

dairy dimension

bi-monthly

Volume 3 | Issue 10 | May-June 2026

Using Dairy Farm Data to Improve Efficiency and Profitability

Dr T M Gowrisankar

Vijay Singh

CEO, Shunya

*From Scarcity to Abundance:
Reimagining the Future of
Dairy Nutrition in India*



PLUS

India's Dairy Export Moment:
Why the Next Decade Belongs to Value, Quality and Resilience

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SCO-17, 2nd Floor, Mugal Canal, Karnal-132001, Haryana
+91 86074 63377, 98960 35006 | +91 184 4047817
p.arora@dairyindustryexpo.com

www.dairyindustryexpo.com

Publisher & Editor

Prachi Arora

prachi.a@benisonmedia.com

Managing Editor

Prashant Tripathi

prashant@jordbrukare.com

Content Manager

Hema Singh

discover@dairydimension.com

Advertisement Manager

Gaurav Chander

g.chander@benisonmedia.com

Subscription Manager

Shakti Thakur

s.thakur@benisonmedia.com

Designing & Marketing Head

Ashwani Verma

info@benisonmedia.com

Published by

BENISON Media

SCO-17, 2nd Floor, Mugal Canal,

Karnal-132001, Haryana

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In association with

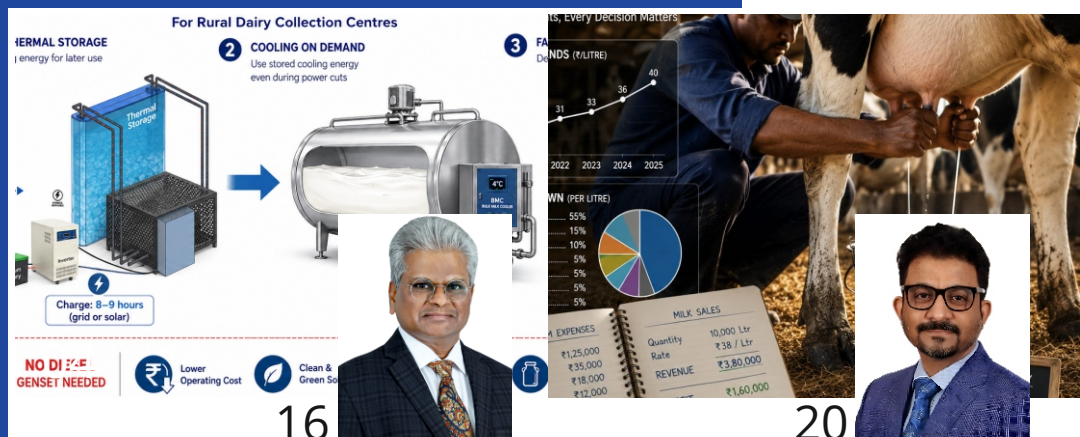
JORDBRUKARE

Gutenbergstrasse Kiel, 24118,

Germany

+49 176 41834763

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SUBSCRIPTION INFORMATION

	Simple Post	Courier	Overseas
One Year	: INR 1200	INR 1800	USD 300
Three Year	: INR 3300	INR 4800	USD 900
Five Year	: INR 5200	INR 6500	USD 1500

Printed by: Noni Printer | Published by: Prachi Arora | On behalf of: BENISON Media |
 Printed at: Model Town, Karnal-132001, Haryana | Published at: SCO-17, 2nd Floor, Mugal
 Canal Market, Karnal-132001, Haryana | Editor: Prachi Arora

Dairy Dimension is a bi-monthly magazine published by BENISON Media at its office in Karnal in association with Jordbrukare. Editorial policy is independent. Views expressed by authors are not necessarily those held by the editors. The data/information provided in the magazine is sourced through various sources and the publisher considers its sources reliable and verifies as much data as possible. However, the publisher accepts no liability for the material herein and consequently readers using this information do so at their own risk.

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Using Dairy Farm Data to Improve Efficiency and Profitability

(Adapted from the original article "Data detectives: Use your data to increase long-term efficiency and profitability" by Mark Case, published in Ag Proud (February 24, 2021). Additional commentary and recommendations have been included for the Indian dairy farming context.)

By **Dr T M Gowrisankar**, Independent Animal Nutritionist and Animal Feed Consultant



Dr T M Gowrisankar

Introduction

Even with significant improvements in dairy productivity over the past 50 years, most farms still have substantial opportunities to enhance efficiency and profitability. One of the most effective ways to achieve this is by leveraging farm-level data more systematically. While many dairy operations collect extensive performance and financial data, much of it remains underutilized in decision-making.

Farm accounting systems often provide benchmarking data that highlight performance gaps across herds. However, the key question remains: what do these numbers actually imply for management, and which performance indicators have the greatest influence on profitability?

A study analyzing 11 years of herd data (from 489 year-end financial and production records in the USA) identified six key drivers of dairy farm profitability based on net farm income. These "Six Dairy Financial Drivers" were found to explain nearly 85% of the variation in farm profitability.

By examining the data behind each driver, dairy



managers can identify targeted interventions that deliver the greatest improvements in efficiency and economic performance.

1. Somatic Cell Count (SCC)

High SCC is associated with reduced milk yield, lower reproductive performance, and higher mortality. The study found that every increase of 100,000 cells/mL in bulk tank SCC reduces milk yield by approximately 2.4 kg.

Management interventions such as mastitis control protocols, milking hygiene, equipment maintenance, bedding management, and cow comfort improvement are critical. Milk culture testing helps identify causative pathogens for targeted intervention.

Indian context: Regular teat dipping, improved hygiene practices, and the use of preventive ethno-veterinary approaches can help reduce subclinical mastitis and improve milk quality which will reduce the overall SCC in milk.

2. Energy-Corrected Milk (ECM)

Higher ECM herds demonstrate better fertility, lower feed costs, reduced mortality, and improved herd health. Differences of up to 9 kg/day have been observed between high and low-performing herds.

Poor transition management, improper stocking density, and inadequate fresh cow care negatively affect production peaks and overall lactation performance.

Indian context: Strong emphasis on Artificial Insemination programs, transition cow management, and early lactation care significantly improves peak yield and lactation performance. The study showed a INR 106-per-hundred weight difference in net herd turnover cost

3. Net Herd Turnover Cost

The study identified a difference of approximately INR 106 per hundredweight in net herd turnover cost between the most profitable and least profitable dairy herds. This raises an important management question: how can farmers meet heifer replacement needs without creating gaps in herd productivity or supply?

While maintaining the right number of replacement heifers is essential, producing the right quality heifers is equally critical for long-term profitability. Advances in genomics, structured mating programs, and selective breeding strategies can significantly improve the genetic merit and productivity of replacement stock, thereby strengthening overall herd performance.

Indian context: Greater attention is required toward artificial insemination practices, semen straw selection, and structured breeding plans. A more scientific and data-driven approach to breeding decisions can substantially improve herd quality and long-term productivity.

4. Death loss

The study found a significant difference in death loss between the top-performing herds (4.3%) and the bottom-performing herds (10%), translating into an estimated impact of approximately INR 13,500 per cow per year.

Systematic recording of when and why cows die is essential for identifying underlying causes and implementing timely corrective measures. Most mortality events occur within the first 60 days in milk (DIM), particularly during the transition and early lactation period. If death loss is elevated during this phase, it indicates the need to critically evaluate transition cow management and fresh cow care protocols.

A low death loss rate reflects strong animal husbandry practices and is directly associated with higher net farm income. It is also important to assess whether appropriately trained personnel are assigned to animal care and whether standard operating procedures are consistently followed.

Indian context: In Indian dairy farms, mortality can be significantly reduced through structured training of farm staff in preventive health care and disease control practices. Special attention should be given to the transition period—approximately the last 60 days of pregnancy and the first 90 days after calving. In addition, dairy farmers should engage qualified and experienced veterinary practitioners from government, university, or private sectors to ensure timely and effective emergency intervention for sick animals.

5. Pregnancy Rate

The most profitable herds recorded an average

pregnancy rate of 27.4%. A higher pregnancy rate helps maintain the herd within an optimal range of days in milk (DIM), thereby improving overall production efficiency. The study further indicates that for every 10-day reduction in DIM, average milk production increases by approximately 0.5 to 0.7 kg per cow per day.

Indian context: Improving reproductive performance in Indian dairy herds requires a comprehensive and scientific approach. Key focus areas include strengthening artificial insemination programs, selecting bulls based on genomic indices, and implementing structured breeding policies. In addition, balanced nutrition—including mineral mixtures and essential feed additives—plays a critical role in fertility. Effective management of infertility, repeat breeding cases, and overall reproductive health is essential for improving herd productivity and economic returns.

6. Heifer Survival Rate

he highest-profit herds recorded an average heifer survival rate of 95%. Standards such as the Dairy Calf and Heifer Association's Gold Standards can be used to establish benchmarks, evaluate herd performance, and prioritize management interventions aimed at improving heifer survival.

Key focus areas include ensuring timely and high-quality colostrum feeding, maintaining systematic records of heifer health events, and continuously monitoring growth rates.

Indian context: Calf and heifer management remains an underprioritised area in many Indian dairy systems. Greater emphasis is required on comprehensive calf rearing practices from birth through the heifer stage, ensuring optimal growth and health. Female calves should ideally reach a body weight of 250–275 kg within 12 months to enable first artificial insemination. With an average daily gain of around 700 g or more, calving can be targeted between 22 and 24 months of age, significantly improving lifetime productivity and herd efficiency.

Conclusion

“If you can't measure it, you can't manage it.”

Farm data has limited value if it is merely stored in a computer, spreadsheet, or notebook without regular review and interpretation. Effective dairy management requires that data be systematically organized, frequently analysed, and actively used to support decision-making.

Dairy farms should adopt simple but robust systems to monitor and track key performance indicators over time. Such systems can play a critical role in improving farm-level decision-making by providing clear insights into herd performance, health, reproduction, and productivity. Ultimately, data-driven management enhances long-term efficiency, resilience, and profitability in dairy farming in India.

