SEPTEMBER

MONTHLY BILINGUAL

INR 300

DAIRY PLANNER

HARBIL/2004/22481

Title Code HARBIL00698

Vol. 22 | No. 09 | September - 2025

pixie expomedia
CREATE • CONNECT • CONQUER

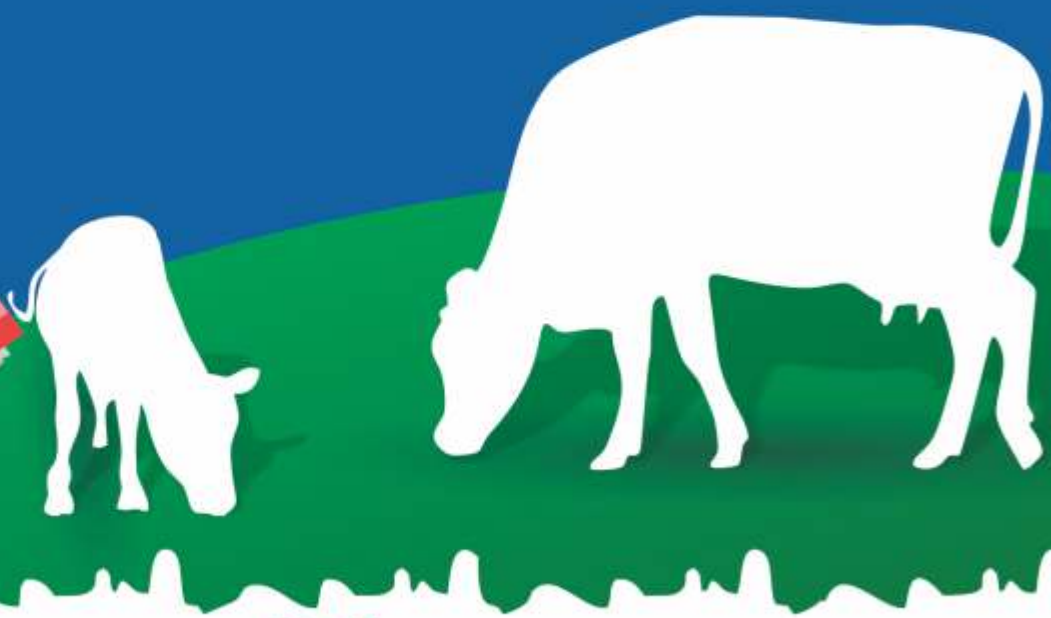
THE NEW STANDARD
IN DEVELOPING TODAY'S BUSINESS

BOOST
YOUR **BRAND VISIBILITY**
with us

With Over
45,000+
Readership

Advertise with us
Today
See your business
Growing

The Magazine Covers all the latest news, articles, Product Launches, CSR, Press Releases, New Appointments, Latest Developments & a complete industrial over view.



pixie expomedia
CREATE • CONNECT • CONQUER

Pixie Expomedia Pvt. Ltd.
C/o OmAng Hotel, Namaste Chowk, Near Janta Petrol Pump, KARNAL - 132001 (Haryana) INDIA
Email : poultry.pcsl@gmail.com, dairy.pcsl@gmail.com

+91 9991705007
www.facebook.com/dairyplanner123
www.facebook.com/poultryplanner123
www.linkedin.com/company/dairy-planner

Marketing Division : +91 9991705007 | 9718070952

HEALTH
Benefits of A2 Milk

Strong Teeth
Milk is the best source for calcium and that's exactly what your teeth need. In addition, milk helps prevent cavities and tooth decay.

Healthy Bones
It's true that kids need to drink milk to increase bone health, in order to improve proper growth.

Weight Loss
Studies have proven that women who drink milk daily are more likely to lose weight than women who do not drink milk.

Reduce Stress
Sit down and drink a warm glass of milk. This helps to relieve muscle tension and soothe your nerves.

Energy Booster
When you're struggling to get through the day and you need a little pick-me-up, reach for an ice cold glass of milk. You will feel revitalized in no time.

From the Pen of Chief Editor

Processing & Packaging – The Future Pillars of Food Safety and Market Growth

As the livestock, dairy, and poultry industries continue to evolve, **processing and packaging** have become more than just support functions—they are now central to ensuring product safety, extending shelf life, enhancing marketability, and building consumer trust. The journey of any food product, from farm to fork, is incomplete without efficient and hygienic processing and innovative, sustainable packaging.

Processing plays a key role in transforming raw produce into safe, value-added, and consumer-ready products. Whether it's pasteurized milk, frozen chicken, egg powder, or ready-to-cook meat, modern processing techniques reduce microbial risks, retain nutritional value, and minimize wastage. Automation and quality control systems have enabled consistency, increased output, and adherence to food safety regulations.

Packaging, on the other hand, has evolved into a strategic function that does far more than just contain a product. It protects the contents from contamination, extends usability, supports cold-chain logistics, and now increasingly communicates vital product information to consumers. The shift toward **smart packaging**—with QR codes for traceability, tamper-proof seals, and recyclable materials—reflects the industry's response to growing consumer demand for safety, transparency, and sustainability.

Yet, the industry faces hurdles. Small-scale producers often struggle with access to modern machinery, infrastructure, and skilled manpower. High costs, limited awareness, and regulatory hurdles further slow adoption of modern processing and packaging solutions. Bridging this gap requires collaborative initiatives—government schemes, training programs, private investment, and partnerships that bring technology within reach of rural and mid-sized producers.

Going forward, the livestock sector must view processing and packaging not as add-ons, but as **essential building blocks for growth, safety, and competitiveness**. Embracing innovation in these areas will not only boost profitability but also ensure that consumers receive high-quality, safe, and sustainable products—every time.

Office :
Pixie Publication
Anand Vihar, near gogripur railway crossing, hansi road, karnal-132001 (Haryana)

Editorial Policy is Independent. Views expressed by authors are not necessarily those held by the editors.

Registered as Newspaper by Register of Newspaper for India : **RNI No. HARBIL/2004/22481**

Publisher, Printer : **Mr. Vishal Gupta** on Behalf of **Pixie Publication** Karnal.

Printed at : Jaiswal Printing Press, Chaura Bazar, Karnal-132001 (Haryana).

Published at : Anand Vihar, near gogripur railway crossing, hansi road, karnal-132001 (Haryana)

Editor-In-Chief : Mr. Vishal Rai Gupta

All Legal matters are subject to Karnal.

ADVERTISEMENT

PRESS RELEASE

ARTICLE

Commercial Drying of Fodder: Business Opportunities for Farmer Producer Organizations (FPOs) in India

[1]Dr. Simranjeet Kaur, [2]Dr. Harsimran Kaur, [3]Dr. Harinder Singh, [4]Dr. Ramandeep Singh

[1]Ph.D., School of Business Studies, Punjab Agricultural University

[2] Ph.D., School of Business Studies, Punjab Agricultural University

[3] M.Sc. Animal Nutrition, Excellent Enterprises, Khanna

[4] Director, School of Business Studies, Punjab Agricultural University

Introduction

India's agricultural landscape is deeply intertwined with its vast livestock population, which plays a crucial role in the socio-economic fabric of rural communities. Despite being a leading global producer of various crops, India faces a significant paradox: substantial post-harvest losses and a considerable deficit in livestock feed and fodder. Estimates indicate a substantial gap between the demand and supply of both green and dry fodder, projected to widen in the coming years. This scarcity directly impacts animal health, productivity, and ultimately, farmer income.

