for farmers rather than individual farmers, reflect a promising approach. Furthermore, our Centers of Excellence (CoEs), established in collaboration

Mr. Michiel van Erkel

with India's Mission Integrated Development of Horticulture (MIDH), focus on horticulture and protective cultivation.

Could you elaborate on the Centers of Excellence and their impact?

We currently have about nine operational CoEs, focusing on areas such as potatoes, vegetables, and flowers. For instance, our center in Baramati, Maharashtra, excels in vegetable cultivation. A newer center in Kerala focuses on both vegetables and flowers. We are also expanding into public-private CoEs, such as AGROTIE in Bangalore, a family-owned company that started its own CoE. We recently signed an agreement to have them recognized as an Indo-Dutch CoE.

Looking ahead, we aim to establish CoEs for dairy and

animal husbandry in collaboration with the Center of Excellence for Animal Husbandry (CEAH) in Bangalore. Just like the horticulture centers, this center will adapt global expertise to local needs. In the case of dairy, we will demonstrate practical solutions such as silage preparation, improved farm management, feed management, and productivity enhancements tailored for smallholders.

In previous discussions, you mentioned that the embassy is supporting Indian companies to explore the Dutch market. Could you share some recent examples of such initiatives?

India's potential as a global food powerhouse is immense. I advise that the country focus on regional markets and export niche Indian products to Europe. Many Indian companies are exploring the EU market after establishing their base in the Netherlands. It is an excellent hub, with the Port of Rotterdam as the number one gateway to Europe, its expertise in logistics, and a well-educated, English-speaking workforce. For example, companies like Sonalika have successfully exported their low-horsepower electric tractors to European countries after setting up their base in the Netherlands. Indian companies in the shrimp sector also participate in European exhibitions to gain market access.

With India's start-up ecosystem growing rapidly, are Dutch companies looking to invest in Indian start-ups, especially in the agricultural sector?

Indeed, a couple of companies are looking into investing in Indian start-ups. A nice example is the investment of Nutreco (Trouw Nutrition for animal feed and their aquaculture feed branch, Skretting), and eventually the acquisition of the Indian start-up Eruvaka. Nutreco saw the fascinating Eruvaka feeding technology as a good addition to their business in India. Many investments in start-ups are facilitated through venture capital firms like Omnivore, in which the Netherlands' public-private entrepreneurial development bank, FMO, has taken a significant share.

Are there any new strategies being implemented to reduce agriculture's carbon footprint and promote environmental sustainability?

Both our countries are serious about climate change and the need for global action to adapt to and mitigate these changes. The Netherlands, lying largely below sea level, faces rising water levels, while India faces both drought and flooding. The Dutch farmers' cooperative Rabobank launched an interesting initiative, Acorn, to empower smallholder farmers worldwide in their transition to sustainable agroforestry, issuing carbon credits accordingly.

As you approach the completion of your tenure in 2025, what are your key priorities, and what lessons will you carry forward?

I will be sad to leave India, knowing that even after more than four years, I will have only had a glimpse of this fascinating and impressive country and its states, cities, and people. For this year, my key priorities remain the same: horticulture and the dairy sector. I hope to have realized nearly 20 Centers of Excellence, identified or operational, close to the number agreed upon between the honorable Prime Minister Modi and the former Netherlands Prime Minister Rutte. My team and I, at the Embassy and with our offices pan-India, will also work on embedding the strong bilateral relationship in agriculture into the broader Strategic Partnership, envisioned in the very near future between India and the Netherlands.

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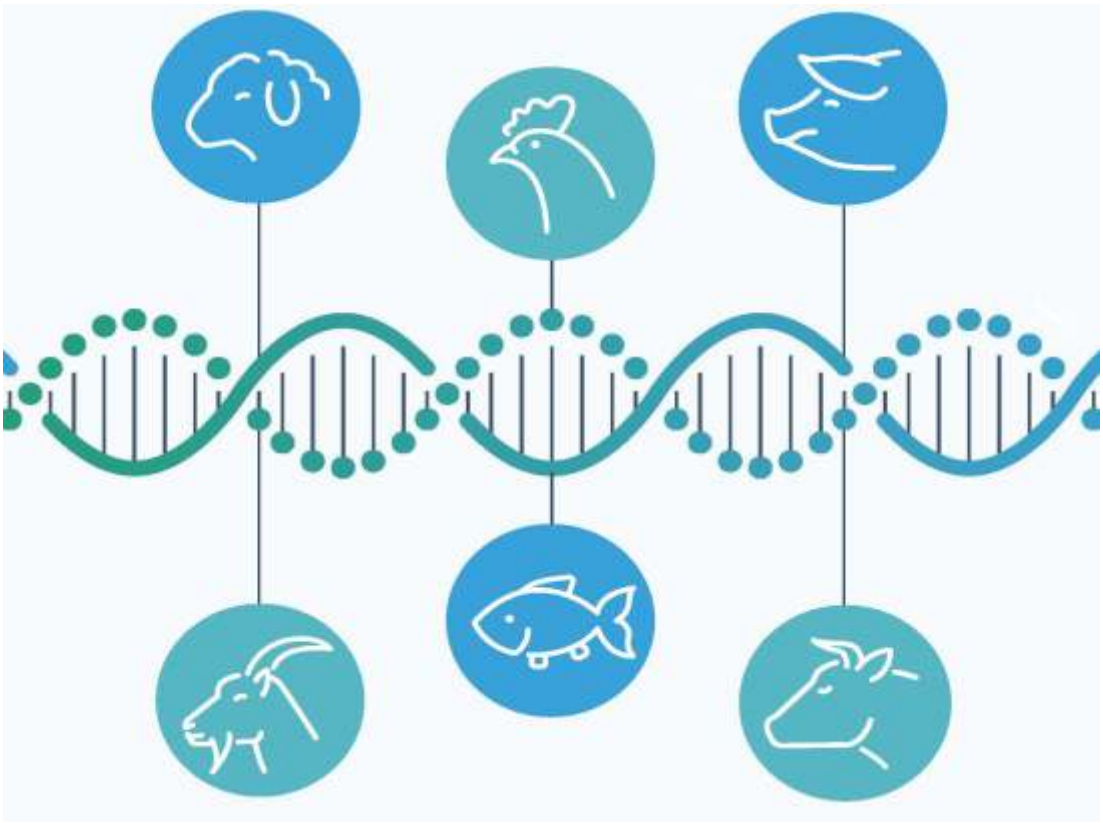