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Milk prices may rise again if El Nino and fodder stress worsen

The warning that Indian milk prices could rise again by July or August is one of the most important short-term market signals. Major dairy companies had already raised prices by around 2-3% in May, and executives warned that El Nino conditions or a deficient monsoon could worsen fodder shortages, reduce milk production and force further price action. This matters because milk is both an essential consumer staple and a politically sensitive food item. For processors, procurement inflation can squeeze margins unless price increases are passed through or product mix improves. For consumers, repeated hikes may affect household budgets and demand for discretionary value-added products. For farmers, higher prices can help only if feed and water costs do not rise faster. The situation also illustrates why India's dairy sector cannot rely only on animal numbers; productivity, fodder security, water resilience and ration efficiency are becoming strategic priorities. Companies with strong farmer extension, silage systems and procurement intelligence should be better placed during climate-linked supply stress.

Source: Times of India / eFeedLink

Himachal Pradesh dairy procurement reportedly quadruples

Himachal Pradesh's reported fourfold increase in milk procurement is important because it shows how state-backed cooperative reforms and farmgate price support can rapidly change organised milk flows. In hill states, dairy development faces specific constraints: scattered production, difficult transport, smaller herd sizes and higher logistics costs. A strong procurement response therefore indicates that farmers are willing to enter formal channels when prices, collection systems and institutional support improve. For the state, increased procurement can support rural incomes, women's participation and local processing. For processors, it can create new opportunities in pasteurised milk, curd, paneer and traditional products tailored to regional demand. The key risk is whether procurement growth is sustainable without excessive subsidy or weak quality controls. As volumes rise, the state will need investment in chilling, route optimisation, compositional testing and animal productivity. The broader lesson for India is that underdeveloped dairy regions can respond quickly when incentives and infrastructure are aligned, but long-term success depends on commercial discipline.

Source: The Dairy Times

INDIAN NEWS

India's Dairy Export Moment: Why the Next Decade Belongs to Value, Quality and Resilience



Bharti Singh Nagar is an International Business Expert and senior executive at Paras Dairy (VRS Foods Ltd.), where she has spent over a decade leading international business development and expanding the company's global dairy footprint. With extensive experience in export markets, value-added dairy products, and international customer relationships, she has been instrumental in positioning Indian dairy products in key overseas markets while advocating for quality, innovation, and long-term competitiveness.

As India's dairy industry steadily expands its global footprint, the conversation is no longer centred on whether India can export dairy; it is now about how the country can build a sustainable, high-value export ecosystem. In this exclusive interview with Dairy Dimension, Bharti Singh Nagar, International Business Expert and senior leader at Paras Dairy, shares her perspective on India's export competitiveness, emerging product opportunities, lessons from recent geopolitical disruptions in the Middle East, and the strategic roadmap required for India to become a leading dairy-exporting nation by 2030.

How do you assess the current position of India in the global dairy export landscape?

India entered the recent period of geopolitical disruption as an emerging dairy exporter with significant untapped potential. Capitalising on this shift, Amul substantially expanded its skimmed milk powder (SMP) exports to the Gulf region despite challenging logistics conditions. During the peak of the crisis, the cooperative exported approximately 2,700 metric tonnes of SMP to Dubai,

compared with negligible volumes during the same period a year earlier. This performance translated into a 120% increase in export volumes.

Which dairy product categories offer the strongest export opportunities for Indian companies today?

The higher-value opportunity lies upstream. India must shift focus from raw or low-value outputs to higher-value processed dairy products — including skimmed milk powder, cheese, whey, milk proteins, and infant nutrition ingredients — which offer stronger margins and greater export potential.

Ghee is a particularly important category, where India can command a genuine premium and build a differentiated brand narrative that no European or Oceanian competitors can replicate.

Cheese exports have received increasing attention in recent years. How do you see the future of Indian cheese in international markets?

A realistic view is essential. The global cheese market is dominated by EU and Swiss producers with centuries of heritage, protected designations of origin, and deeply

entrenched retail networks. India cannot — and should not — compete in aged varieties such as Gouda or Parmigiano.

India's strength lies in two niches: first, Indian-style cheeses such as paneer, which have strong diaspora demand and are increasingly entering mainstream foodservice globally; and second, processed cheese and cheese analogues for food manufacturing, where cost efficiency and scale matter more than artisanal positioning.

Beyond cheese, which value-added dairy products hold the greatest export potential for India?

Three categories stand out.

First, A2 and speciality ghee. India's buffalo milk base provides a natural advantage for culturally relevant products such as butter and ghee.

Second, whey protein and dairy ingredients. The global rise in sports nutrition and functional foods is driving strong demand for whey protein concentrates and isolates. India's milk volumes provide a strong raw material base, but require greater investment in whey processing infrastructure, which remains underutilised.

Third, UHT milk and dairy-based beverages for Southeast Asian and African markets, where cold chain infrastructure is limited and shelf-stable products are preferred. Products such as paneer, ghee, UHT milk, and probiotic beverages are witnessing growing adoption, gradually shifting the revenue mix beyond traditional liquid milk.

Which international markets should Indian dairy companies prioritise over the next three to five years?

The question is no longer only where we sell, but also how reliably we reach those markets.

The strategy must focus on building Hormuz-independent export corridors.

To be direct: the 2026 Gulf conflict has not merely disrupted export planning; it has permanently altered the strategic calculus for Indian dairy exporters. Any market prioritisation strategy that does not account for maritime and geopolitical risk is incomplete.

What are the key strengths that make Indian dairy exporters competitive in the global marketplace?

India's competitive advantages are structural and durable.

- Scale of production: Milk output increased by 71.56%, from 146.3 million tonnes in 2014–15 to 251 million tonnes in 2024–25, with an annual growth rate of 5.7%, far above the global average of 2%.
- Cost competitiveness: Indian dairy products are priced lower than those from Europe and North

America, providing an advantage in price-sensitive markets without undermining producer margins.

- Cultural and diaspora demand: Products such as ghee, paneer, and dahi have strong cultural relevance across South Asia, the Gulf, and diaspora markets in the UK, USA, Canada, and Australia.
- Brand strength: Cooperatives such as Amul and Paras Dairy have built strong international recognition, particularly among expatriate communities and niche local markets.

How has the ongoing Middle East situation affected dairy trade, customer demand, logistics, and export planning?

The situation in the Middle East has been a double-edged development — disrupting supply chains while reinforcing India's role as a reliable alternative supplier.

On the disruption side, instability in the Strait of Hormuz has increased energy and fertiliser costs, adding pressure on dairy producers already facing margin compression. For exporters, higher freight costs and container shortages have further squeezed margins, especially for bulk commodities such as SMP and butter. India exported around 5,000 metric tonnes of SMP to Dubai during the peak crisis period, compared with virtually no shipments in the same period a year earlier — representing a sharp recovery in volumes.

When the 2026 Gulf conflict disrupted shipping routes and made marine insurance prohibitive, most exporters paused shipments. Paras Dairy's Managing Director, Mr Rajendra Singh, continued dispatches without insurance coverage, assuming full commercial risk — reflecting a high-trust approach in international dairy trade.

What are the biggest challenges currently facing Indian dairy exporters?

Several structural challenges need urgent attention.

Cold chain infrastructure gaps remain the most critical constraint. Without reliable cold chains from farm to port, scaling high-value perishable exports remains difficult.

Export concentration is another vulnerability. A large share of exports is still limited to ghee, butter, and SMP, accounting for nearly three-fifths of shipments. Concentration in low-margin commodities leaves India exposed to global price volatility.

Regulatory and compliance requirements are also tightening, especially in the EU and UK, where food safety, traceability, and sustainability standards are becoming more stringent.

Geopolitical risks — including tariff uncertainty and fluctuating demand in markets such as Bangladesh — add further external volatility.

What strategic investments or policy changes would help India strengthen its dairy export competitiveness?

A multi-pronged approach is required.

Cold chain infrastructure must be scaled rapidly, with stronger implementation of schemes such as PLI and PMFME to connect production clusters with export-ready storage and logistics networks.

Quality and compliance systems must be upgraded to meet global standards for food safety, traceability, and sustainability.

Trade policy should prioritise South-South partnerships, with faster progress on agreements with ASEAN countries and African blocs, where cultural alignment and lower barriers exist.

R&D investment in whey proteins, lactoferrin, dairy peptides, and infant nutrition ingredients is essential to move up the value chain.

Looking ahead, what is your vision for India's role in

global dairy trade by 2030?

By 2030, India has the potential to rank among the top five global dairy exporters by value, not just volume. This would require scaling export value from approximately USD 490 million today to USD 3–5 billion.

Future demand will increasingly focus on organic dairy, A2 milk, and speciality cheeses. At the same time, cross-border e-commerce will enable Indian dairy brands to reach global consumers directly.

The opportunity is significant. The constraint is not production capacity, but execution — particularly in quality systems, compliance readiness, and brand building. India's 2030 dairy export vision is not aspirational; it is achievable with coordinated industry and policy action.

Disclaimer: The views and opinions expressed in this interview are solely those of the interviewee in her personal capacity and do not necessarily reflect the views, policies, or positions of her employer or any affiliated organization.

CRISIL projects 13-15% revenue growth for India's organised dairy sector

CRISIL's latest view is one of the most important recent signals for India's dairy industry because it confirms that organised dairy growth is being driven not only by higher milk availability, but by pricing power, branded consumption and value-added products. The agency expects revenue growth to accelerate by 200-400 basis points over the previous year and place the organised sector in the 13-15% range for FY27. The growth thesis rests on 8-10% volume expansion, staggered price increases and continued consumer demand for essentials such as milk, curd, butter and ghee, along with stronger uptake of value-added dairy products. This matters because raw milk procurement costs remain high and production growth is not unlimited. Companies with efficient procurement, better product mix and stronger cold-chain reach should be better positioned to defend margins. For market access, the message is clear: India's organised dairy sector is maturing into a branded, value-added, creditworthy segment that can absorb investment in processing, quality testing, distribution and premium formats.