Farmer Producer Organizations (FPOs) have emerged as pivotal entities in addressing the challenges faced by small and marginal farmers, enabling them to collectively leverage resources, access technology, and improve market linkages. While traditional FPO models often focus on aggregation, a strategic shift towards value-addition activities, such as commercial drying, presents a significant opportunity for FPOs to capture a larger share of the value chain and enhance member income.

Commercial drying, a time-tested preservation technique, offers a viable solution to the fodder deficit by converting surplus green fodder into a storable, nutritious form, thereby ensuring year-round availability. This article delves into the specific business opportunities in commercial fodder drying for FPOs, examining the technologies involved, market dynamics, economic viability, and the supportive policy ecosystem.

The Need for Commercial Fodder Drying in India

The livestock sector in India is a major contributor to agricultural GDP, supporting millions of rural livelihoods. However, the sector is plagued by a chronic shortage of quality feed and fodder. Several factors contribute to this deficit:

- **Seasonal Availability of Green Fodder:** Green fodder is abundant only during specific seasons, leading to gluts and subsequent shortages during lean periods. During harvest, fodders generally have 60-75% moisture, risking shelf life to get infected by toxins.
- **Post-Harvest Losses:** A significant portion of fodder is lost due to inadequate storage, handling, and preservation methods.
- **Shrinking Grazing Lands:** Increasing population and urbanization have led to a decline in permanent pastures and grazing lands, further exacerbating the fodder shortage. Approx 4% of agriculture land of India comes under fodder, still shrinking.
- **Nutritional Deficiencies:**

Traditional feeding practices often result in imbalanced diets for livestock, impacting their productivity (milk, meat).

Commercial drying addresses these issues by:

- **Preserving Nutrients:** Drying processes help retain the nutritional value of fodder, ensuring a consistent supply of quality feed.
- **Extending Shelf Life:** Dried fodder products like hay and silage can be stored for extended periods, making them available during fodder-scarce months.
- **Reducing Wastage:** By processing surplus fodder, significant post-harvest losses can be mitigated.
- **Facilitating Transport and Storage:** Dried and compressed fodder (e.g., fodder blocks) is easier to transport and store, especially to remote or deficit regions.

Key Fodder Drying Technologies and Processes for FPOs

FPOs can explore various commercial fodder drying technologies, ranging from traditional methods to more advanced industrial systems. The choice of technology depends on factors like investment capacity, scale of operation, desired product quality, and energy availability.

1. **Hay Making** Hay is green fodder (e.g., grasses) that has been dried to a moisture content of 12-16% for preservation. The process typically involves:

- **Cutting and Wilting:** Fodder is cut and spread to dry, often under the sun, to remove excess moisture. Avoid over-drying to prevent nutrient loss and breakage.
- **Turning:** Regular turning of the fodder ensures uniform drying.
- **Baling/Compaction/ Pelletisation:** Once sufficiently dried, the hay is compressed into bales or into pellets for easy storage and transport.
- **Storage:** Hay should be stored in well-ventilated, moisture-free conditions to prevent spoilage. Hay can be stored for 12 to 24 months.

While sun drying is a simple method, FPOs can adopt commercial dryers or other artificial drying methods for faster, more efficient, and hygienic processing, ensuring better nutrient retention.

2. **Silage Making** Silage is fermented green fodder, typically made from crops like maize or sorghum, stored in airtight conditions. This anaerobic fermentation process preserves the fodder, making it moist and nutrient-rich, lasting for 5-6 months. Key steps include:

- **Harvesting and Chopping:** Fresh green fodder is harvested at the right stage and chopped into small pieces (2-4 cm). This improves packing density and aids fermentation.
- **Wilting (Optional but Recommended):** Excess moisture may be removed to achieve an ideal dry matter content of 30-35%.
- **Compaction and Sealing:** The chopped fodder is compacted tightly into pits, bunkers, or silage bags to expel oxygen. Proper sealing is crucial to maintain anaerobic conditions and prevent spoilage.
- **Fermentation:** The fodder ferments for 2-4 weeks, converting sugars into lactic acid, which acts as a natural preservative. Additives like jaggery/molasses, salt, mineral

mixture, and Lactic Acid Bacteria (LAB) can enhance the fermentation process.

3. **Total Mixed Ration (TMR) Units** TMR units create balanced feed mixtures by combining dry fodder, silage, grains, and minerals, tailored to specific animal requirements (weight, age, breed). This technology improves milk and meat production by ensuring optimal nutrition.
4. **Fodder Blocks** These are compressed blocks made from dry fodder, grains, and supplements. Fodder blocks are compact, easy to store, and ideal for transporting feed to remote areas or during emergencies.
5. **Advanced Drying Systems** For larger-scale operations, FPOs can explore industrial drying systems such as:

- **Rotary Drum Dryers:** Used for various agricultural co-products, including distillers dried grains (DDGS).
- **Tube Bundle Dryers:** Suitable for materials like sugar beet pulp.
- **Flash Dryers and Belt Dryers:** Efficient for continuous drying processes. These are good for commercial hay production, economically.
- **Microwave Drying and Pneumatic Drying:** These modern techniques offer faster drying rates and improved product quality.

Market Potential for Dried Fodder in India

The market for dried fodder in India presents a significant opportunity due to the persistent demand-supply gap and the increasing emphasis on livestock productivity.

- **Fodder Deficit:** India faces a considerable shortage of both green and dry fodder. Projections indicate a gap of approximately 65% for green fodder and 25% for dry fodder by 2025 at the national level, with even more alarming gaps in certain states.
- **Rising Demand for Animal Products:** The increasing urban population fuels a growing demand for milk and meat, necessitating better animal nutrition and consistent fodder supply.
- **Regional Disparities:** Fodder production and availability vary significantly across states, creating opportunities for inter-state trade of dried fodder. States like Assam, Karnataka, Tamil Nadu, Chhattisgarh, West Bengal, Bihar, Rajasthan, Jharkhand, Andhra Pradesh, Maharashtra, and Telangana face dry fodder shortages, while others like Tripura, Odisha, and Punjab have surpluses.

Price Dynamics: Market prices for dry fodder fluctuate seasonally and regionally, with higher prices observed during periods of scarcity or in drought-prone areas. FPOs can capitalize on these price differentials by producing and storing fodder during surplus periods and selling it when prices are high.

Economic Viability and Financial Models

Commercial fodder drying can be a profitable venture for FPOs, contributing to increased farmer income and sustainable rural development. The economic viability depends on factors such as:

- **Scale of Operation:** Larger units often benefit from economies of scale, reducing per-unit production costs.
- **Technology Adoption:** Investing in efficient drying technologies can reduce operational costs (energy, labor) and improve product quality, fetching better market prices.
- **Raw Material Sourcing:** Access to abundant and affordable green fodder is crucial for consistent production.
- **Market Linkages:** Establishing strong market connections (e.g., direct sales to dairy farmers, livestock cooperatives, fodder

ORGANIZED BY

vnu ASIA PACIFIC | PERMATA KREASI MEDIA

POWERED BY

WORLDWIDE | FMPI Federation of the Indonesian Poultry Society

ILDEX INDONESIA

Co-located with Horti&Agri Indonesia

Highlight Pavilions meat pro

ILDEX INDONESIA

17-19 September 2025

Indonesia Convention Exhibition (ICE), Jakarta

THE 7th INTERNATIONAL LIVESTOCK, DAIRY, MEAT PROCESSING AND AQUACULTURE EXPOSITION

www.ildex-indonesia.com

Pre-register for ILDEX Indonesia 2025 and get a chance to win FREE FLIGHTS to Jakarta

PRE-REGISTER NOW!

traders) ensures consistent demand and fair prices.