Image Source: Cambridge University Press & Assessment

Advancing Nutrigenomics in Livestock Nutrition

by **Shiwani Singh** (Ph.D. Scholar)**, Prital Bhujbal** (M.V.Sc Scholar), **N.R. Karambele,** and **S.D. Jagadale** (Assistant Professors), Animal Nutrition Division, Mumbai Veterinary College, Parel

Shiwani Singh

Introduction

Nutrigenomics is the study of the effect of nutrients on gene expression and, as such, revolutionizes animal nutrition. This emerging field investigates the interplay between diet, genes, and metabolic pathways, providing novel opportunities to enhance animal health, productivity, and sustainability. While initially focused on humans and rodent models, nutrigenomics research has expanded to include livestock species such as cattle, pigs, and poultry. These advances hold tremendous promise for optimizing feed efficiency, disease resistance, and the quality of animal products, contributing to global food security.

The Basics: Understanding Nutrigenomics

At the core of nutrigenomics is the ability to decode how nutrients act as signals, regulating gene expression and cellular processes. This field employs cutting-edge molecular biology tools, including transcriptomics, proteomics, and metabolomics, to uncover the biological mechanisms driving dietary effects on livestock.

- **Transcriptomics:** This involves studying RNA transcripts from genes, helping us understand how nutrients influence gene expression patterns.

- **Proteomics:** This involves studying the entire set of proteins expressed by a cell or tissue, offering insights into how dietary components can affect protein synthesis and function.
- **Metabolomics:** This analyzes small molecules or metabolites in a biological system, providing a snapshot of metabolic changes that occur with different diets.

These "omics" technologies have enabled scientists to identify genes and pathways involved in traits like growth, immunity, and reproduction, paving the way for precision feeding strategies.

Fundamentals of Nutrigenomics

The fundamentals of nutrigenomics revolve around the intricate relationship between diet, genes, and health outcomes. It aims to develop dietary recommendations that predict disease prevention based on genetic variations and their effects. Nutrigenomics seeks to design effective dietary regimens to manage complex diseases and optimize productivity, especially in livestock. The core focus of its research is the identification of genetic alleles affecting polygenic traits, enabling the development of appropriate nutritional strategies for better performance and disease resistance. This field emphasizes a personalized approach by tailoring dietary interventions according to an individual's genetic makeup, linking nutritional molecules with genetic activity and the broader biological system. Through its findings, nutrigenomics supports evidence-based strategies for achieving health and productivity goals.

Table 1: Impact of Dietary Oils on Fatty Acid Profiles in Cattle

Oil Type	Key Gene Expression Changes	Fatty Acid Profile Improvements
Linseed Oil	Upregulates INSR, GHR1A	Increased Omega-3 PUFAs
Soybean Oil	Downregulates SCD1, SREBF1	Reduced Saturated Fat Content
Palm Oil	Reduces AMPK? in adipose tissue	Increased Oleic Acid

Applications in Ruminants

- **Prenatal and Postnatal Nutrition**

Ruminants, including cattle, buffaloes, goats, and sheep, are crucial to the global meat and dairy industry. From a nutrigenomic perspective, prenatal and postnatal nutrition significantly impacts gene expression. For example, under-nutrition during early gestation in beef cattle reduces muscle and fat development, affecting meat quality. Conversely, over-nutrition can lead to excessive fat deposition by modifying adipogenesis-related genes, such as PPARG (Peroxisome Proliferator-Activated Receptor Gamma). Nutritional strategies during these phases can promote desirable traits, including marbling in meat. In adult

Prital Bhujbal

Table 2: Effects of Dietary Protein and Fat on Pork Quality

Dietary Factor	Gene Expression Changes	Meat Quality Outcomes
Low Protein Diet	Upregulated Stearoyl-CoA Desaturase, Fatty Acid Synthase	Increased Marbeling
Soybean Oil	Alters Leptin, Malic Enzyme 1 expression	Improved Omega-6/Omega-3 Ratio
Selenium	Enhances antioxidant genes	Improved Immune Function

ruminants, dietary strategies—such as the inclusion of specific oils or starch sources—can refine meat and milk quality by influencing lipid metabolism gene expression. For instance, feeding linseed or soybean oil increases omega-3 fatty acids in milk, making it beneficial for consumers.

Enhancing Qualities of Milk and Meat

Bioactive fatty acids in feed can control milk fat synthesis and improve fatty acid profiles. Studies have shown that feeding specific oils, such as linseed oil, to cattle increases omega-3 PUFAs (Polyunsaturated Fatty Acids) and decreases saturated fats, directly benefiting consumers by meeting their demand for healthier animal products.