Source: Economic Times / CRISIL

Maharashtra FDA tightens enforcement against dairy violations

Maharashtra's FDA action is significant because it puts food safety and compliance back at the centre of the dairy conversation. The regulator has announced stricter checks and potential fines of up to INR 10 lakh for dairy businesses violating hygiene, labelling or adulteration norms. The timing is important: demand for milk, curd, paneer, sweets and value-added products is rising, but consumer confidence depends on credible quality assurance. For organised processors, tighter enforcement may create a competitive advantage by raising the cost of non-compliance for informal and poor-quality suppliers. For smaller dairies, however, it may require urgent investment in testing, documentation, plant hygiene and traceability. This also strengthens the case for independent milk testing, digital quality records and supplier grading. The news should be read not just as a legal update, but as a market signal: food safety enforcement is likely to become more visible, especially in large urban markets where consumer risk, media attention and political sensitivity are high.

Source: Times of India

Tripura becomes Northeast India's second-largest milk producer

Tripura's rise as the second-largest milk producer in Northeast India is a regional development story with

wider strategic importance. The state's Animal Resource Development and Fisheries Minister linked the improvement to expanded dairy facilities, veterinary care and livestock services. For the Northeast, where dairy supply chains are often constrained by geography, fragmented production and logistics, even moderate improvements in local production can reduce dependence on long-distance milk movement. The development is also relevant to India's broader strategy of strengthening dairy in non-traditional regions through infrastructure, veterinary support and farmer-linked procurement. If sustained, Tripura's progress could open space for chilling centres, packaged milk distribution, cattle productivity services, feed interventions and cooperative or private processing investment. The key question is whether production growth is matched by quality systems, reliable procurement and market development. For investors and processors, the news suggests that the Northeast should not be viewed only as a consumption market; selected states may become more credible local sourcing and processing hubs.

Source: Times of India

Jaipur dairy farmers protest ethanol-linked maize cost pressure

The Jaipur dairy farmers' M-20 movement is important because it links dairy economics with India's biofuel policy. Farmers argue that higher ethanol blending is increasing diversion of maize toward fuel use, which in turn raises the cost of a key cattle-feed ingredient. Whether all of the price movement can be attributed to ethanol is a matter for deeper analysis, but the protest highlights a real vulnerability: feed costs can quickly erode dairy farmer margins, especially in regions where green fodder and balanced ration access are uneven. For processors, rising feed cost eventually appears as higher procurement pressure, lower milk availability or farmer dissatisfaction. For policymakers, the case shows the need to balance energy, food, feed and livestock-sector objectives. The story is strategically relevant because India's dairy growth depends on farmer viability, not only processing investment. If maize and concentrate prices remain high, the sector may need stronger fodder planning, alternative feed ingredients, ration advisory services and targeted support for small and medium dairy farmers.

Source: Times of India

Amul plans a INR 200 crore dairy facility in Bihar

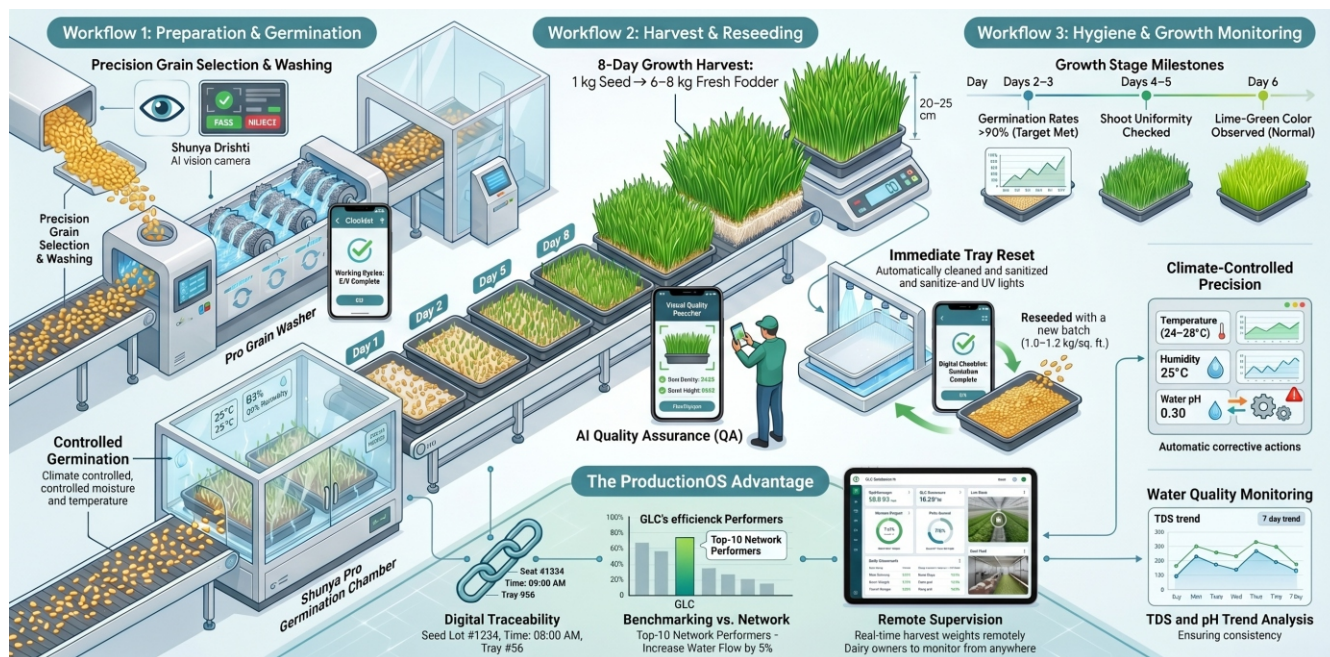
Amul's reported plan to invest around INR 200 crore in a new dairy processing and production facility at Fatuha in Bihar is important because it continues the cooperative's eastward capacity build-out. Bihar is a high-potential dairy state with strong farmer participation, but the opportunity depends on organised procurement, chilling, processing and branded distribution. A large Amul-backed facility can create demand certainty for milk producers, improve local industrial activity and support value-added dairy production closer to consumption centres. It may also intensify competition for milk procurement and packaged dairy markets in eastern India, where several cooperatives and private players are expanding. The project's land-allotment progress indicates that state governments are actively using dairy investment as a rural-development and food-processing strategy. For the industry, the takeaway is that capacity expansion is shifting beyond the traditional western and southern dairy belts. Eastern India remains one of the most important battlegrounds for procurement growth, curd, lassi, ice cream, ghee and fresh dairy distribution.

Source: Dairy Business MEA

Aavin faces milk quality concerns across Tamil Nadu unions

Reports that more than 60% of milk procured by Aavin in 10 district unions during May 2026 did not meet minimum quality standards are highly relevant for India's cooperative sector. The issue reportedly relates to milk not consistently achieving the prescribed 4% fat and 8% solids-not-fat levels in districts including Thanjavur, Mayiladuthurai, Vellore, Ranipet, Kanniyakumari, Villupuram and Virudhunagar. This matters because cooperative credibility rests on both farmer service and consumer trust. Low fat/SNF levels can reflect breed mix, feeding, dilution, seasonal stress, weak testing discipline or procurement incentives that do not sufficiently reward quality. The problem also has financial implications: processors may face yield losses in curd, ghee, paneer and milk powder, while consumers may question value for money. The news strengthens the argument for transparent testing, automatic milk collection units, farmer-level advisory and payment systems linked to verified quality. For Tamil Nadu, the strategic challenge is to protect farmer inclusion while improving compositional quality and preventing leakages in procurement systems.

Source: Dairy News 7x7



From Scarcity to Abundance: Reimagining the Future of Dairy Nutrition in India

The White Revolution's Greatest Success—and Its Biggest Challenge

Vijay Singh, CEO Shunya



Vijay Singh

Few sectors have contributed as profoundly to rural India's economic transformation as dairy. The success of the White Revolution not only made India the world's largest milk producer but also demonstrated how millions of smallholder farmers, operating with just a handful of animals, could collectively create one of the world's largest agricultural value chains. Today, dairy contributes ~30% to rural household incomes, supports nutritional security for millions, and remains one of the most inclusive sectors of the Indian economy.

However, beneath this remarkable success story lies a contradiction that has persisted for decades. India may be the largest milk producer, but its animals remain underproductive. They produce substantially less milk per head than their counterparts in many dairy economies and exhibit lower quality parameters. While genetics, breeding programs, veterinary interventions, and milk procurement infrastructure have improved considerably over the years, the challenge of consistent, high-quality nutrition remains stubbornly unresolved and may be deteriorating.

Why Nutrition Remains the Biggest Constraint

The reasons are not difficult to understand.

Livestock nutrition in India continues to be deeply dependent on factors that are becoming increasingly constrained. Agricultural land holdings are shrinking. Water availability is under pressure in large parts of the country. Climatic variability has made traditional fodder cultivation less predictable than ever before. Meanwhile, the livestock population continues to grow, placing additional stress on already stretched feed and fodder resources. Various studies have highlighted deficits of up to 40% in green fodder availability across several regions of the country. While the precise magnitude may vary by geography and season, the broader reality remains unchanged: nutrition continues to be one of the principal constraints on productivity in Indian dairy, especially fresh green feed, which is the primary driver of impacts on milk and reproduction.

Managing Scarcity Is No Longer Enough

Historically, the industry has attempted to address this challenge by better managing scarcity. Improved fodder varieties, ration-balancing programs, silage adoption, feed supplements, and extension services have all contributed meaningfully to improving nutritional outcomes. These interventions have undoubtedly helped, but the question that increasingly confronts policymakers, industry leaders and progressive dairy farmers is whether incremental improvements alone will be sufficient for the next phase of dairy growth.

The future may require a more fundamental shift in thinking.

From Agriculture to Infrastructure

For much of agricultural history, fodder has been viewed as an output of farming. It is grown on available land, subject to local weather conditions, harvested when ready, and transported where it is needed. This model has served agriculture well for generations, but it is also built around uncertainty and the availability of cheap labour. Rainfall variations, water shortages, pest pressures, competing land-use priorities, and seasonal fluctuations all influence availability and quality.

A useful comparison can perhaps be drawn from other sectors that have undergone transformative change. Telecommunications once depended on limited physical connectivity. Banking depended on physical branches. Access to information was restricted by geography and infrastructure. In each case, technology fundamentally altered the underlying economics of access. What was once scarce became abundant. What was once uncertain became predictable.