- **Value Addition:** Producing higher-value products like TMR or fodder blocks can enhance profitability.
- **Export Potential:** Gulf region & South- East Asian countries (Japan, Korea, Taiwan) are leading importers of dried fodders.

Illustrative projections for commercial drying ventures typically demonstrate profitability through:

- **Cost Savings:** Reducing post-harvest losses and ensuring fodder availability year-round can prevent economic setbacks for farmers.
- **Increased Revenue:** Selling value-added dried fodder products at competitive prices generates additional income streams for FPO members. Moreover, crops of their own FPO members will be processed with value-addition & higher returns (instead of selling the produce in faraway markets).
- **Improved Livestock Productivity:** Access to nutritious, year-round fodder leads to healthier animals and higher yields of milk and meat, indirectly benefiting FPO members who are also livestock owners. Dried fodders & hays deliver better productivity of the animals, also higher milk yield & solids.

Government Support and Policy Ecosystem for FPOs in Fodder Drying

The Government of India recognizes the importance of FPOs and fodder development, offering extensive support through various schemes and policies.

- **National Livestock Mission (NLM):** The NLM aims to transform fodder growing into a structured, commercial business. It provides financial assistance and capital subsidies to entrepreneurs, including FPOs, for setting up units for fodder cultivation, processing, preservation, and marketing.
  - **Capital Subsidy:** Under NLM, FPOs can avail capital subsidies up to 50% of the total project cost, with a maximum limit of ₹50 lakh. Eligible expenses include infrastructure development (godown, storage units) and machinery purchase (baler machines, harvesting machines, processing equipment).
- **Animal Husbandry Infrastructure Development Fund (AHIDF):** The AHIDF provides financial assistance through interest subsidies for projects related to animal husbandry infrastructure, including fodder processing units.
  - **Interest Subsidy:** FPOs can receive a 3% interest subvention on term loans for up to 8 years. There is no upper limit on the loan amount, and collateral-free loans are available under the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) scheme.
- **Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs) Scheme:** This central sector scheme, launched in 2020, aims to promote 10,000 new FPOs by 2027-28 with a total budgetary outlay of ₹6,865 Crore. It provides handholding support to new FPOs for up to five years, covering aspects like management, inputs, production, processing, value addition, market linkages, credit linkages, and technology use. The National Dairy Development Board (NDDB) has been designated as an implementing agency to promote fodder-centric FPOs under this scheme.
- **AIF (Agriculture Infrastructure Fund)**- Fund with 3% reduction on interest rate.
- **Pradhan Mantri Kisan Sampada Yojana (PMKSY):** While broader in scope, PMKSY supports the creation and expansion of food processing and preservation capacities, which can be leveraged by FPOs for fodder processing.
- **Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PMFME) Scheme:** This scheme supports the upgradation of individual micro food processing units and provides support to FPOs, including assistance for common infrastructure and branding/marketing.

Strategic Recommendations for FPOs

To successfully venture into commercial fodder drying, FPOs should consider the following strategic recommendations:

- **Conduct Feasibility Studies:** Before setting up a unit, a thorough feasibility study is essential to assess local demand, raw material availability, climatic conditions, livestock population, and market linkages.
- **Technology Selection:** Choose appropriate drying technologies based on the type of fodder, scale of operation, and available resources. Consider a mix of traditional and modern methods to optimize costs and efficiency.
- **Quality Assurance:** Implement

stringent quality control measures to ensure the dried fodder retains its nutritional value and is free from contaminants. This will build trust among buyers and command better prices.

- **Market Linkages and Branding:** Develop strong market linkages with dairy farmers, livestock cooperatives, and feed manufacturers. Explore opportunities for branding dried fodder products to differentiate them in the market.
- **Capacity Building:** Invest in training FPO members and staff on best practices in fodder harvesting, drying, storage, and marketing.
- **Leverage Government Schemes:** Actively seek and utilize financial assistance and subsidies available under schemes like NLM, AHIDF, and FPO promotion schemes.
- **Collaboration and Partnerships:** Collaborate with research institutions for technological advancements, and with private players for market access and technical expertise.
- **Diversification:** Explore opportunities to produce various types of dried fodder (hay, silage, TMR, fodder blocks) to cater to diverse market needs and ensure year-round operations.
- **Rural Employment:** Commercial fodder drying offers scalable employment opportunities across processing, logistics, packaging, and distribution — supporting livelihoods in rural areas.
- **Checking Rural Migration:** By generating income opportunities locally through fodder value chains, Farmer Producer Organizations can help reduce rural-to-urban migration and retain skilled youth in agriculture-based enterprises.

Conclusion

Commercial drying of fodder presents a robust and timely business opportunity for Farmer Producer Organizations in India. By converting surplus green fodder into valuable dried products, FPOs can address critical feed shortages, reduce post-harvest losses, and significantly enhance the income of their members. The comprehensive support from government schemes like the National Livestock Mission and the Animal Husbandry Infrastructure Development Fund, coupled with the inherent advantages of collective action within FPOs, creates a conducive environment for success. By strategically adopting appropriate technologies, ensuring quality, and building strong market linkages, FPOs can play a transformative role in strengthening India's livestock sector and fostering sustainable rural economic growth.

References

- *ARCC Journals. (n.d.). Forage Production in India: Bottlenecks and Opportunities by Opening up New Way with an Increase in Fodder Oats Demand: A Review.*
- *Büttner EN. (n.d.). Drying Fodder – Industrial dryers.*
- *CEEW. (n.d.). Enhancing India's milk and meat production: Is hydroponics green fodder the answer?*
- *Directorate of Economics and Statistics (DES). (n.d.). Assessment of Livestock Feed and Fodder An All India study.*
- *KIP Financial Consultancy Pvt Ltd. (2025). Boost Your Business: The National Livestock Mission (NLM) in India.*
- *KIP Financial Consultancy Pvt Ltd. (2025). How to Start a Cattle Feed Business & Avail Government Subsidies.*
- *KIP Financial Consultancy Pvt Ltd. (2025). Transforming India's Livestock Sector: A Golden Opportunity for Entrepreneurs under the National Livestock Mission (NLM).*
- *KNOWLEDGE EXCHANGE HUB. (2023). Push-pull Technology and Fodder Production.*
- *Ministry of Food Processing Industries. (n.d.). About PMKSY Scheme.*
- *MPRA. (2014). A Micro Analysis of Fodder Production and Marketing in India: The Case of Bihar.*
- *NABARD. (n.d.). Farmer Producer Organisations - Frequently Asked Questions (FAQs).*
- *NWGD. (2021). Drying in the feed industry.*
- *PIB. (2025). 10000 FPOs Achieved under Government's Flagship Scheme A Step Towards Atmnirbhar Krishi.*
- *ResearchGate. (2020). Fodder Technology Intervention for Round the Year Feed Security to Livestock.*
- *ResearchGate. (2024). (PDF) Fodder Management and Preservation Technology.*
- *ResearchGate. (2024). trend of market price of dry fodder in north-western india.*
- *Sansad.in. (2023). GOVERNMENT OF INDIA MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DAIRYING DEPARTMENT OF ANIMAL HUSBANDRY AND DAIRYING LOK SABHA.*
- *Vikaspedia. (2024). Animal Husbandry Infrastructure Development Fund - Schemes.*