Applications in Pigs

- **Impact of Diet on Meat Quality and Fatty Acid Composition in Pigs**

  Pigs are a major source of protein worldwide, and nutrigenomic studies have revealed how dietary factors influence the fatty acid composition of their meat. For example, low-protein diets increase intramuscular fat, leading to marbling in the meat, which enhances sensory quality. Numerous compounds produced through these dietary practices upregulate lipogenic genes such as SCD (Stearoyl-CoA Desaturase) and ACACA (Acetyl-CoA Carboxylase Alpha), which regulate lipid synthesis.

The type of fat in the diet also plays a crucial role in determining the fatty acid composition of muscle tissues. For example, using oleic-rich sources like sunflower oil can promote fat growth in the meat while lowering saturated fat content.

- **Supplementation with Micronutrients**

  Micronutrient supplementation, including selenium and L-carnitine, can positively affect immune function and muscle growth. Selenium enhances the transcription of genes involved in antioxidant defense, while carnitine supplementation can inhibit genes involved in muscle atrophy and apoptosis, promoting skeletal muscle development.

- **Reproductive Performance**

  Nutrigenomics also optimizes reproductive performance in pigs. Trace minerals like selenium enhance antioxidant defense in boars, improving semen quality. Lactating sows benefit from micronutrient supplementation, which improves reproductive longevity and productivity.

Applications in Poultry

- **Growth and Immunity**

  Nutrigenomic research has focused on enhancing growth and immune responses in poultry. Plant-derived additives such as oregano, curcumin, and garlic extracts show promise in modulating immunity through gene expression regulation.

Table 3: Nutrigenomics of Poultry Diets

Supplement	Key Genes Affected	Observed Benefits
Oregano	Downregulates fatty acid genes	Reduced Fat Deposition
Methionine	Upregulates Methionine Adenosyl Transferase 1A, Glycine N-Methyltransferase	Improved Growth Rates
Chromium	Alters muscle microRNAs	Enhanced Protein Synthesis

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Garlic supplementation activates inflammatory response genes, while oregano supplementation downregulates lipid metabolism genes, preventing fat deposition.

- **Reducing Antibiotic Dependence**
  The reduction of antibiotic use is a major goal in sustainable livestock production worldwide. Nutrigenomics implicates plant-based additives, such as curcumin and oregano, as natural antibiotics. These not only enhance immunity but also promote gut health and feed efficiency, contributing to sustainable poultry production.
- **Amino Acids and Microelements**
  Methionine and cysteine are essential amino acids important for growth, feather quality, and stress resistance in poultry. For example, methionine deficiency reduces the expression of glutathione peroxidase (GPx), which is vital for oxidative stress resistance, leading to reduced growth performance and immunity. Supplementing trace minerals, such as chromium, enhances muscle protein synthesis and insulin sensitivity, further improving growth.

Future Directions and Challenges

- **Emerging Technologies**
  The future of nutrigenomics combines advanced genomic tools with appropriate feeding strategies. RNA sequencing and epigenomic mapping are providing in-depth understanding of how diets impact gene expression across generations, enhancing our understanding of transgenerational nutrition.
- **Precision Nutrition**
  By tailoring diets based on individual genetic profiles, production efficiency can be optimized while minimizing environmental impacts, such as greenhouse gas emissions. Nutrigenomics helps develop precision feeding strategies that optimize feed efficiency, reduce waste, and improve animal health.
- **Towards Sustainable Feeding Practices**
  Through genetic studies, nutrigenomics seeks to incorporate agricultural waste and plant-based alternatives into animal feed to address environmental concerns. These strategies aim to lower feed costs, reduce environmental impact, and provide high-quality animal products. An example is substituting conventional feedstuffs for nutrient-dense waste products.
- **Ethical and Economic Considerations**
  Despite its advantages, nutrigenomics faces challenges such as the high costs of research and ethical dilemmas in certain genetic studies. Ensuring that nutrigenomic tools are economically viable and accessible will help integrate them into the livestock industry.

Conclusion

Nutrigenomics offers a bold new approach to livestock nutrition, emphasizing the molecular interactions between diet and gene expression. It has the potential to deliver significant economic gains through increased productivity and other pathways. From improving meat and milk quality in ruminants to enhancing poultry growth and immunity, nutrigenomics will have extensive applications. As more research unfolds, new aspirations will emerge, playing a central role in addressing the challenges of sustainable animal agriculture and meeting the growing global demand for high-quality animal products.

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European Demand Boosts Indian Soyameal Exports in December, But Cumulative Exports Lag Behind

Soyameal exports in December rose slightly to 2.77 lakh tonnes (lt), driven by higher demand from European markets, particularly Germany and the Netherlands. However, the offtake by the domestic livestock feed sector remained stable at 5.5 lt, according to the latest data from the Soyabean Processors Association of India (SOPA).

While December's exports were up by just over 1% compared to 2.74 lt in the same period last year, cumulative exports for the 2024-25 oil year, starting October, have fallen by 21% to 5.18 lt from 6.59 lt in the previous year. The dip in exports is attributed to India's higher pricing, which has made it less competitive in the global market. Exports also saw a decline in both October and November.

Top Export Markets

Germany was the largest importer of Indian soyameal in December, purchasing 49,875 tonnes, followed by the Netherlands at 39,088 tonnes, Bangladesh at 32,002 tonnes, and France at 28,542 tonnes. Neighboring Nepal also imported over 27,724 tonnes, while Belgium bought more than 17,800 tonnes. Notably, Iran, a major buyer in the previous year, saw a sharp reduction in its purchases, with only around 500 tonnes imported in December.

Soyabean Market Trends

Domestic market arrivals of soyabean were estimated at 46 lt by the end of December, down 11% from 52 lt in the previous year. This decline is reflective of a bearish price trend, influenced by global market conditions. Soyabean crushing for the period was also down by 14%, totaling 30.50 lt compared to 35.50 lt last year. However, direct usage of soyabean increased slightly to 1.40 lt from 1.10 lt. Stocks with crushing units and traders stood at 89.82 lt, a decrease from 93.46 lt a year ago.