The dairy sector may now be approaching a similar moment.

At the heart of this transformation lies an emerging recognition that livestock nutrition should be viewed not merely as an agricultural commodity, but as a form of infrastructure. The distinction may appear subtle, yet its implications are significant. Agriculture is inherently seasonal and variable. Infrastructure, by contrast, is designed for reliability and availability. The objective is no longer to grow fodder when conditions permit, but to ensure that high-quality nutrition is available regardless of season, geography, or climate.

Controlled-Environment Agriculture: A New Approach to Livestock Nutrition

This is the context in which we began exploring controlled-environment fodder production, leading to the establishment of Shunya Agritech. While hydroponic fodder systems are often discussed in terms of water efficiency and reduced land requirements, their broader significance lies elsewhere. Their true value may lie in their ability to convert fodder production from a seasonal agricultural activity into a predictable process. Through its network of Growth and Logistics Centres, the company produces hydroponically grown fodder in controlled-environment facilities and delivers it directly to dairy farmers within hours of harvest.

Beyond Hydroponics: Delivering Consistent Quality

While hydroponically grown fodder is widely recognised for its nutritional value, discussions have often centred on its relatively low dry matter content. However, recent laboratory assessments of Shunya's fodder have shown that well-managed production systems can achieve dry matter levels within the nutritionally viable range for livestock feeding, making hydroponically grown fodder comparable to good-quality conventional alternatives. The broader opportunity lies not merely in growing fodder differently, but in rethinking where and how fodder is produced. By shifting from a seasonal, land-dependent agricultural activity to a controlled and predictable production process, it becomes possible to improve the reliability, consistency, and accessibility of quality livestock nutrition.

Fodder-as-a-Service: Bringing Nutrition Closer to Farmers

The implications of such a model are substantial. Controlled-environment production can significantly reduce land and water requirements while enabling the establishment of production infrastructure close to livestock populations. Rather than transporting fodder over long distances or expecting farmers to cultivate

sufficient quantities themselves, production can be decentralised and located nearer to demand centres. This gives rise to a "Fodder-as-a-Service" model, where fresh fodder is produced locally and supplied to farmers on a regular basis.

This approach becomes particularly relevant in regions where land and water resources are increasingly constrained. In such circumstances, the challenge extends beyond production efficiency to ensuring a reliable and uninterrupted supply of quality nutrition. Dairy animals require balanced nutrition every day, and their biological systems cannot adapt to seasonal fluctuations in the way agricultural production cycles often do. Consistency in feeding translates directly into improved productivity, reproductive performance, and overall herd health.

Evidence from the Field: A Case Study

Evidence from the field continues to reinforce this principle. A case study conducted in June 2025 on dairy buffaloes in Kanpur Nagar district, Uttar Pradesh, evaluated the impact of incorporating controlled-environment, hydroponically grown fresh fodder into daily feeding practices. Animals were monitored through a baseline period followed by a controlled feeding phase and compared with a conventionally fed control group. The study observed improvements in milk fat while helping animals maintain production levels during the challenging summer months. Participating farmers also reported improvements in animal body condition and general health, along with reductions in feed-related costs. Although the findings are based on a single field study, they align with the broader understanding among livestock nutrition experts that consistent, high-quality nutrition can deliver cumulative benefits extending well beyond immediate milk yield.

The Next Frontier: Process Intelligence

Yet production is only one dimension of the challenge. If the dairy sector is to strengthen nutritional resilience at scale, it must also address a second, equally important constraint: process intelligence.

Historically, decisions regarding fodder availability, infrastructure placement, and resource allocation have been driven largely by fragmented information. Policymakers and businesses alike often struggle to answer fundamental questions: Which districts face the highest nutritional vulnerability? Where are fodder deficits likely to emerge? Which geographies offer the greatest opportunity for intervention? How should capital be deployed to maximise impact?

Increasingly, these questions require intelligent systems

like Fresh Grid, which are capable of analysing large volumes of spatial, agricultural, climatic, and livestock data to support evidence-based planning. Such decision-support frameworks can help identify priority regions, optimise infrastructure placement, and improve the efficiency of investments in livestock nutrition.

Once suitable locations have been identified, the next challenge is determining how production infrastructure can be deployed efficiently. Increasingly, the emphasis is shifting away from centralised production towards distributed networks that operate closer to livestock populations while encouraging local entrepreneurship. India's dairy success has always been built on local participation. The White Revolution succeeded because it empowered millions of producers rather than concentrating production within a handful of large enterprises. Any future nutrition infrastructure should follow the same principle.

One example of this approach is Shunya Agritech's Production Partner Program. Instead of building and operating every production centre itself, the company works with local micro-entrepreneurs to establish and manage Growth and Logistics Centres using standardised production protocols, quality systems, and a common digital technology platform. Such distributed models have the potential to generate rural employment, encourage local enterprise, and enable nutrition infrastructure to expand more rapidly than traditional centralised systems.

More importantly, it reflects an enduring principle in agriculture: lasting transformation occurs when technology strengthens local ecosystems rather than replacing them.

One of the key challenges in controlled-environment agriculture (CEA)-based hydroponic fodder production is maintaining strict adherence to production protocols. Even minor deviations can lead to issues such as fungal contamination, pest infestations, or reduced fodder quality. This challenge becomes more pronounced in decentralised production systems, particularly in rural settings of our country where operational conditions can vary widely.

Addressing this requires not only infrastructure, but also strong process discipline supported by appropriate technology.

In this context, smartphone-based digital tools have emerged as a practical enabler. By combining standardised protocols with mobile-accessible guidance systems, it becomes possible to support semi-skilled operators in maintaining consistency across distributed

production units.

In collaboration with multiple research institutes under the Indian Council of Agricultural Research (ICAR), production protocols have been refined into an actionable framework implemented through ProductionOS, a fodder-specific digital operating system accessible via smartphones. The system is designed to support local entrepreneurs and semi-skilled teams by integrating guided digital workflows with on-ground production infrastructure.

As part of this approach, digital decision-support systems have been developed to assist with key steps in the production cycle. For example, in the procurement of grain for hydroponic fodder production, variability in grain quality can significantly affect output. Mobile-based image analysis tools in ProductionOS can help assess parameters such as grain uniformity and germination potential before inputs enter the production cycle. Images captured in the field are analysed in real time to provide feedback on expected performance, reducing reliance on subjective manual assessment.

The significance of such systems extends beyond quality control. They represent an early step towards codifying agricultural expertise into scalable digital systems that can be replicated across geographies, improving consistency and reducing operational risk in distributed agricultural production networks.

Digital operating systems for nutrition infrastructure represent a broader shift towards standardisation, traceability, and scalability in livestock production systems. Such platforms aim to integrate production management, quality assurance, monitoring, and workflow execution across distributed facilities.

The key question, however, is whether these models can scale effectively in a country as large and diverse as India, and potentially in other emerging dairy markets as well.

This approach reflects a broader move towards such phygital infrastructure models, where physical production systems are combined with digital coordination layers to improve efficiency, consistency, and visibility across networks of decentralised units.

Within this context, distributed infrastructure models based on multiple small-scale production and logistics centres are gaining attention as an alternative to highly centralised systems. Such networks aim to operate closer to demand centres while maintaining standardised processes through technology-enabled coordination.



As India's dairy sector evolves, the focus is gradually shifting from production volumes to productivity, resilience, and sustainability. The next decade is likely to be defined less by herd expansion and more by how effectively each animal is nourished, managed, and supported.

This is where the concept of moving from scarcity to abundance gains its deeper relevance.

From Scarcity to Abundance

Abundance does not imply unlimited resources. Rather, it reflects a system's ability to reliably provide what is needed, when it is needed, regardless of external constraints.

The first White Revolution connected farmers to markets and fundamentally transformed India's relationship with milk. The next chapter is likely to be less visible but equally significant. It will involve building the infrastructure, intelligence, and operating systems required to ensure that high-quality nutrition is consistently accessible across the country's dairy landscape.

If this transition takes shape, the future of Indian dairy will not be defined solely by higher productivity. It will be defined by a sector that moves beyond managing scarcity and begins to operate with sustained resilience, confidence, and nutritional abundance.

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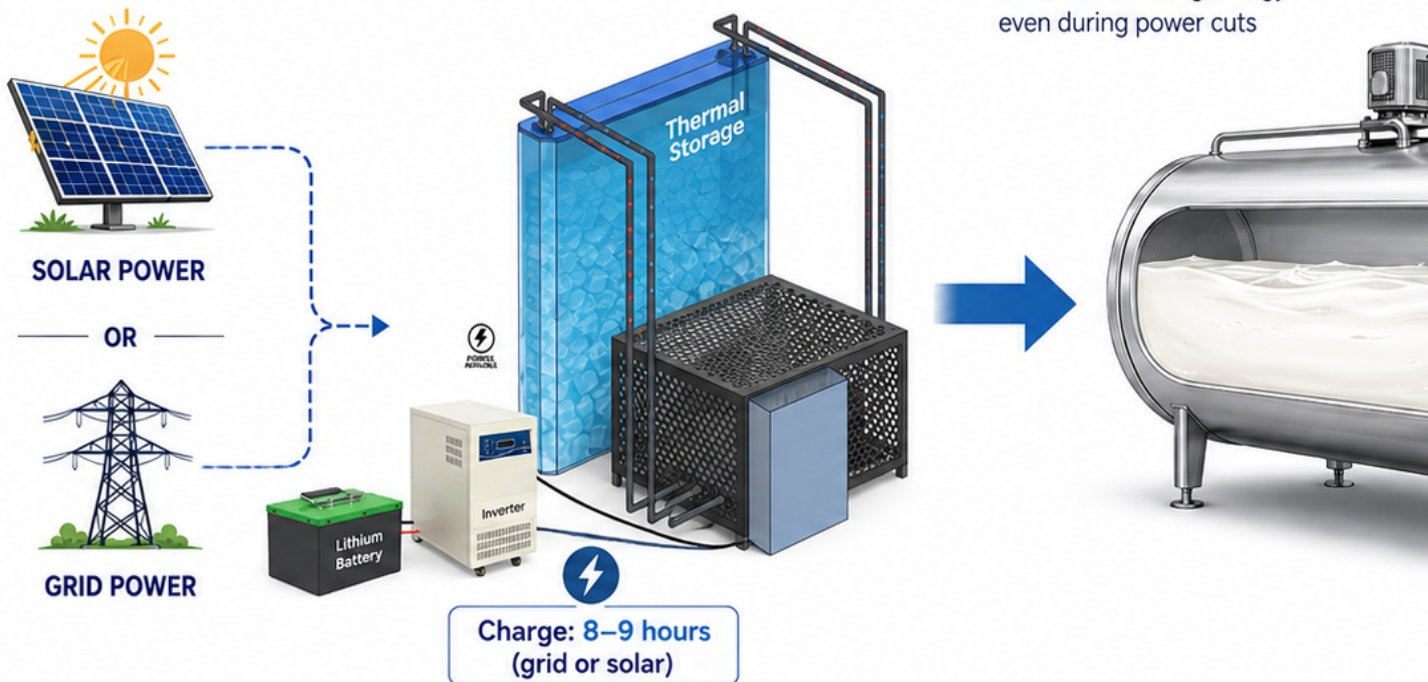
For Rural Dairy Collection Centres