Bunching behaviour: Signals stress in dairy herd

T. K. S. Rao[1], Archita Singh[2], H. P. Thakor[3], Shashipal[4], Rajesh Kumar[5] and Hemant Kumar[6]

College of Veterinary and Animal Sciences, Kishanganj Bihar Animal Sciences University, Patna

[1,4,5] Associate Professor COVAS Kishanganj, [6]Assistant Professor COVAS Kishanganj [2]Assistant Professor BUAT Banda, [3]Veterinary Officer KU Gujarat

Bunching behaviour in cattle is natural cow instinct also known as **protective grouping**, is a common behaviour where cattle form stable permanent groups in response to stressors or threats or discomfort for shared interests (Chopra et al., 2024). Cattle group together even though; the bunching may be in less comfortable place of the barn which further worsen the situation. Efforts to disperse the assemblage are likely fail that may cause additional stress to animals and also the attendants. Stressors for same include heat stress (Erbez et al., 2012), biting flies, lack of fresh air (poor ventilation) or even the presence of strange person. Cow bunching or herding together also associated with social dynamics of herd. Cow housed indoor moving away from side wall and congregating at centre at middle of barn. It is also considered as fresh air seeking behaviour. This behaviour Common north south as compared to east-west oriented barn.

Expression of bunching behaviour in cows in a slightly darker area of the barn with slow air flow during hot conditions. Bunching signal heat stress (high temperature humidity index THI), biting flies or insects, lack of fresh air and escaping of light. Cows congregate together in barn with ample free space remain unutilized. It is often difficult to determine the cause of bunching in barn. Drinking water reduce heat load of body through cooling of the digestive system, respiration and sweating. Cow consume about **50% of daily water intake within an hour** of milking, therefore offering fresh water at the exit of milking parlour is a very scientific approach.

Bunching behaviour offers social interactions among the member of the herd. It is actually response of cow to stress in order to share interest in resources such as feeding and watering areas also. It occurs at higher ambient temperature in order to share fly load or to seek shade and protection from direct sun light and heat stress.

Bunching behaviour estimated by spatial measures such as mean herd **intercow distance (ICD)** and mean herd **nearest neighbour distance (NND).** If ambient temperature is above 20oC, herd expressed higher bunching behaviour with reduced ICD and NND.

*Herd showing **bunching behaviour** in cows*

Cows always need space: Cows always need space and is always essential, however, bunching behaviour create unused space and thus create stress to the animals and herd.

Cows walk and stand with their head down and they need space for their head to move up and down freely. This also allow them to find safe foot placement, enables them to avoid dominant cow and give them room to respond to pain if animal self-isolate themselves. If heads of cows are up in barn it might be due to lack of sufficient space or they are too tightly packed.

Negative impacts of bunching behaviours in cattle: Negative effect of bunching behaviour in cows include

1) **Reduced feed intake and rumination:** Feeding pattern deviated from normal due to bunching, moreover, cow spent more time in cud chewing.
2) **Increased incidence of limping/ lameness:** While expressing the bunching behaviour decreases lying time which further intensify the lameness situation.
3) **Reduced milk production:** Bunching behaviour additionally decrease feed intake and its proper utilization which further worsen the production status of animals.
4) **Increased heat load:** Cows in bunch or close group are likely to experience the heat stress. Therefore, while resting cow during summer maintains a distance between the individual cows while in winter they maintain close sitting between the bunching members.
5) **Muddy areas:** Bunching on pasture can create muddy areas, increases risk of mastitis to cows and superficial loss of soil layer while mud formation.
6) **Hygienic issues:** Bunching behaviour sometimes splash manure on udders, potentially may infect udder to create mastitis.
7) **Compromised welfare status:** Bunching behaviour symbolize a stress and discomfort, potentially impacting overall wellbeing of the animals.

Management planning against the bunching behaviour in cattle:

1) **Heat abatement:** Using shades, fans and soakers which help cow to cool down during stress hours.
2) **Fly control:** Sting of insect cause grouping of cattle i.e., bunching behaviour (Ashmawy et al., 2019). Mosquito net, smoke can be utilized to control insects in barn facilities. Observing the behaviour of cattle help to determine which type of flies may create a problem i.e., stable or face fly. Face fly congregate around eyes and house fly concentrated around nostril and mouths. Cleaning of spilled feed, facilities and reducing breeding area for fly such as wet areas. Fly repellent spray, fly tags may be used along with regular removal of manure promptly reduce heat load and fly population in barn.
3) **Ventilation & cooling system:** Provision of cross ventilation and fresh air may reduce stress and expression of bunching behaviour. Mechanically ventilated barn is also a very good management option.
4) **Water and feed access:** Access to plenty of fresh water is essential regardless of production system, as water cools the body after entry into digestive and respiratory system and finally inform of sweating. Moreover, feed is essential for offering energy to the
5) **Direct sunlight exposure:** Direct exposure of sunlight needs to avoided to control bunching behaviour in cattle. Shed cloth may be used from lit side to control light entry.
6) **Addressing stray voltage/ mild electric current:** Stary voltage is one of the potential stressors that can trigger this behaviour. Actually, stray voltage creates discomfort and some times pain leading cow to seek out areas where they perceive less electrical stimulus. This low intensity of electric current not perceive by human being; cows are comparatively more sensitive and can feel it clearly. Behavioural changes with respect to stary voltage include

hesitation to enter the place, rapid exit from place, restlessness or nervousness, avoidance to water and feed source also.

7) **Increased lying time:** While bunching cows spend less time lying down to rest and ruminate and more time in standing which is detrimental to health and welfare of cattle. Prolong standing time due to expression of bunching behaviour increased incidence of limping (Blackie et al., 2011) reduced feed intake and ultimately reduced milk production. Management practice to increase lying time include reducing heat stress, fly problems and improving ventilation.
8) **Managing social dynamics:** Bunching behaviour affects social dynamics within the herd. Younger or recessive animals may bunch together for protection against dominant individuals. Cows may bunch to facilitate social interaction like grooming or simply to be closed to familiar herd. Moreover, regularly observing social interactions can help identify and address intimidation or aggressive behaviour.
9) **Ensuring sufficient space per cow:** Pen design size and layout may be modified to allow more space per cow.
10) **Monitoring cow behaviour:** Regular visit through the barn particularly during afternoon hours to identify area of expression of bunching behaviour.

Heat stress: Results in expression of both hormonal and behavioural changes-

1) **Hormonal changes:** It include rise in concentration of GnRH, ACTH, Glucocorticoids and progesterone & decrease in prolactin, oxytocin, TSH, estrogen, T3, T4 etc.
2) **Behavioural changes:** It covers an increase in visit of water trough, no. of steps or speed, agonistic behaviour, difficult breathing, however, there is decrease in feed intake and resting/lying time.