Domestic Consumption Trends

Soyameal production dropped by 14% to 24.07 lt from 28.01 lt during the October-December period. Domestic consumption of soyameal in the food sector decreased marginally to 2.10 lt, from 2.25 lt last year. The feed sector also saw a slight decline, with consumption down to 17 lt from 18.50 lt.

Pricing and Procurement

Soyabean prices continue to remain below the Minimum Support Price (MSP) in key producing regions. While the government set the MSP at INR 4,892 per quintal, prices in Madhya Pradesh—the largest soyabean-producing state—ranged between INR 3,500 and INR 4,400 per quintal as of January 13.

As of January, government agencies have procured over 8.84 lt of soyabean, with the majority coming from Madhya Pradesh (3.88 lt) and Maharashtra (3.10 lt). Other states, including Telangana, Rajasthan, Gujarat, and Karnataka, have contributed smaller quantities, with the total government procurement target set at 33.85 lt.

Source: The Business Line

India's DDGS Exports Surge, But Price Decline Remains a Concern

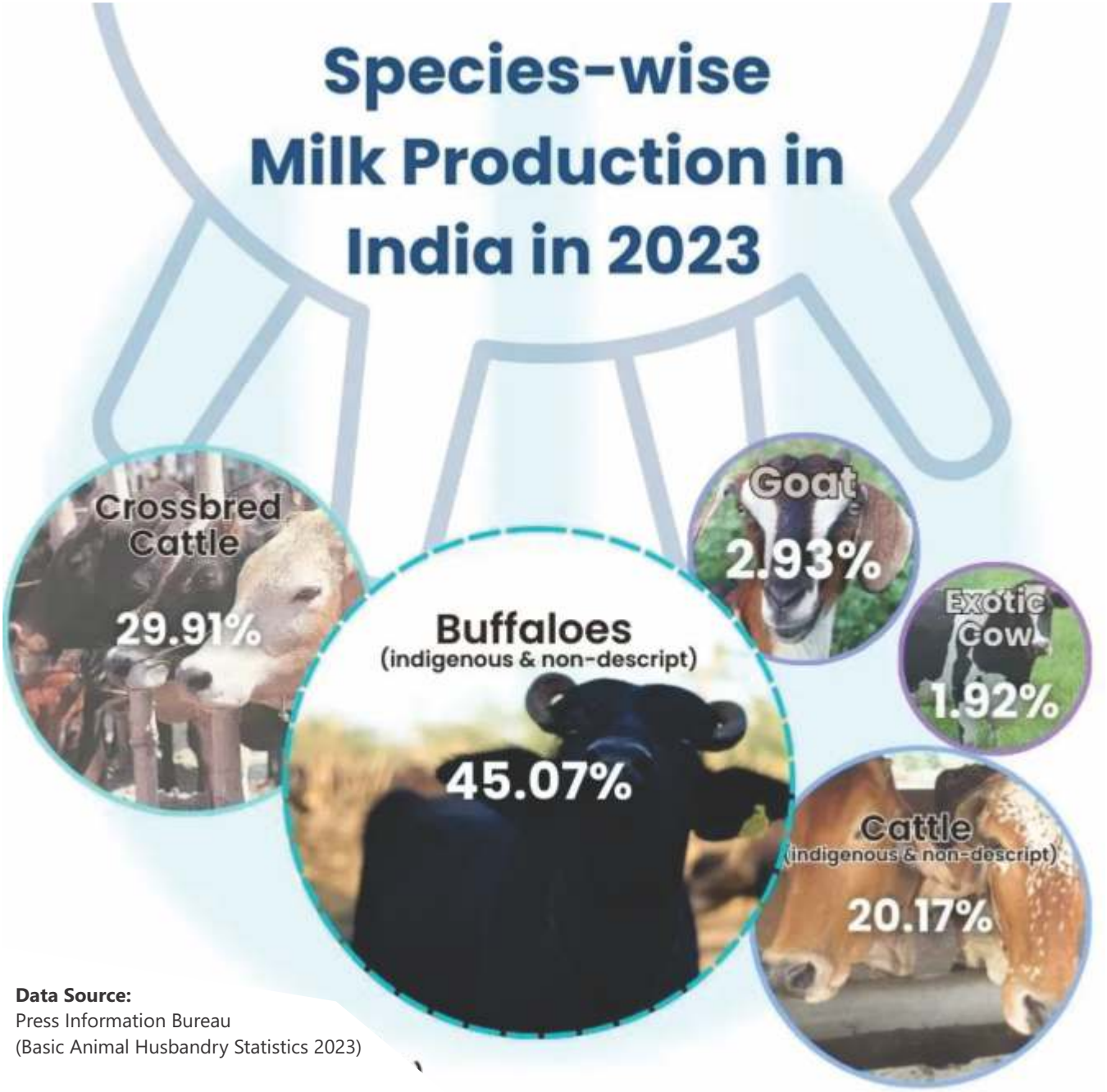
India has seen a substantial increase in the export of DDGS (Distiller's Dried Grains with Solubles), a byproduct of ethanol production, in recent years. However, despite this impressive growth, the industry is grappling with concerns about the ongoing decline in DDGS export prices. The rise in DDGS exports has made the product an essential component in the animal husbandry sector, providing a valuable source of protein and energy for livestock and poultry.