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Dr. Sudhindra Tatti

Cooling Milk Without Burning Diesel

How thermal-storage refrigeration is changing the economics of rural milk chilling

By **Dr. Sudhindra Tatti**, CEO, Prompt Innovations

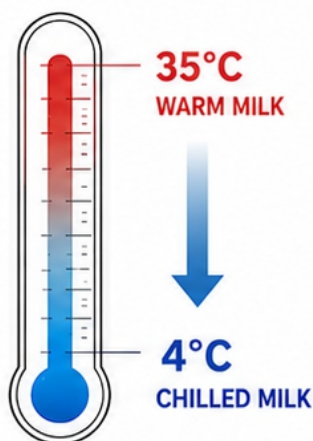
Known in the industry as the man who pushed for QUALITY in Indian dairy, Dr. Sudhindra Tatti, CEO of Prompt Innovations, is a rare leader who combines deep tech expertise with a grassroots understanding of agriculture. Under his leadership, Prompt has redefined what's possible for India's fragmented dairy supply chain, placing transparency, sustainability, and farmer empowerment at the core of dairy transformation.

MILK COOLING •

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3 FAST & EFFECTIVE COOLING

Deliver high quality chilled milk



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Anytime



Better Milk Quality
Higher Farmer Income

A Field Story

At a milk collection centre in rural Maharashtra, the diesel generator used to start twice each day to keep freshly collected milk chilled until the tanker arrived. During the summer months, it often ran for several hours—not to power machinery, but simply to maintain the required storage temperature. Over time, diesel became one of the centre's largest operating expenses. In early 2026, the centre retrofitted its conventional bulk milk cooler with a thermal-storage system. According to operational records collected after commissioning, generator use declined significantly, milk cooling time was reduced, and diesel consumption fell by approximately 80%. Based on the observed performance, the centre expects annual operating savings of around INR 2 lakh.

While this represents a single installation, it illustrates how thermal-storage refrigeration can address one of the most persistent challenges in rural dairy

infrastructure: dependable milk chilling where electricity supply is limited or unreliable.

The Bigger Picture

Across India, village-level milk collection centres form the first link in the dairy cold chain. At these centres, bulk milk coolers (BMCs) rapidly reduce milk temperature after collection, helping preserve quality until transportation.

Conventional BMCs, however, depend on a reliable electricity supply. In many rural areas, frequent power interruptions mean diesel generators are routinely used to maintain cooling. Although effective, generator operation adds recurring fuel, maintenance, and servicing costs that can substantially increase the overall cost of milk chilling.

Thermal storage-based refrigeration offers an alternative approach. Instead of relying entirely on real-time electricity, the system stores cooling energy when grid power—or solar power—is available and releases it when required. This allows cooling to continue during power interruptions while reducing dependence on diesel generators.

The technology also offers quality benefits. By reducing the time required to cool milk from approximately 35°C to 4°C, thermal-storage systems can limit bacterial growth during the critical post-collection period, helping maintain better microbiological quality and improved methylene blue reduction time (MBRT).

The Diesel Challenge

For decades, direct-expansion bulk milk coolers have been the standard equipment used at milk collection centres. Although reliable under stable power conditions, they require continuous electricity throughout the cooling cycle.

Where grid reliability is poor, diesel generators become essential. During power outages, fuel consumption becomes an unavoidable part of the cooling process, increasing operating costs while also introducing maintenance requirements and the risk of equipment downtime.

Cooling performance is another consideration. Conventional systems generally require around three hours to reduce milk temperature to the recommended storage level. Higher ambient temperatures during summer can further increase cooling time, extending the period during which bacterial growth may occur.

A typical 2,000-litre collection centre operating primarily on generator power may consume approximately 200–300 litres of diesel each month. When fuel, servicing, and equipment maintenance are considered together, diesel often becomes one of the largest recurring expenses associated with milk collection.

Thermal Storage-Based Milk Cooling

Thermal storage-based bulk milk cooling combines conventional refrigeration with a thermal energy storage

system. During periods when electricity is available, the refrigeration unit charges the thermal storage. The stored cooling energy is then used to chill milk during collection, including periods when grid power is unavailable. Under suitable operating conditions, a fully charged system can support two milk collection shifts before recharging, with recharge typically requiring approximately 8–9 hours of electricity.

Typical operating characteristics include:

- Cooling milk from approximately 35°C to 4°C in less than two hours.
- Thermal storage capacity sufficient for two collection shifts.
- Charging from either grid electricity or solar photovoltaic systems.
- Reduced dependence on diesel generators during routine operation.

An important advantage of this approach is that thermal-storage systems can often be retrofitted to existing bulk milk coolers. Rather than replacing installed equipment, collection centres can upgrade their existing cooling infrastructure, reducing both capital expenditure and implementation time.

When integrated with appropriately sized solar photovoltaic systems and battery storage, thermal-storage refrigeration can further reduce dependence on both diesel generators and the electrical grid.

Operational Comparison

Parameter	Conventional BMC	Thermal Storage-Based BMC
Cooling method	Direct expansion	Direct expansion with thermal storage
Thermal storage	No	Yes
Typical cooling time	Approximately 3 hours	Less than 2 hours
Operation during power outages	High as generator typically required	Low as it can operate using stored cooling energy*
Diesel consumption	High in weak-grid locations	Significantly reduced
Solar compatibility	Limited economic benefit	Well suited for integration
Generator maintenance	Required	Reduced or eliminated under suitable operating conditions

*Performance depends on system design and the availability of sufficient charging time.

Case Study: Rural Maharashtra

A 2,000-litre milk collection centre in Maharashtra evaluated thermal-storage refrigeration by comparing operating performance before and after retrofitting its existing bulk milk cooler.

Reported observations included:

- Diesel consumption reduced from approximately 200–250 litres per month to 40–50 litres per month.
- Cooling time maintained below two hours despite summer operating conditions.
- Approximately 80% reduction in diesel use.
- Estimated annual operating savings of around INR 2 lakh.
- Reduced generator operation for milk chilling and associated pumping equipment through the use of an inverter-battery system.

Although results will vary depending on local operating conditions, electricity availability, diesel prices, and utilisation patterns, the case demonstrates the potential for thermal-storage refrigeration to reduce operating costs while maintaining cooling performance.

Economic Perspective

Based on the observed annual operating savings of around 2 lakh, a thermal-storage retrofit may achieve a payback period of approximately 2–3 years, depending

on site-specific operating conditions. Thereafter, the reduction in fuel and operating costs can provide ongoing financial benefits while maintaining milk quality.

Looking Ahead

As dairy collection networks continue to expand into regions with constrained electrical infrastructure, improving the efficiency and reliability of milk chilling will remain a priority. Thermal-storage refrigeration represents one approach to addressing this challenge by reducing dependence on diesel generators, improving energy resilience, and enabling greater use of renewable energy.

For collection centres operating in areas with intermittent grid supply, the technology has the potential to lower operating costs while supporting consistent milk quality. As adoption increases and additional field data become available, thermal-storage refrigeration may become an increasingly important component of sustainable dairy cold-chain infrastructure.

Disclaimer: This article features Prompt Milkochiller and includes a case study based on operational data shared by the company. The information is presented for educational and industry discussion purposes. Actual performance and economic outcomes may vary depending on installation, operating conditions, and site-specific factors.



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The Dairy Profitability Crisis: Are Milk Prices Keeping Pace with Rising Rearing Costs?

By **Dr. Raja Mukherjee**, Executive Vice President, Intas Pharmaceuticals Ltd.



Dr. Raja Mukherjee

Dairy farming is a lifeline for millions of Indian families and a key pillar of agricultural growth. Yet, rising costs and low productivity continue to limit farmer profitability.

As India strives to double farmers' income, we must ask: **Are we truly increasing dairy farmers' incomes, or merely sustaining their survival?**

True progress begins when every dairy farmer earns more—not by owning more animals, but by unlocking greater value from each one.

This article examines the economic challenges facing dairy farmers by analysing the relationship between milk procurement prices and rising rearing costs. Feed and fodder account for 60–70% of milk production costs, while the prices of key feed ingredients have increased significantly without a proportional rise in milk prices, reducing farmers' profitability. The article compares the revenue potential of cow and buffalo milk, highlights the importance of monitoring production costs and farm performance, and emphasises improving productivity per animal rather than herd size. It also outlines practical strategies to enhance profitability and ensure the long-

Table 1. Daily Feed Cost for a Crossbred Cow (10-12 Litres/day milk yield)

Feed Ingredient	Daily Quantity (kg)	Market Price (INR/kg, June 2026)	Daily Cost (INR)
Green fodder (maize, sorghum, napier)	20-25	~3	60-75
Dry fodder (wheat/paddy straw)	5-6	~10	30-36
Concentrates (maize, wheat bran, soybean meal, oilseed cakes)	4-5	Weighted average ~28-32	120-150
Total Daily Feed Cost			210 - 261

term sustainability of dairy farming.