Important signals expression in cow: Bunching behaviour also known as clustering with their head towards the centre and tail outwards i.e., head to centre and tail to outside. Increased proximity. Increased restlessness, movement towards shelter. Increased standing time, reduced inter-cow distance, seeking shade or ventilation, increased activity near water bodies

Concluding notes:

Cow bunching behaviour is a complex natural behaviour response to stress that affect welfare and management of cattle can be intervened by addressing issues creating stress to the cattle like rise in standing time, manure splashing and stress hormone release. This result in risk of lameness, reduced feed intake, rumination and reduction in milk production. Understanding behaviour is crucial to observe stress and bunching. Microclimate, electromagnetic waves also trigger the behaviour. Other factors include pests, feed, water also some time affect expression of bunching behaviour.

Heat abatement strategies, plenty of fresh air, water (8 linear metre water/100 cows), control of fly insects along with reduction in variation of light.

Raised head: Lack of sufficient space or tight pack situation in herd- Bunching behaviour

References:

1) *Ashmawy, W. R. E., Williams, D. R., Gerry, A. C., Champagne, J. D., Lehenbauer, et al. 2019. Risk factors affecting dairy cattle protective grouping behaviour, commonly known as bunching against Stomoxys calcitrans on California dairies. PLOS ONE 14 (11):e0224987.doi:10.1371/journal.pone.0224987.*
2) *Blackie, N., Amory, J., Bleach, E. et al. 2011. The effect of lameness on lying behaviour of zero grazed Holstein dairy cattle. Applied Animal Behaviour Science, 134: 85-91.*
3) *Chopra, K., Hofges, H. R., Barker, Z. E., Thurman, A., Bartlett, D. et al. 2024. Bunching behaviour in housed dairy cows at higher ambient temperature. Journal of Dairy Science, 107 (4): 2406-2425.*
4) *Chopra, K., Hodges, H. R., Barker, Z. E. et al. 2020. Proximity interactions in a permanently housed dairy herd: Network structure, consistency and individual differences. Frontier Veterinary Science, 7: 583715.*
5) *Erbez, M., Boe, K. E., Falta, D. et al. 2012. Crowding of dairy cows in a cubicle barn during the hot summer months. Arch. Tierzucht, 55: 325-331.*

From Farm to Fridge: The Role of Processing & Packaging in the Dairy Industry

The dairy industry stands as one of the most critical pillars of the global food supply chain, playing a fundamental role in shaping the nutrition, health, and livelihoods of billions across the world. Dairy products—ranging from fresh milk and yogurt to cheese, butter, and milk powder—are not only dietary staples but also culturally significant foods consumed daily across diverse age groups, regions, and culinary traditions. As global populations expand, urbanize, and become increasingly health-conscious, the demand for safe, nutrient-rich, and conveniently packaged dairy products is escalating rapidly. Yet, at the heart of this booming demand lies a key challenge: milk is an inherently perishable and biologically sensitive commodity. From the moment it leaves the udder, raw milk begins a rapid countdown toward spoilage, susceptible to microbial contamination and degradation. Without timely and efficient intervention, this highly nutritious liquid can quickly become a public health risk rather than a source of sustenance.

This is where processing and packaging play a critical role—not merely as mechanical or technical steps, but as vital transformations that preserve quality, ensure safety, enhance shelf life, and add value to raw milk. In modern dairy systems, processing and packaging have evolved from simple preservation techniques to sophisticated technologies that ensure the delivery of high-quality products to consumers worldwide.

Milk processing involves a series of scientific and engineering interventions that convert raw milk into safe and marketable dairy products. The primary goal is to eliminate harmful pathogens, extend shelf life, and create a variety of products with improved taste, texture, and nutritional value. The process typically begins with milk collection, followed by filtration, clarification, separation, pasteurization, homogenization, and in many cases, fermentation or further value-addition like cheese-making or drying.

Pasteurization, for example, is one of the most important steps in milk processing. It involves heating milk to a specific temperature for a set time to kill harmful microorganisms without affecting its nutritional quality. There are two commonly used methods: High-Temperature Short Time (HTST) and Low-Temperature Long Time (LTLT). For longer shelf life, UHT (Ultra High Temperature) processing is used, where milk is rapidly heated to 135–150°C for a few seconds. This not only sterilizes the milk but also

Simran jeet Singh[1] and Niddhi Arora[2]

[1] YP-II, Department of Veterinary Medicine

[2]Professor, Department of Veterinary Medicine

College of Veterinary and Animal Sciences, GB Pant University of Agriculture and Technology, Pantnagar, Udhamsingh Nagar, Uttarakhand-263145

enables storage at room temperature when combined with aseptic packaging.

Another key process is homogenization, which breaks down fat globules to ensure a uniform texture and prevent cream from separating. This improves both the aesthetic and sensory qualities of milk. Products like yogurt and curd undergo fermentation, where selected bacterial cultures are added to convert lactose into lactic acid. This not only thickens the product but also imparts the tangy flavor characteristic of fermented dairy.

Beyond fluid milk, dairy processing includes the production of value-added products such as butter, cheese, condensed milk, ice cream, and milk powder. These products involve complex processes like churning, coagulation, filtration, evaporation, or drying. Each step requires precision, hygiene, and adherence to strict food safety standards to ensure the final product is both safe and appealing to consumers.

However, processing alone is not enough. Once dairy products are created, they must be safely stored, transported, and presented to consumers. This is where packaging plays a crucial role. Effective dairy packaging serves multiple functions—it protects the product from contamination, prolongs shelf life, provides convenience to users, and displays essential branding and nutritional information.

Various materials are used in dairy packaging, including high-density polyethylene (HDPE) and polyethylene terephthalate (PET) for milk bottles, Tetra Pak cartons for UHT milk, flexible plastic pouches for fresh milk, glass jars for premium yogurts, and metal cans for condensed milk and milk powder. Each material is chosen based on the product's shelf life, required protection, and market segment.

Aseptic packaging is especially important for UHT-treated milk and other sterilized dairy products. It ensures that the product is packed in a sterile environment within a sterile container, thereby eliminating the need for refrigeration until the package is opened. This significantly expands market reach, especially in regions with limited cold chain infrastructure.

In recent years, the dairy packaging sector has witnessed a wave of innovation aimed at improving sustainability, functionality, and consumer engagement. Eco-friendly packaging made from biodegradable or recyclable materials is gaining traction as companies respond to environmental concerns. Meanwhile, smart packaging technologies with freshness indicators, QR codes for traceability, and temperature-sensitive labels are gradually entering the market. Single-serve packaging is also becoming more popular, catering to health-conscious, on-the-go consumers who prefer convenience and portion control.

Despite these advancements, the dairy industry faces a number of challenges. Ensuring consistent raw milk quality remains difficult, especially in countries with smallholder dairy farms. Maintaining the cold chain during transportation and distribution is energy-intensive and costly. Moreover, the packaging waste generated—especially from single-use plastics—raises environmental concerns. Regulatory compliance, food safety risks, and changing consumer expectations also place constant pressure on dairy companies to adapt and innovate.