Data from the Grain Ethanol Manufacturers Association (GEMA) highlights a sharp increase in maize DDGS exports over the past three years. In 2022, exports of maize DDGS were just 30 metric tons (MT), but by 2023, this figure surged to 20,847 MT. In 2024, exports skyrocketed to 287,593 MT, marking a significant leap.

Rice DDGS exports also showed growth, rising from 12,064 MT in 2022 to 60,296 MT in 2024, although they remain smaller in volume compared to maize DDGS.

However, export prices for both maize and rice DDGS have been on the decline. The price of maize DDGS dropped from USD 239 per metric ton in 2022 to USD 220 per metric ton in 2024. Similarly, rice DDGS prices saw a sharper decline, falling from USD 435 per metric ton in 2022 to USD 324 per metric ton in 2024. This price drop is raising concerns within the industry, as it impacts profitability despite the growing export volumes.

Source: Chini Mandi



Data Source:
Press Information Bureau
(Basic Animal Husbandry Statistics 2023)

Self-Sufficient Indian Dairy Sector: A Decade Ahead

Think Grain Think Feed connected with Dr. Pradeep Mahajan, a seasoned dairy expert with in-depth knowledge of the Indian dairy farming sector. In this e-interview, Dr. Mahajan shares his insights on the industry's current state, the challenges it faces, and the steps needed to enhance production while ensuring self-sufficiency in the coming decade. Below are the key excerpts from the interview.

Indian milk production has increased by 3.78%, which is a decline compared to last year's growth of 5.77%. What is your observation on this growth trend, and do you think India will remain self-sufficient in dairy production over the next decade? What changes in fundamentals are necessary to achieve this?

That is too complex a question to answer. Whether India will

remain self-sufficient will not only depend on the supply but also on the demand trend. The price elasticity of demand for milk and milk products will become more significant as the cost of production—and, consequently, prices—rise. However, fortunately (or unfortunately), we have very low productivity in our animals, and there is tremendous scope for improvement. This improvement will certainly happen, and it will surely help us stay self-sufficient. So, overall, I believe we will remain self-sufficient in milk production over the next decade.

With the slowing growth rate and increasing demand for dairy, what role can commercial cattle feed play in addressing these challenges?

The first major role will have to be played by genetics. Improvement in genetic potential of animals is going to be key. As and when that happens, commercial cattle feed will easily rise to the occasion and will help realise the genetic potential through better nutrition.

In interview coverage with TGTF in 2017, you mentioned lack of green fodder availability a major challenge for dairy farming. Has anything changed in all these years?

If we go by the prices of commercially traded corn silage and prices of straw throughout the country, the situation has certainly worsened. The shortage of good quality forage is becoming more acute. The demand for maize ethanol production is also expected to skew the availability of corn, as farmers growing corn may shift to grain production rather than using it for forage or silage.

The average farm size in Indian dairy farming is 3-4 animals, which constitutes a major portion of the overall sector. Do you foresee consolidation in the industry? What would be your advice for making dairy farming more profitable?

Consolidation in dairy farming has been a trend worldwide, and India will not be an exception. The rate of consolidation may vary, but it will happen. Both social and economic factors will favour consolidation. Upward mobility and aspirations of youth will drive many out of dairy farming and those who stay, will rightfully expect better standards of living through higher income. This can only come with larger farms and higher productivity. On the commercial side, ensuring quality milk production in a fragmented farming is not easy. Only with a decent farm size, you can start taking precautions and implement good managemental practices to ensure quality of milk.

Consolidation will also happen geographically. We already have pockets which

Dr. Pradeep Mahajan

produce more milk, and these areas will grow, capturing a higher share of milk production. The availability and growth in infrastructure for milk collection and processing, access to good quality forage, a establishment of forage markets, and a conducive climate for dairy farming will all play a role in this geographical consolidation.

Silage is an excellent feed supplement for cattle, but managing it can be challenging. Could you please share some tips on proper handling of silage?

This is a topic for a decent sized book – at least with 200 pages! But to answer your question in short, I

think, right stage of harvesting, right moisture content and management of moisture at the time of ensiling, good quality chopping to ensure both – stem and grain processing, good impaction to remove as much air as possible, proper sealing to prevent entry of air and speed of the entire process of ensiling are all very important factors which help in preparing good quality silage. During feeding, silage face management is important to avoid fungal growth.

Antimicrobial resistance (AMR) is a growing concern. What is the situation regarding AMR in Indian dairy farms?

AMR is a global concern and Indian dairy farms are no exception. Fortunately, unlike other farm animals, antibiotics have never been used as growth promoters in dairy farming or feed in India. However, misuse and overuse of antibiotics is a problem. This is mostly due to quacks and unqualified persons treating animals. Better access to veterinary services from qualified personnel and access to clean water, improved hygiene and sanitation, will go a long way in avoiding overuse of antibiotics in dairy animals. When it comes to antibiotic residues in animal products, I think dairying is much better off. There are well established procedures for testing for various antibiotics residues in milk, and these are routinely followed, at least in the organized sector.

What major changes do you foresee in the dairy industry over the next 5-10 years?

To answer this question, I will restrict myself to only the dairy farming and not the dairy industry as a whole. I think most of the changes in farming will be driven by better availability of improved genetics. We will see some consolidation happening outside Punjab and Haryana. This is already being felt in the adjoining areas of Rajasthan and Western Uttar Pradesh, and it will extend to other pockets of the country as well.