Daily Feed Requirements and Costs for Crossbred Cows

The daily feed requirements of a crossbred cow producing 10–12 litres of milk per day constitute the largest component of rearing costs. The major feed ingredients, their daily quantities, prevailing market prices (June 2026), and associated costs are presented in Table 1.

Concentrates account for the largest share of daily feed expenditure, contributing INR 120–150 per day because of their relatively high cost. Overall, the daily feed cost of maintaining a crossbred cow producing 10–12 litres of milk ranges from INR 210 to INR 261, making feed the single largest contributor to the total cost of milk production.

Annual Rearing Costs Per Cow

In addition to daily feed expenses, dairy farmer incur annual costs related to labor and other miscellaneous farm expenses. The estimated annual cost for maintaining a crossbred cow is presented in Table 2.

Table 2. Estimated Annual Rearing Cost per Cow

Expense	Cost (INR)
Feed Cost	70,000
Labour	10,000
Miscellaneous	2,000
Total	82,000

Feed accounts for the largest share of annual rearing cost, contributing INR 70,000, or nearly 85% of the total annual expenditure of INR 82,000. This underscores the importance of improving feed efficiency and adopting cost-effective feeding strategies to enhance dairy farm profitability.

Milk Procurement Prices: Cow vs. Buffalo

Milk procurement prices in India are primarily determined by the fat and solids-not-fat (SNF) content of milk. Since buffalo milk typically contains a higher fat percentage than cow milk, it generally commands a higher procurement price. Tables 3 and 4 present

Table 3. Cow Milk Procurement Prices

Fat (%)	SNF (%)	Price per litre (INR)
3.5	8.5	~35
4.0	8.5	~37
4.5	8.5	~39
5.0	9.0	~42
5.5	9.0	~45
6.0	9.0	~48

Table 4. Buffalo Milk Procurement Prices

Fat (%)	SNF (%)	Price per litre (INR)
6.0	9.0	~45
7.0	9.0	~52
8.0	9.0	~60
9.0	9.0	~68
10.0	9.0	~75
11.0	9.0	~82
12.0	9.0	~90

indicative procurement prices of cow and buffalo milk.

Price Comparison

A comparison of the maximum procurement prices highlights the higher revenue potential of buffalo milk.

- **Highest Cow Milk Price:** ~INR 48 per litre (6.0% fat, 9.0% SNF)
- **Highest Buffalo Milk Price:** ~INR 90 per litre (12.0% fat, 9.0% SNF)

Although procurement prices are comparable at lower fat levels, buffalo milk commands significantly higher prices as fat content increases. At its highest procurement slab, buffalo milk fetches nearly 1.9 times the price of cow milk, offering substantially greater revenue potential for dairy farmers producing high-fat milk.

Economic Viability: Milk Revenue vs. Cost

To evaluate the economic viability of dairy farming, the estimated annual milk revenue from a crossbred cow was compared with its annual rearing cost.

Revenue Estimation

- Milk yield per lactation: 3,000 litres
- Average procurement price: INR 35 per litre (3.5% fat, 8.5% SNF)
- Total annual milk revenue: 3,000 litres × INR 35 = INR 105,000

Profitability Analysis

Comparing the annual milk revenue with the total annual rearing cost indicates that dairy farming can remain economically viable under the assumed production and pricing conditions.

- Total Milk Revenue: INR 105,000
- Total Annual Rearing Cost: INR 82,000
- Net Margin: INR 23,000 per cow per lactation

Based on these assumptions, a crossbred cow producing 3,000 litres of milk per lactation generates an estimated net margin of INR 23,000. However, this margin remains highly sensitive to fluctuations in feed prices, milk procurement prices, and animal productivity.

Key Findings

The economic analysis of dairy farming reveals that feed costs are the most dominant expense, both on a daily basis (INR 210-INR 261/day) and annually (INR 70,000 out of INR 82,000 total). While the daily costs for green and dry fodder are relatively low, concentrates contribute the most significantly to daily feed expenses. Furthermore, buffalo milk consistently yields higher procurement prices, especially at increased fat percentages, offering potentially greater revenue per litre compared to cow milk. Despite substantial rearing costs, the data indicates a positive net margin of INR 23,000 per cow per lactation cycle when producing 3,000 litres at a procurement price of INR 35/litre.

Way Ahead

To enhance profitability and sustainability in dairy farming, the following strategies are suggested:

Feed Cost Optimization: Given that feed is the largest expense, farmers should explore opportunities to optimize feed formulations and procurement. This could include cultivating more green fodder on-site, negotiating better prices for concentrates, or exploring alternative, cost-effective feed sources while maintaining nutritional standards. Farmers should adopt least-cost ration plans using locally available forage like Napier grass, paddy straw, and soybean cake, which can reduce feed costs by 19-22%. Growing your own green fodder instead of purchasing it can save INR 8,000 annually (27% reduction). Silage making and using drought-

tolerant crops like sorghum and millet further lower costs in water-scarce regions.

Fair Milk Pricing: Milk procurement prices should reflect the increasing cost of production. Establishing a minimum procurement price linked to input costs would help protect dairy farmers from rising feed and labour expenses while ensuring sustainable farm incomes.

Enhancing Milk Quality: For both cow and buffalo farming, focusing on animal genetics and nutrition to improve milk fat and SNF percentages can directly lead to higher per-litre procurement prices, significantly boosting farmers' income.

Strategic Breed Selection: Farmers might consider the higher revenue potential of buffalo milk due to its premium pricing at higher fat percentages. This could involve strategic investments in buffalo farming, especially in regions where demand for high-fat milk is strong.

Improving Productivity: Increasing milk yield per animal is more profitable than simply increasing herd size. The use of artificial insemination with genetically superior bulls, timely veterinary care, efficient reproductive management, and removing unproductive animals can substantially improve productivity and reduce per-litre production cost.

Value Addition: Selling raw milk alone limits profitability. Processing milk into products such as ghee, paneer, curd, butter, and khoa generates higher returns, reduces wastage, and creates additional income streams. Even small-scale processing units can significantly improve farm profitability.

Efficient Farm Management: Improving labour efficiency, reducing avoidable expenses, maintaining accurate production records, and regularly monitoring production costs enable farmers to make informed management decisions and improve overall farm performance.

Conclusion

The future of dairy farming in India lies in producing more milk with fewer resources. Scientific feeding, genetic improvement, better animal health management, value addition, and sound financial planning are essential for overcoming rising input costs and improving farm profitability. Sustainable dairy farming is not about increasing herd size; it is about maximising productivity, minimising wastage, and increasing the economic return from every animal.

BRIDGING INDIAN DAIRY WITH THE WORLD

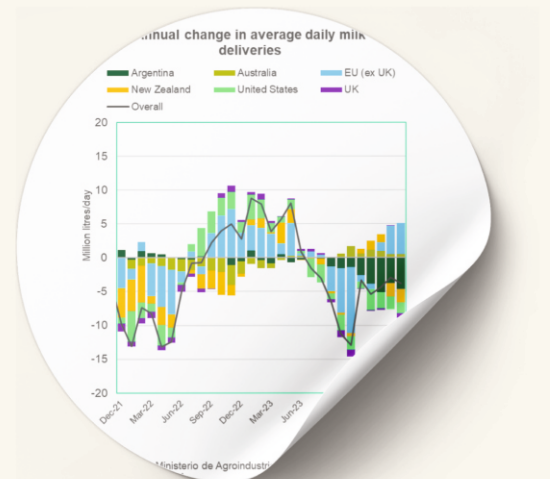


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Rajiv Mitra

India's Dairy Opportunity: From Feeding a Nation to Nourishing the World

The 19th Global Dairy Congress, held in Barcelona on 17–18 June 2026, brought together senior executives, scientists, innovators and policymakers from across the global dairy value chain. Representatives from Yili, Morinaga, Nestlé, Fonterra, Lactalis, Bel, Roquette, Sidel, Vinamilk and many other leading companies joined delegates from Europe, Asia, Oceania and the Americas to discuss

the future of dairy, nutrition, sustainability and innovation.

One of the sessions that attracted considerable interest was Rajiv Mitra's address on "India's Key Dairy Opportunities." Rather than focusing solely on India's impressive scale, it explored how the world's largest milk-producing nation can become an increasingly important contributor to global nutrition, dairy proteins and

value-added dairy products over the coming decade.

The World Has Largely Won the Battle for Calories

Over the past six decades, global food systems have undergone a remarkable transformation. Since 1960, agricultural production has grown significantly faster than the world's population. Wheat, rice, maize, fruits, vegetables, milk, eggs

and meat production have all expanded dramatically, enabling humanity to largely overcome the widespread food shortages once feared by many experts.

The Green Revolution and sustained improvements in agricultural productivity have strengthened not only global food security but also economic stability.

Today's challenge, however, is no longer producing enough calories. The next frontier is affordable nutrition—and, increasingly, quality protein.

India's Agricultural Success Story

India's own agricultural journey reflects this global transformation. Today, the country ranks among the world's leading producers of rice,

wheat, sugarcane, eggs, pulses, spices and millets, while achieving food self-sufficiency for a population of more than 1.4 billion.

At the heart of this success is dairy. Milk is India's largest agricultural commodity, valued at more than USD 200 billion annually. The country produces around one-quarter of the world's milk, making it the largest milk producer globally. What makes this achievement exceptional is that it has been built not on large industrial farms but on the efforts of millions of smallholder farmers.

More Than Milk: The Social Impact of Dairy

In India, dairy is far more than an

agricultural business. It supports the livelihoods of more than 90 million rural households and contributes nearly 5 per cent of the country's GDP and around one-quarter of agricultural GDP.

Its impact extends well beyond milk production:

Women's empowerment – In many rural households, women manage dairy income, strengthening financial inclusion and economic independence.

Employment generation – The sector creates jobs across farming, processing, logistics, veterinary services, retail and manufacturing.

Animal welfare – Better genetics, nutrition and healthcare improve both productivity and animal well-being.