Looking ahead, several emerging trends are shaping the future of dairy processing and packaging. Technologies such as High-Pressure Processing (HPP), AI-powered automation, and blockchain traceability are being explored to increase efficiency, reduce spoilage, and enhance transparency in the supply chain. On the packaging front, innovations in compostable materials, minimalist designs, and interactive packaging are expected to redefine how dairy products are perceived and consumed.

In conclusion, processing and packaging serve as the backbone of the modern dairy industry, silently but powerfully driving its ability to deliver safe, fresh, and high-quality products from farm to consumer. These two functions not only safeguard public health and extend product shelf life but also play a pivotal role in enabling dairy producers to stay agile and competitive in an increasingly dynamic global market. As consumer expectations shift toward greater convenience, nutritional transparency, and environmental responsibility, the future of the dairy sector will be defined by its capacity to innovate, adapt, and lead.

To remain relevant and resilient, the industry must embrace cutting-edge technologies, adopt sustainable and circular packaging solutions, and implement smarter, more efficient processing systems that reduce waste and energy use without compromising quality. Ultimately, the ability to align production practices with the evolving values of a health-conscious, eco-aware global population will determine not just the success of individual dairy brands—but the long-term viability of the industry itself.

Intelligent Packaging; Demand of Future Generation

Dr. Bijoy Kumar Sarkar[1] and Dr. Tapan Kumar Das[2]

[1]Associate Professor, Department of LPT, C.V.Sc. & A. H., R. K. Nagar, West Tripura, Tripura-799008, India.

[2]Associate Professor, Department of LFC, C.V.Sc. & A. H., R. K. Nagar, West Tripura, Tripura-799008, India.

Intelligent packaging can be designated as "packaging that includes an external or internal indicator to convey information regarding various aspects of the package's history and/or the quality of the food" (Robertson, 2006). The traditional packaging's communicative function can be improved by intelligent packaging, which advises the consumer through its ability to sense, detect as well as record changes in the product's internal or external environment. This packaging technology offers innovative solutions by integrating knowledge from diverse fields like chemistry, biology, electronics, physics, and food technology. The main objective of intelligent packaging is to provide information, sense and specify about the quality of the product is deteriorating or not. Through intelligent packaging, consumers can access vital details about product storage, usage, and expiration dates. As noted by Robertson (2006), the intelligent system can be tailored to enhance convenience, improve a product's quality, value, or provide protection against theft or tampering. To effectively measure the product quality within the package, the food product or headspace must be in direct contact with it. Ultimately, an intelligent system should support the consumer in making informed decisions that extend shelf life, enhance safety, improve quality, provide information, and alert them to potential problems. Intelligent packaging serves as an effective method for monitoring possible misuse that may occur throughout the food supply chain (Ghaani et al., 2016). Through the utilization of intelligent packaging, customers can be alerted to potentially life-threatening situations by being informed of previous incidents such as package tampering. Furthermore, consumers may possess the capability to identify altered packages. Currently, there is ongoing development of transparent seals or labels that remain visible until the package is opened. These labels or seals will undergo a permanent color change to indicate tampering; they may even display messages such as "opened" or "stop." Another advantage of intelligent packaging is its contribution to enhancing Hazard Analysis and Critical Control Points (HACCP) and Quality Analysis and Critical Control Points (QACCP) systems. This enhancement aids in recognizing potential health risks, detecting unsafe food products on-site, and formulating

strategies to mitigate these risks, thereby improving food quality.

Features of Intelligent Packaging: Some of the smart features of intelligent packaging are:

1. **Temperature History:** A significant challenge in the distribution, transit, and storage of food products is the environmental temperature. Intelligent packaging aims to provide consumers with alerts regarding potential risks associated with product consumption and indicators that monitor temperature variations. These indicators respond to the temperature history by inducing an irreversible physical alteration in the packaging.
2. **Microbial Growth Indicators:** These indicators detect the presence of gases or other volatile compounds that may develop within the packaging, thus monitoring the proliferation of microorganisms in packaged food. Additionally, these indicators assess the pH level of the food product, reflecting its condition.
3. **Protection from Light:** As light and ultraviolet radiation can trigger chemical reactions in food products, it is essential for any container to offer protection against light. Intelligent packaging addresses this concern by employing specialized inks or pigments that react to UV light, changing color to inform the end user of the necessary subsequent actions.
4. **Indicators of Physical Shock:** Shock indicators reveal whether the goods have been subjected to potentially damaging impacts during transport. Similar to other indicators, these visually alert end users and other stakeholders to possible damage.
5. **Indicators of Leakage:** These indicators inform us about any potential leaks in the package throughout the entire delivery process. They reveal both gas and material leaks. For instance, a decrease in CO2 levels coupled with an increase in O2 can lead to microbial growth and spoilage.

Classification of intelligent packaging: Three types of intelligent packaging systems can be distinguished: sensors, indicators and radiofrequency identification (RFID) systems.

A. Sensors: A sensor is defined as a device employed for the detection, measurement, and placement of energy or matter. In response to stimuli, it generates a continuous output signal that can be utilized to quantify the extent of chemical or physical stimuli it is reacting to (Ghaani et al., 2016). Typically, most sensors consist of two primary components: a transducer and a receptor. Various types of sensors are available, categorized based on the stimuli that provoke a specific response.

- **Biosensors:** These sensors possess the capability to identify, capture, and relay information related to biological systems. Bioreceptors can be biological or organic entities, including enzymes, nucleic acids, and antigens. Most commercial biosensors integrate an optical transducer with an antibody-based receptor. For instance, Sire Technologies Inc. developed an antibody-based biosensor branded as Food Sentinel System® and ToxinGuard®, was created by Toxin Alert, Canada, which involves antibodies printed on polyethylene plastic packaging.
- **Gas Sensors:** Gas sensors are designed to detect gaseous analytes within a package, including oxygen, water vapor, carbon dioxide, ethylene, and others. Commonly used gas sensors encompass ethanol sensors, piezoelectric crystal sensors, semiconductor field effect transistors, and organic conducting polymers, in addition to sensors for oxygen, carbon dioxide, and water vapor. Reports indicate the utilization of pH-sensitive dyes, including methyl red and curcumin, for the detection of basic volatile amines generated from decomposing fish and meat (Wu et al., 2021).
- **Chemical Sensors:** These sensors have been developed utilizing chemically selective coatings capable of adsorbing specific chemicals onto a surface. Carbon-based nanomaterials, such as graphene, carbon nanotubes, and carbon nanofibers, are extensively employed as chemical sensors due to their

exceptional surface area, enhanced electrical and mechanical properties, and favorable electrical characteristics.

- **Electronic Nose:** This device comprises various sensors that demonstrate partial specificity to different odor types, whether chemical or biosensors. Statistical methods are utilized to differentiate between simple and complex odors, producing a unique response for each. The electronic nose system has been successfully tested on odors emitted from vacuum-packed meat, fruits and vegetables, grilled chicken, and fresh yellowfin tuna. Electronic nose system may also be applicable to the packaging of milk products.

B. Indicators: These are defined as compounds that can indicate the presence or concentration of other substances or the reaction between two or more substances through characteristic optical changes, such as color changes (Kiryukhin et al., 2018).