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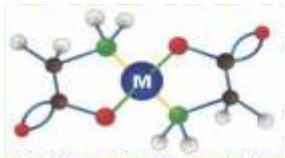

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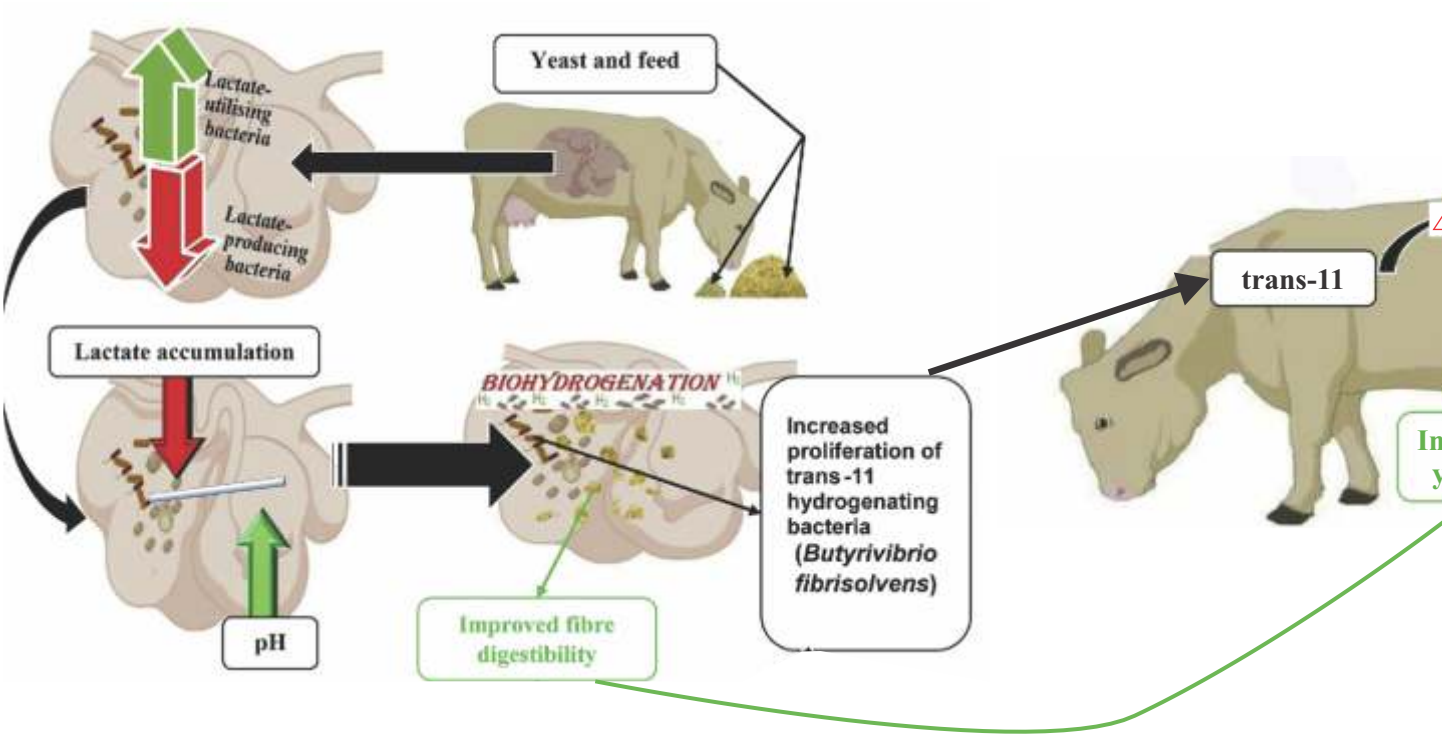


Yeast for the Rumen: Active Dry Yeast, Yeast Culture, or Yeast Cell Wall—Does it Make a Difference?

Sarwar Ali, Immeureka Animal Health

Sarwar Ali

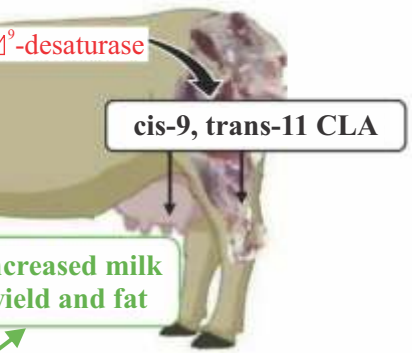
Sarwar Ali has a postgraduate degree in molecular biology and management. With over a decade of experience in the feed additives and vaccine business, he specializes in product management, branding, and key account management. Currently, he holds the position of DGM Sales & Marketing at Immeureka Animal Health.

The addition of direct feed microbes can enhance feed digestion, improve animal performance, and support animal health by influencing the rumen's digestive processes. As a result, ruminants are commonly fed various microbial feed additives. Yeast products, particularly Saccharomyces cerevisiae, have been shown to be effective in regulating rumen metabolism and improving ruminant productivity. Research suggests that supplementing yeast in the diet can improve feed intake, weight gain, digestion, and the populations of anaerobic and cellulolytic bacteria (ruminal microflora), as well as stabilize the ruminal pH.

However, there has been ongoing debate regarding whether yeast should be fed as active dry yeast (ADY), yeast culture, or yeast cell wall. The goal of supplementing yeast in ruminant diets is to improve animal health and production efficiency, while also considering cost-effective applications.

Different Yeast Species of Importance in Animal Feeding

1. Active Dry Yeast (ADY)
   Active dry yeast is the most common type used in dairy and cattle feeds. It is a granular substance containing live organisms in a dormant state, with 5–20 billion live yeast cells per gram. There is a wide range of commercial ADY products available in the dairy nutrition market, each containing a distinct



strain of Saccharomyces cerevisiae, with varying dosing rates and cell viability.

2. Yeast Cultures
Yeast cultures are unique in that they contain both yeast biomass and fermentation metabolites produced during the fermentation process. To produce yeast cultures, live yeast cells are inoculated into a specific medium and allowed to ferment under controlled conditions. The metabolites produced depend on the media used and the fermentation conditions.