Rural development – Daily milk payments provide a reliable source of cash flow, making dairy one of India's most inclusive rural industries.

Few sectors combine commercial opportunity with social impact on such a scale.

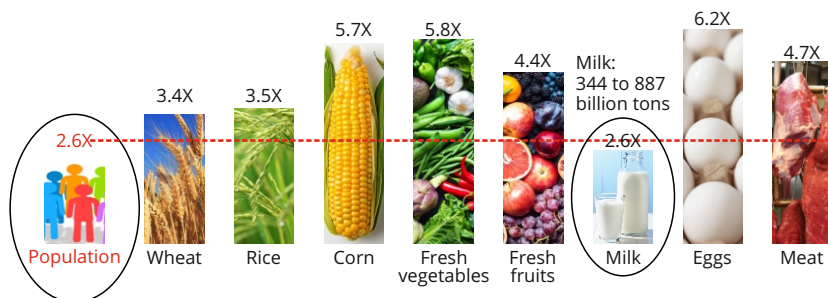
Seven Opportunities That Could Shape Indian Dairy

Building on this strong foundation, India's dairy industry now has seven major opportunities that could define its next phase of growth.

1. Farm Productivity

India's low average milk yield presents one of the industry's biggest growth opportunities. While dairy farms in many developed markets achieve average yields of more than 25 litres per animal per day, productivity in India remains significantly lower. Improvements in genetics, breeding, sexed semen, feed and nutrition, animal health, precision livestock management and modern farming practices can substantially increase output. Every

The Green Revolution - a major factor in world peace



Remarkable growth in agriculture throughput, same with eggs and meat in last 6 decades. Food systems successfully scaled calories. The next challenge is affordable nutrition and protein.

Multiplicative factor between 1961 and 2020
Source: FAOStat

India: Feeding 1.4 Billion People

#1



Milk

World's Largest Producer
24% of Global Output
USD 210 billion
#1 Agricultural Crop in India
Largest Job Creator



Rice-#2
25% of global output



Wheat -#2
15% of global output



Sugarcane-#1



Eggs-#2



Spices-#1

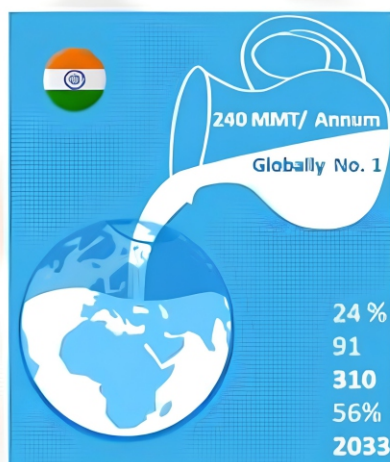


Pulses-#1



Millets-#1
40% of global output

Indian Dairy Sector



	USA : 96 MMT
	Germany: 32 MMT
	France: 25 MMT
	New Zealand: 22 MMT
	Australia: 8.6 MMT
	Brazil: 27 MMT
	EU : 140 MMT

additional litre of milk produced from an existing animal also improves sustainability by reducing the need for herd expansion.

2. Expansion of the Organised Sector

Despite its scale, India's dairy industry remains largely fragmented, with a significant share of milk still sold through informal channels. Rising consumer demand for food safety, traceability, convenience and quality is accelerating the shift towards organised dairy. Continued growth in modern retail, quick commerce, digital commerce and cold-chain infrastructure will further support formalisation, benefiting consumers while improving quality assurance and price realisation for farmers.

This transition benefits both consumers and farmers through improved quality assurance and better price realisation for farmers.

3. Value Addition and Premiumisation

India continues to convert much of its milk into relatively low-value products. However, rising incomes and changing consumer preferences are creating strong demand for value-added products such as

cheese, yoghurt, fermented dairy, lactose-free dairy, functional nutrition products and premium traditional dairy offerings. The industry is steadily shifting from a volume-led to a value-led growth model.

4. The Dairy Protein Opportunity

One of the most significant opportunities for India's dairy industry lies in dairy proteins.

Protein has moved beyond sports nutrition to become a mainstream dietary priority. This shift is being driven by three key trends: ageing populations seeking higher protein intake to support healthy ageing and muscle retention; growing consumer preference for high-protein diets; and the rapid adoption of GLP-1-based weight-management therapies, which are encouraging greater demand for nutrient-dense, protein-rich foods.

As a result, dairy protein consumption is expanding well beyond powders into yoghurts, ready-to-drink beverages, snacks, bakery products, ice cream and everyday fortified foods. At the same time, constrained global processing capacity has tightened supply, contributing to higher whey protein

concentrate prices in recent years.

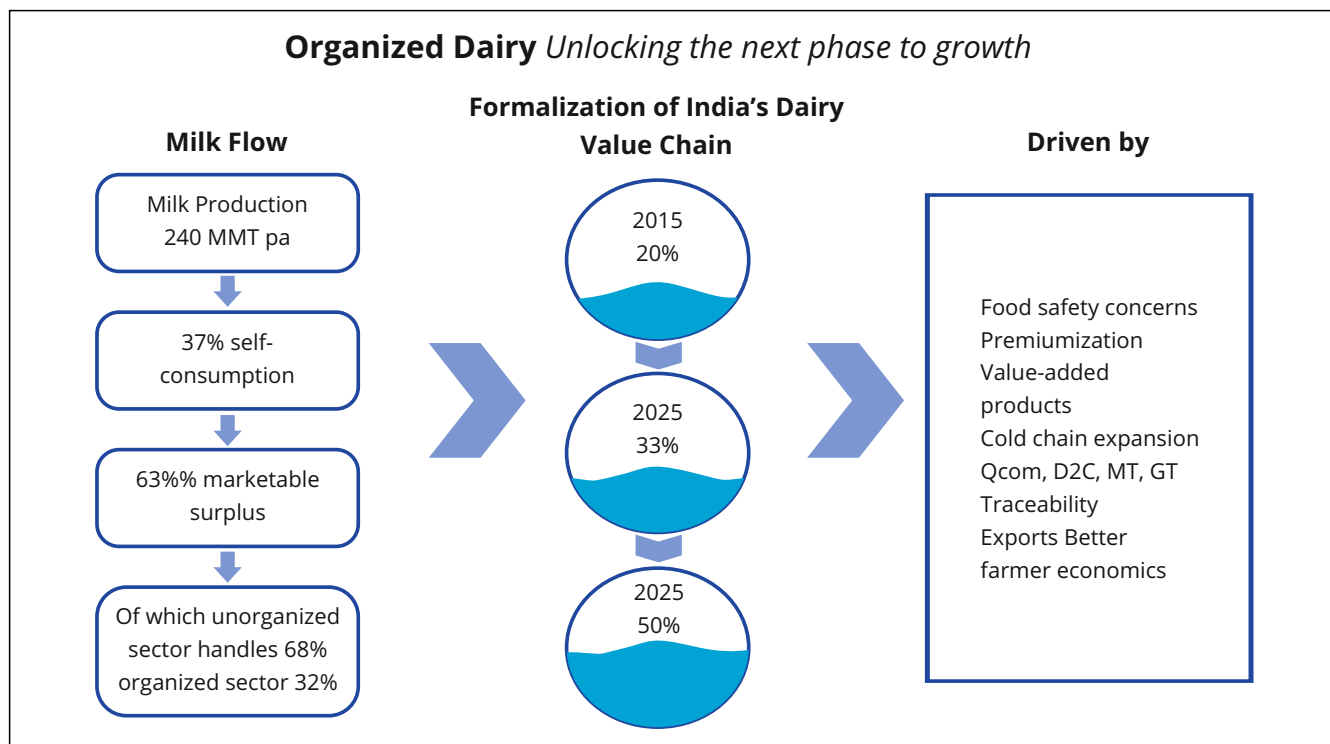
India has historically been a predominantly fresh dairy market, with limited cheese consumption and whey often regarded as a low-value by-product. That is now beginning to change, supported by rising cheese demand, investments in cold-chain and cheese-making infrastructure, and the growing adoption of Western dairy formats. With strong milk production, a large farmer base and expanding processing capabilities, India is well positioned to emerge as a significant supplier of dairy proteins and specialised dairy ingredients for both domestic and global markets.

5. Circular Dairy Economy

Technology is becoming a key driver of competitiveness in the dairy industry. Precision livestock management, AI-driven quality systems, traceability platforms, digital farmer ecosystems and smart logistics are improving productivity, food safety, transparency and farmer engagement across the value chain.

6. Technology and Digital Dairy

Technology is becoming a key driver of competitiveness in the dairy industry. Precision livestock



management, AI-driven quality systems, traceability platforms, digital farmer ecosystems and smart logistics are improving productivity, food safety, transparency and farmer engagement across the value chain.

7. Export Growth

Despite being the world's largest milk producer, India accounts for less than one per cent of global dairy exports, highlighting a significant growth opportunity. Milk powders, ghee, butter, anhydrous milk fat and specialised dairy ingredients offer strong export potential, particularly in Southeast Asia, Africa, Central and West Asia, as well as ethnic markets in developed countries.

The challenge will be to expand exports while maintaining India's commitment to food security, rural livelihoods and farmer welfare.

Looking Ahead

By 2035, India is likely to play a much larger role in global dairy through protein ingredients, value-added products, digital innovation, sustainable production and stronger

export participation. The industry's future is not simply about producing more milk, but about creating greater value, improving productivity and becoming a more influential contributor to global nutrition.

Having transformed itself from a milk-deficient nation into the world's largest milk producer, India is now well positioned to help meet the world's growing demand for high-quality nutrition and dairy proteins. That growing international interest was evident throughout the Global Dairy Congress in Barcelona, where delegates were keen to understand the scale and potential of India's dairy ecosystem. Wanxing Eugene Ho of Mengniu Dairy said he had "benefitted greatly" from the insights shared on India, while Richard Hall, Chair of FoodBev Media and founder of the Global Dairy Congress, described India as "such an important contributor to the dairy world." Industry leaders from New Zealand, Europe and Asia also recognised India's growing influence

in shaping the future of global dairy. Such recognition brings responsibility. The next phase of India's dairy journey will depend on improving farm productivity, expanding value-added products, building globally competitive dairy ingredient businesses, strengthening sustainability and increasing exports while maintaining its commitment to food security, rural livelihoods and farmer welfare.