1. **Freshness Indicators:** These indicators offer insights into product quality by identifying the chemical changes caused by microbial growth within the product (Kalpana et al., 2019). COX Technologies, USA, launched colorimetric indicator labels branded as FreshTag®. These labels utilize a color shift to indicate when fish and seafood products are storing and producing volatile amines. Ripe Sense™, a commercially available freshness indicator, assesses ripeness by interacting with aromatic compounds and ethylene gas produced during the ripening process. To ascertain the freshness of different dairy products, such an indicator will provide greater assurance and satisfaction among consumers, thereby facilitating further advancement in the dairy industry.
2. **Time Temperature Indicators (TTIs):** The primary environmental factor that affects the rate at which food products deteriorate is temperature. Time temperature indicators are responsible for indicating whether the storage temperature of food has exceeded this threshold, as well as the minimum duration for which the food has been above this threshold. TTIs serve as labels that visually represent when temperature-sensitive perishable items like frozen foods, have been improperly handled from the moment of production to the point of consumption (Ghaani et al., 2016). The use of thermochromic inks and pigments in food packaging is mainly confined to products such as cold and hot beverage cans, including those for cold drinks, beer, wine, soup, and coffee.
3. **Integrity Indicators:** During the entire process of producing and distributing packaged food, preventing leakage is a vital consideration. The role of integrity indicators is to ensure their integrity. Visual oxygen indicators consist of redox sensitive dyes that alter color in response to variations in oxygen levels in modified atmosphere packaging (MAP) meals. Several companies have developed oxygen indicator tablets like Ageless Eye, Vitalon, and Samso-Checker to assess oxygen and carbon dioxide leakage.

C. Radio-frequency Identification (RFID) Systems: RFID represents an automatic identification technology that employs tags or readers to identify objects and gather data autonomously, eliminating the need for human intervention. There are two categories of RFID tags: active and passive. Active tags are powered by an integrated battery, which enables the microchip circuitry to function and transmit a signal to the reader. In contrast, passive RFID tags depend on the power supply from the reader to operate. These tags consist of a coiled antenna that generates power to relay information to the reader when it interacts with the radio waves emitted by the reader. In comparison to conventional barcode tags, these tags are more advanced, reliable, and efficient for food traceability.

Advantages and challenges: This technology can be employed to identify counterfeit goods, enhance consumer engagement via smartphone applications, and reduce food waste by clearly indicating product expiration dates or freshness levels (Yousefi

et al., 2019). The numerous advantages of intelligent packaging such as increased consumer interaction, improved consumer experiences, elevated quality standards, and solutions to issues associated with traditional packaging methods, are compelling brand owners to adopt this technology. However, the primary challenges facing intelligent packaging include consumer education, the utilization, cost, and availability of smart or intelligent materials.

Future of intelligent packaging: While the concept of intelligent packaging is intriguing, it is essential that all packaging materials receive approval for use, and intelligent packaging is governed by the same regulations as conventional packaging (Hurme et al., 2002). As noted by Robertson (2006), there are no current methods established for assessing the suitability of intelligent packaging for direct food contact. A major concern is that most intelligent packaging solutions require food to be in close proximity to some type of sensor, which may lead to the leaching of materials from the sensor into the food.

1. It is crucial to identify the composition, concentration, and potential health implications of these compounds for them to be approved and regulated.
2. High cost of intelligent packaging hinders its practical implementation.
3. To guarantee that the information conveyed is accurate and that consumers are not let down when opting for these modern technologies over traditional ones, the system requires validation.

On a broader scale, it is vital that food producers, retailers, and consumers are aligned with the intelligent system. New technologies should be welcomed with an open mindset, and all participants in the supply chain must be assured that the new system is dependable and safe for users. Despite these challenges, there are still numerous advancements on the horizon. There is optimism surrounding intelligent packaging, and promising new innovations may still emerge.

Conclusion: Intelligent packaging systems offer immediate assessments of food product quality, which can assist in minimizing packaging duration and material expenses. These systems improve supply chain management through data carriers such as barcodes and QR codes, which are both economical and user-friendly. Nevertheless, the use of sensors and time-temperature indicators entails higher development and production expenses, and it is essential to keep packing materials as cost-effective as possible. It is crucial not to depend exclusively on intelligent packaging, as there is a risk of misuse or system malfunctions. Enhancing the performance of intelligent packaging continues to be a primary focus for research, with ongoing investigations aimed at resolving these challenges and improving its dependability for future industrial applications.

References

- *Ghaani, M., Cozzolino, C.A., Castelli, G., Farris, S., 2016. An overview of the intelligent packaging technologies in the food sector. Trends Food Sci. Technol. 51, 1–11.*
- *Hurme, Eero & Sipiläinen-Malm, Thea & Ahvenainen, R. & Nielsen, T. (2002). Active and intelligent packaging. Minimal Processing Technologies in the Food Industries (pp.87-123).*
- *Kalpana, S., Priyadarshini, S.R., Maria Leena, M., Moses, J.A., Anandharamakrishnan, C., 2019. Intelligent packaging: trends and applications in food systems. Trends Food Sci. Technol. 93, 145–157.*
- *Kiryukhin, M.V., Lau, H.H., Goh, S.H., Teh, C., Korzh, V., Sadovoy, A., 2018. A membrane film sensor with encapsulated fluorescent dyes towards express freshness monitoring of packaged food. Talanta 182, 187–192.*
- *Robertson, G. L. 2006. Active and intelligent packaging. In Food packaging: principles and practice - 2nd ed. CRC Press, Boca Raton, Fl. Chap. 14.*
- *Wu, D., Zhang, M., Chen, H., Bhandari, B., 2021. Freshness monitoring technology of fish products in intelligent packaging. Crit. Rev. Food Sci. Nutr. 61, 1279–1292.*
- *Yousefi, H., Su, H.-M., Imani, S.M., Alkhaldi, K.M., Filipe, C.D., Didar, T.F., 2019. Intelligent food packaging: a review of smart sensing technologies for monitoring food quality. ACS Sens. 4, 808–821.*

A2 Milk: A Farmer's Perspective on Dairy's Next Chapter

Dr. Sonika Choudhary*[1], Dr. Ankit Goyal1 and Dr. Anuradha Kumari[2]

[1]Assistant Professor, Department of Dairy Chemistry, College of Dairy and Food Science Technology, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab, India

[2] Assistant Professor, Department of Dairy Chemistry, Sanjay Gandhi Institute of Dairy Technology, Bihar Animal Sciences University, Patna, Bihar

sonikachoudhary15@gmail.com

ankit.ndri@gmail.com

Anu.ndri@gmail.com

*Corresponding author: sonikachoudhary15@gmail.com, Tel: +918950125767

Abstract

India, as the largest milk producer, faces a growing consumer demand for A2 milk, believed to offer health benefits like reduced risks of Type-I diabetes and cardiovascular issues, unlike A1 milk, which contains beta-casein linked to various health concerns. Transitioning to A2 milk requires genetic testing and selective breeding, presenting both challenges and opportunities for farmers. A2 milk can command higher prices, enhance market differentiation, and promote direct-to-consumer sales, contributing to increased profitability. However, farmers must also navigate costs associated with genetic testing, market competition, and regulatory compliance. Ultimately, understanding these dynamics allows farmers to leverage A2 milk's potential, balancing challenges with opportunities to meet consumer demands and improve their income.