3. Yeast Cell Wall
Yeast autolysates, which include both intracellular components and yeast cell wall fragments, are derived from lysed yeast cells using acids, enzymes, or high-salt solutions. Glucans, the principal polysaccharide component in Saccharomyces cerevisiae, form the structural support of the yeast cell wall. The innermost layer of yeast

Table 1: Mode of action of active dry yeast, yeast culture and yeast cell wall

Active dry yeast	Yeast culture	Yeast cell wall
Some studies suggest that ADY alters bacterial populations in the rumen. ADY may help reduce oxygen levels in the rumen, creating a more favorable environment for anaerobic, cellulolytic bacteria. It has been also suggested that ADY's disintegrate in rumen and acts as micronutrients that stimulate the proliferation of rumen microbial growth.	Yeast cultures are distinctive due to the combination of yeast biomass and fermentation metabolites. These micronutrients stimulate the growth of rumen microbes.	Supplementation with yeast cell wall has been shown to influence the rumen's microbial environment, promoting the growth of lactate-fermenting bacteria and reducing lactate concentration in the rumen. Mannan oligosaccharides stimulate beneficial lactic acid bacteria, promoting their growth and gastrointestinal viability.

Following table summarizes a review of literature studies reporting an improvement in dairy cow's performance and udder health due to feeding of active dry yeast, yeast culture and yeast cell wall.

Table 2: Effect of Yeast Products Supplementation on Milk Quantity and Quality of Dairy Cows

Yeast Species/Type	Period Fed Diets	Dosage	Improved Parameters	References
Yeast Cell Wall (Saccharomyces cerevisiae)	14 weeks	28 g/cow per day	Increased milk production and milk protein	Nocek et al. (2011)
Active Dry Yeast (Saccharomyces cerevisiae)	10 weeks /head/ day	8×10?10 CFU	4% fat-corrected milk yield increase	Aizahal et al. (2014)
Yeast Cell Wall (Saccharomyces cerevisiae)	10 weeks	10 g/cow/day	Improved milk production and composition, and better blood energy metabolites	Aung et al. (2019)
Yeast Culture (Inactivate strains of Saccharomyces cerevisiae)	6 months	40 g/head/day	Increased 4% FCM milk yield, milk fat, total solids, and solids-not-fat	Wafa et al. (2020)

Table 3: Effect of Yeast Products Supplementation on Udder Health in Dairy Cows

Yeast Species/Type	Period Fed Diets	Dosage (g/kg of Feed or % of Diet or CFU)	Improved Parameters	References
Yeast Cell Wall (Saccharomyces cerevisiae)	14 weeks	28 g\head\day	Decreased somatic cell count, improved mammary gland health	Nocek et al. (2011)
Active Dry Yeast (Saccharomyces cerevisiae)	16 months	4 g/100 lb. of body weight daily	Enhanced immune response against mastitis-causing pathogens	Ryman et al. (2013)
Selenium Yeast (Saccharomyces cerevisiae)	124 days	278 mg/kg DM	Reduced somatic cell count, lower incidence of mastitis	Oltramari et al (2014), Weng et al (2018)
Yeast Culture (Inactivate strains of Saccharomyces cerevisiae)	3 weeks	5 ml/head, 2.0× 10 ? 7 CFU/mL	Improved milk quality, reduced somatic cell count	Lim et al. (2021)

cell walls consists of insoluble β-glucan. Mannans, another significant component of yeast cell walls. Mannan oligosaccharides (MOS) act as prebiotics by serving as nutrients for beneficial microbes in the gastrointestinal tract, promoting probiotic effects.

4. Specialty Yeast Products Specialty yeast products include irradiated yeast, selenium yeast, chromium yeast, and Phaffia yeast. Irradiated yeast contains ergosterol, which transforms into vitamin D2 under ultraviolet radiation. Selenium yeast is a highly bioavailable source of selenium, sold as Selenomethionine. Phaffia yeast is known for producing astaxanthin, a red pigment.

Which one to use in the cattle feed?

The mechanisms of active dry yeast, yeast cultures, and yeast culture conclude in a comparable outcome: the prevention of a decline in rumen pH or the restoration of rumen pH to more normal levels. The provision of both probiotic and prebiotic effects through yeast cultures and yeast cell walls is advantageous. A nutritional source for beneficial bacteria, in conjunction with the other nutrients included in yeast products, will undoubtedly enhance rumen function during periods of acidosis.

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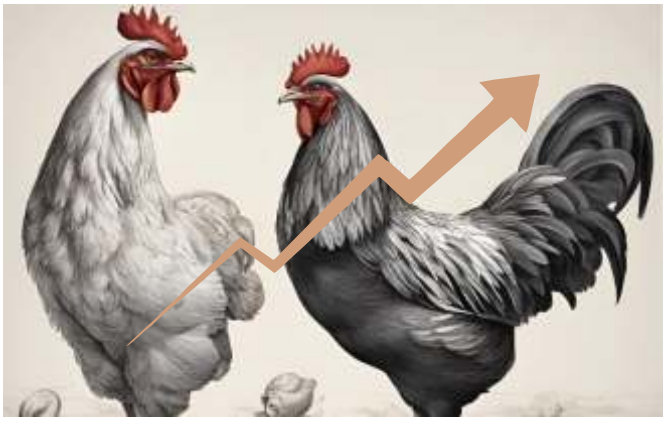
Poultry Market Anticipates 3% Growth in Q1 2025

The global poultry industry is projected to experience a growth of around 3% in the first quarter of 2025, according to the latest report from Rabobank. This positive outlook is driven by multiple factors, including the affordability of poultry meat, consumer demand for more cost-effective protein sources, and a growing commitment to sustainability in developed countries.