The foundations have already been laid by millions of farmers, cooperatives, entrepreneurs, scientists and policymakers. If India can successfully combine its scale with innovation and efficiency, it has the potential to become not only the world's largest dairy producer, but also one of its most influential dairy leaders.

The message from Barcelona was clear: the world is watching India's dairy sector. The next chapter will be defined by how effectively India transforms that interest into global leadership.

FAO Dairy Price Index falls 1.5% in June

The FAO Dairy Price Index declined 1.5% in June to 117.4 points, with prices softening across dairy products and standing 24.5% below June 2025. This is a major global signal because it confirms that the dairy commodity cycle has moved away from the tight, inflationary conditions seen earlier. Lower prices for skim milk powder, whole milk powder, butter and cheese point to improved export availability and softer import demand in parts of the world. However, the details matter: skim milk powder remained relatively stronger than other products, while cheese continued to face pressure from excess export supplies. For importers, softer prices may create buying opportunities and ease food inflation. For exporters and farmers, the same trend can pressure farmgate milk prices and margins. The FAO number should be read alongside weather risks, EU production recovery and US availability. In short, the global dairy market is not collapsing, but it is moving into a more balanced and buyer-sensitive phase after earlier price strength.

Source: FAO / The Dairy Site

IFCN says global milk output crossed 1 billion tonnes in 2025

IFCN's 2026 conference update is one of the most important structural pieces of global dairy news. The network reported that global milk production grew 2.6% in 2025 and surpassed 1 billion tonnes on a solid-corrected-milk basis. It also noted an 11% rise in the IFCN World Milk Price Indicator versus 2024 and higher cull cow prices, which improved cattle-sale returns. These figures matter because they show that 2025 was a strong recovery year for global milk supply, supported by broad-based contributions from the EU, North America and Latin America. But the outlook is more nuanced: a strong production year can create downward pressure on commodity prices if demand does not keep pace. IFCN also highlighted innovation and sustainability themes, including virtual fencing adoption in New Zealand. For strategic planning, the message is that global dairy growth is increasingly shaped by productivity, technology, environmental pressure and regional competitiveness. The industry is expanding, but future winners will be those who combine efficient milk production with credible sustainability and market access.

Source: IFCN Dairy Research Network

Global Dairy Trade index drops 2.8% at June auction

The 2.8% fall in the Global Dairy Trade price index on 16 June is important because GDT remains one of the clearest short-term indicators for internationally traded dairy commodities. The average winning price reportedly fell to USD 3,979 per metric tonne, with weaker prices across several major products. Trading Economics also noted declines in mozzarella, skim milk powder, cheddar, whole milk powder, butter and anhydrous milk fat, while lactose was the only gainer. For exporters such as New Zealand, the GDT signal affects farmgate-price expectations, processor returns and buyer sentiment. For importers in Asia, the Middle East and Africa, a softer auction can provide price relief and encourage forward coverage. The decline also fits the broader FAO picture of easing dairy prices as supply improves. However, one auction does not define the full cycle. Buyers will still watch weather, Chinese demand, EU milk flows and currency movements. The key takeaway is that global dairy buyers are becoming more cautious and price-sensitive after the earlier recovery in commodity values.

Source: Global Dairy Trade / DairyNews.today

OECD-FAO releases 2026-2035 dairy market outlook

The OECD-FAO Agricultural Outlook chapter on dairy is important because it provides a medium-term framework beyond short-term price movements. The 2026-2035 outlook covers production, consumption, trade and prices for milk, fresh dairy products, butter, cheese, skim milk powder and whole milk powder. Such projections matter for processors, exporters and investors because dairy demand growth is increasingly uneven. Mature markets are more focused on cheese, proteins, convenience and premiumisation, while emerging markets continue to drive growth in fresh dairy, milk powders and affordable nutrition. The outlook also highlights risks and uncertainties, including weather, feed costs, disease, policy changes and trade disruptions. For India and other emerging dairy economies, the report is especially relevant because domestic consumption growth can reduce exportable surplus even as production rises. For global exporters, it reinforces the need to align product mix with demand regions. The strategic message is that dairy's next decade will not be won only by producing more milk; competitiveness will depend on efficiency, sustainability, product specialisation and reliable trade channels.

Source: OECD-FAO Agricultural Outlook

GB milk production forecast to ease in 2026/27

AHDB's June forecast that Great Britain milk production will ease to 12.91 billion litres in the 2026/27 season, 0.9% lower than the previous milk year, is an important regional signal. The UK dairy sector has been under pressure from volatile farmgate prices, feed and labour costs, policy uncertainty and structural exits from farming. A modest production decline may support prices if demand remains stable, but it also raises concerns about processing capacity utilisation and domestic supply resilience. For farmers, the forecast reflects the pressure of margin management after a period of global price weakness. For processors, lower milk availability can create stronger competition for suppliers, especially in regions with cheese, liquid milk and ingredient plants. For retailers and foodservice buyers, supply risks may eventually affect procurement strategies. The AHDB update should be viewed in the broader European context: EU and UK milk flows are not uniform, and local weather, farm confidence and policy incentives will influence output. The key implication is that GB dairy remains structurally fragile despite strong consumer demand.

Source: AHDB

Global Dairy Congress 2026 highlights innovation and non-cow dairy

The Global Dairy Congress 2026 coverage is relevant because it shows where global dairy innovation is moving: functionality, accessibility, alternative dairy sources and nutrition-led positioning. The report highlighted discussions around moving beyond traditional cow's milk, including goat milk formats presented by Yili Group, with claims around digestibility and family nutrition. This matters because dairy companies are increasingly competing not just on milk volume, but on consumer problems: digestion, protein, convenience, allergy management, gut health and sustainability. Non-cow dairy is unlikely to replace mainstream cow milk at scale in most markets, but it can create premium niches and differentiated positioning. The story is especially relevant for Asia, the Middle East and Africa, where infant nutrition, family powders and functional dairy beverages remain strong growth areas. For processors, the implication is that R&D and consumer segmentation are becoming as important as plant capacity. For market access, companies that can translate nutrition science into trusted, culturally relevant products will have an advantage.

Source: Dairy Business MEA

GLOBAL DAIRY BUSINESS

USDA raises US milk production forecasts and cuts price outlook

USDA's June dairy market outlook is important because the United States is one of the world's major dairy exporters and a key driver of global commodity availability. USDA raised its milk production forecasts for 2026 and 2027, citing higher expected dairy cow inventories and improved milk per cow yields. At the same time, it revised the 2026 all-milk price forecast downward to USD 20.70 per hundredweight, USD 0.55 below the previous estimate. This combination of higher supply and lower prices fits the broader global picture of easing dairy markets. For US farmers, it signals margin pressure unless feed costs are favourable or risk-management tools are used effectively. For exporters, stronger supply may support competitiveness in skim milk powder, cheese, whey and other ingredients. For global buyers, US availability can act as a price anchor against supply risks elsewhere. The key strategic implication is that productivity gains in the US can quickly affect international price sentiment, especially when combined with recovering EU output and cautious import demand.

Source: USDA Economic Research Service

Rabobank says global dairy markets are moving toward balance

Rabobank's June assessment that global dairy markets are heading toward balance is important because it connects production trends with price direction and regional supply risks. For Australia, RaboResearch forecast a 0.3% decline in milk production for the 2026/27 season, after varied state-level performance in 2025/26. The report noted better rainfall in some areas, but Australia's dairy sector remains exposed to weather, feed costs, farm exits and processor competition. Globally, the idea of balance suggests that the market is moving away from severe shortage but is not necessarily entering a deep oversupply. This distinction matters for buyers and sellers. Importers may see better pricing opportunities, while exporters still need to protect margins and manage volatility. For processors, balanced markets reward operational discipline: product mix, inventory timing, currency risk management and customer diversification. The Rabobank view is particularly useful because it avoids a simplistic bullish or bearish reading. The dairy market is becoming more stable, but not risk-free, and weather or demand shifts can still change the picture quickly.

Source: Rabobank / RaboResearch

New Zealand launches NZ\$46m Responsible Dairy programme

New Zealand's NZ\$46 million Responsible Dairy programme is important because it addresses a strategic challenge for one of the world's most export-oriented dairy economies: lifting productivity while improving environmental performance. DairyNZ described the programme as a way to help farmers move beyond a productivity plateau that has persisted since around 2015. The initiative is designed to build resilience, efficiency and sustainability across different farm systems. This matters globally because New Zealand is often seen as a benchmark for pasture-based dairy exports, yet it faces increasing pressure around emissions, water quality, land use and social licence. If the programme succeeds, it could help defend New Zealand's competitiveness in premium export markets where sustainability claims are increasingly scrutinised. For other dairy countries, it offers a model of sector-wide investment rather than leaving productivity and environmental compliance solely to individual farmers. The key takeaway is that the future of dairy competitiveness will depend on measurable gains in both farm economics and environmental outcomes.

Source: DairyNZ / AgNavigator

Danone strengthens APAC functional dairy position with Made Group deal

Danone's agreement to acquire Australia-based Made Group is important because it confirms the strategic direction of large dairy companies toward functional, high-protein and gut-health beverages. Made Group's portfolio includes health-focused dairy products such as gut-health yoghurts and high-protein ready-to-drink products. For Danone, the deal strengthens its Asia-Pacific presence and aligns with broader consumer trends around protein, digestive health, convenience and active nutrition. This is not only a regional acquisition story; it reflects how global dairy majors are repositioning from commodity dairy toward branded nutrition platforms. The timing also matters because GLP-1 weight-loss drugs, fitness culture and ageing populations are increasing interest in protein-rich, portion-controlled and functional foods. For competitors, the acquisition raises the bar in innovation, branding and distribution. For ingredient suppliers, it points to continued demand for milk proteins, cultures, stabilisers and functional formulations. The strategic takeaway is that growth in premium dairy will increasingly come from targeted health benefits rather than generic dairy consumption.

Source: FoodNavigator / DairyReporter





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