Key Drivers of Growth

A significant factor behind this growth is the affordability of poultry meat. Amid economic uncertainty and inflation, consumers are increasingly turning to poultry as a more affordable protein option compared to other meats. The industry's ongoing efforts to innovate and market new products have also contributed to poultry's rising popularity.

Another key driver is the increasing consumer preference for sustainable food sources. Poultry production generally has a smaller carbon footprint than other animal proteins, making it an attractive choice for environmentally conscious consumers in developed countries. This shift towards sustainability is expected to further drive demand for poultry products.



Regional Growth Patterns

Growth in the poultry industry will not be uniform across all regions. Emerging markets in Asia, Latin America, the Middle East, and Africa are expected to see significant increases in both production and consumption. Rapid urbanization and rising incomes in these regions are fueling higher demand for poultry meat.

In contrast, developed markets such as Europe are also showing positive growth, although at a slower pace. Europe's stronger-than-expected recovery in demand post-pandemic is contributing to the overall global growth of the poultry industry.

Challenges and Risks

Despite the optimistic projections, the poultry industry faces several challenges. The ongoing threat of avian influenza remains a major concern, as outbreaks can disrupt supply chains and impact production. Additionally, geopolitical tensions and trade restrictions may affect the global poultry trade, leading to price volatility and disruptions in supply chains.

Operational costs are also a significant issue. While the availability of key feed ingredients like corn and soybeans is expected to remain stable, potential climate events such as La Niña could affect crop yields and increase feed costs, posing a risk to the industry's growth.

Investment and Future Outlook

To sustain this growth, the poultry industry is likely to attract continued investments in modernization, new facilities, and consolidation. However, recent price declines in markets like the European Union, South Africa, and Thailand underline the risks of overly optimistic growth projections.

In conclusion, while the global poultry industry is on track for a promising start to 2025, maintaining a balance between supply and demand will be critical for consolidating this growth. The industry's ability to navigate challenges such as disease outbreaks, geopolitical tensions, and rising operational costs will be key to its long-term success.

Source: Avi News.com

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Centre Extends Soybean Procurement Deadline for Maharashtra, Rajasthan, and Telangana Due to Shortfall in Targets

The Union Agriculture Ministry has decided to extend the deadline for soybean procurement from Maharashtra, Rajasthan, and Telangana, which originally ended on January 12. Minister Shivraj Singh Chouhan announced that procurement in Maharashtra will continue until January 31, while the new deadline for Rajasthan is February 4. Both states had requested the extension.

"Telangana also requested an extension, and we have approved it," the Minister stated. Additionally, the Centre will now procure 25,000 tonnes of soybean from Telangana, increasing the original target of 59,508 tonnes.

So far, a total of 13.68 lakh tonnes of soybean have been procured from all states, against the target of 33.60 lakh tonnes. When asked about the shortfall in procurement, the Minister attributed it to the State governments' responsibility for arranging procurement. "We will consider extending the procurement deadline for other states if we receive requests," he added.

Mr. Chouhan also held a review meeting with senior officials from the Ministry to discuss agricultural issues. "Several topics were covered, including farm produce, marketing of agricultural products, imports and exports, and weather conditions," a government release stated.

The release also quoted the Minister saying he plans to hold regular meetings with State governments at the Agriculture Ministers' level. He emphasized that officials should engage consistently with State governments to address these issues, as tackling them at the ground level requires active involvement from state officials.

Source: The Hindu

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Duty Reductions for Seafood Exports on the Table in Budget 2025

India's seafood industry exports surpassed INR 60,000 crore so far in financial year 2024-25 (FY25), the Ministry of Finance recently announced, adding proposals to cut customs duties, among other measures to enhance the sector's global competitiveness. This announcement comes in the run-up to the Union Budget 2025, poised for February 1, 2025.

Frozen shrimp emerged as the star performer, accounting for nearly two-thirds of the total seafood exports, the ministry said.

India shipped 1.78 million metric tonnes of seafood in the last financial year FY24, valued at INR 60,523.89 crore, despite facing challenges in major export markets. This represented a 2.67% increase in volume at the end of FY24 compared to the previous year.

In order to increase India's seafood exports, the government has proposed reducing the Basic Customs Duty (BCD) on several key inputs for shrimp and fish feed production to just 5%. This move includes reductions in broodstock, polychaete worms, and various feed components.

Additionally, customs duty exemptions will apply to several inputs used in manufacturing shrimp and fish feed.

Key tax reforms for marine products

The central board of indirect taxes and customs (CBIC) has already implemented several tax reforms to support the aquaculture industry:

- Mineral and vitamin premixes: BCD reduced to 5% for these essential feed ingredients.
- Aquatic feed components: Tax reductions on krill meal, fish lipid oil, crude fish oil, algal prime (flour), and algal oil.
- Research and development: To encourage innovation, BCD on insect meal and single-cell protein derived from natural gas has been reduced.
- Aquatic feed manufacturing: The BCD on prawn and shrimp feed, as well as fish feed, has also been cut to 5%.

US leads Indian seafood exports

Last financial year, the United States continued to remain India's top importer, accounting for 34.53% of the total export value (USD 2.55 billion). Frozen shrimp was the most popular product, making up 91.9% of exports to the US.

China emerged as the second-largest market importing 451,000 metric tonnes worth USD 1.38 billion. Japan ranked third, followed by Vietnam, Thailand, Canada, Spain, Belgium, UAE, and Italy, respectively.

Source: Business Standards

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- SWISS VITAMIN - C
- SWISS VITAMIN - K
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