Introduction

India is the highest milk producer and ranks first in the world contributing 25% of global milk production. Milk is considered almost a complete food constituting high quality protein, superior fat, sugar and micronutrients except iron and vitamin C. The dairy industry is constantly evolving, with new trends and scientific discoveries shaping the way farmers manage their herds and market their products. One of the most significant developments in recent years is the introduction of 'A2 milk' in the market. The concept of A2 milk was first introduced in New Zealand in 1992 claiming that A2 milk was associated with reduced risks of Type-I diabetes and coronary heart diseases. Unlike A2 milk, A1 milk contains beta-casein protein with histidine at position 67, which can break down into beta-casomorphin-7 (BCM-7) during digestion. BCM-7 has been linked to various health issues, including digestive discomfort, inflammation, and potential impacts on the gut-brain axis. Even a few studies have suggested that A1 milk might contribute to conditions like autism, schizophrenia, and heart disease also. Nevertheless, the evidences are not conclusive, and more research is needed to fully understand these potential health implications. Overall, the shift towards A2 milk production is

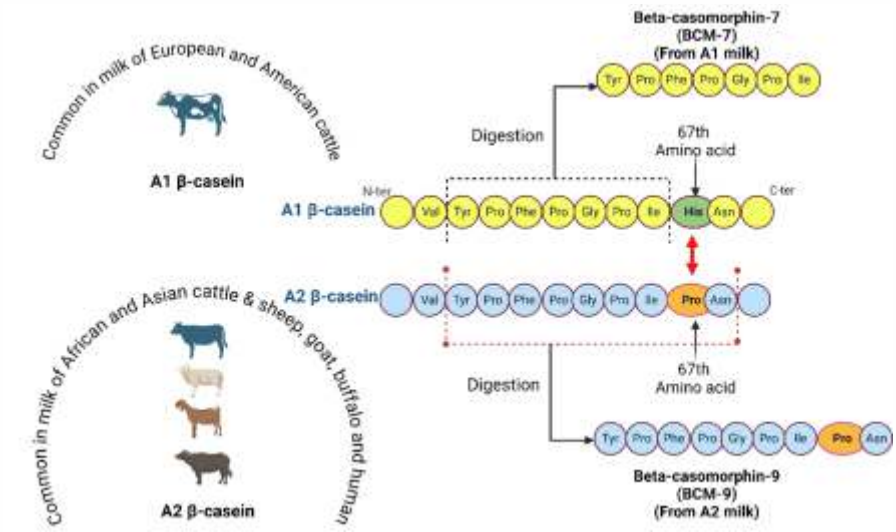


Fig. 1. Structural difference between of A1 and A2 beta-casein milk protein

having a notable impact on dairy farmers. Farmers/milk producers who switched from A1 to A2 milk, are marketing it as a premium product, and thus, potentially increasing their profitability. Despite several socio-economic challenges, the growing consumers are demanding for A2 milk, driven by its perceived health benefits, which further encouraging more farmers to make the switch. This editorial explores the differences between A1 and A2 milk from a farmer's perspective, examining the implications for herd management, market opportunities, and consumer health.

Understanding A1 and A2 Milk

Bovine milk contains two major proteins, casein (80%) and whey (20%) proteins. Casein is made up of four fractions: αs1 (12–15 g/L), β (9–11 g/L), αs2 (3–4 g/L), and κ-casein (2–3 g/L). β-casein is the second largest fraction (~30%) of casein protein, and is found in two variants: A1 and A2, which differ by only one amino acid at position 67. In A1 variant, 67th amino acid is histidine, whereas in A2 variant, it is proline (Fig. 1). When milk containing A1 β-casein variant (A1 milk) is consumed, it is hydrolyzed into a small peptide β-casomorphin-7 (BCM-7) by proteolytic enzymes. BCM-7 is reported to be associated with increase risk of type-I diabetes and cardiovascular diseases. However, it is not the case with A2 milk, and thus, it poses lesser risk of the same (Fig. 2). A few reports are available demonstrating the health implications of A1 milk and benefits of A2 milk which are shown in Fig.2.

It should be noted that A1 variant is not present in sheep, goat, buffalo and human milk, whereas, cow milk contains both (either A1 or A2) depending on breed and genetic polymorphism. This small difference of a single amino acid in A1 and A2 milk protein can affect how the protein is digested and may influence its impact on overall health. Currently, most milk which is marketed contains a mixture of A1 and A2 β-casein that could be due to the mixed milk supplied in the market.

- **A1 beta-Casein:** It is found in milk from breeds such as Holstein, Friesian, and British Shorthor. A1 beta-casein is the result of a genetic mutation that occurred thousands of years ago.
- **A2 beta-Casein:** This protein variant is found in milk from Indian breeds like Gir, Sahiwal, Ongole, Kankrej, Tharparkar, Rathi, Haryanvi, and Gangatiri. All desi cows with humps, classified as Bos Indicus, naturally produce A2 milk. Additionally, some foreign breeds such as Guernsey, Jersey, and Charolais also produce A2 milk as they have not undergone the same genetic mutation as other breeds.

Implications for Herd Management

For farmers, the distinction between A1 and A2 milk presents both challenges and opportunities. Managing a herd to produce A2 milk exclusively requires careful genetic selection and testing. In terms of Genetic Testing and Breeding, to produce A2 milk, farmers must ensure their cows carry the A2 gene. This involves genetic testing, which can be done by analyzing a hair or tissue sample from each cow. The results indicate whether a cow is A1/A1, A1/A2, or A2/A2. Only cows with

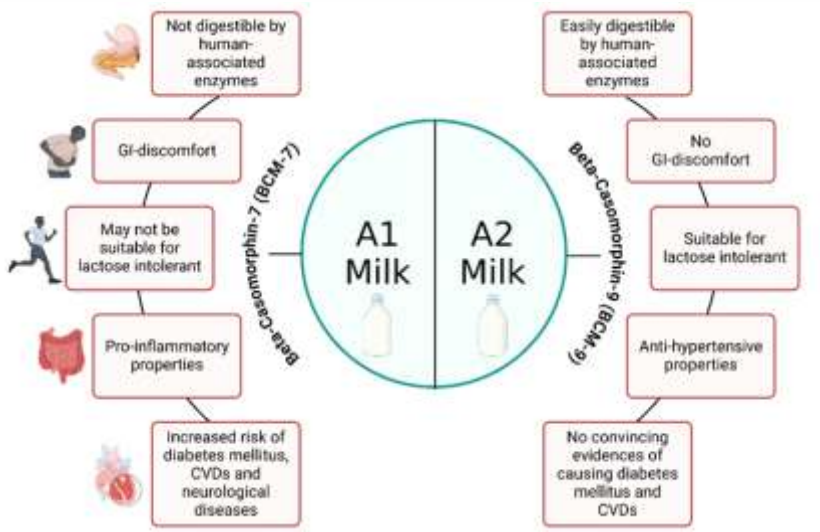


Fig. 2. Reported health effects of β-casomorphin peptides derived from A1 and A2 milk proteins (Sodhi et al., 2012; Semwal et al., 2022; Bolat et al., 2024)

the A2/A2 genotype produce milk that is free of A1 beta-casein. Therefore, selective breeding programs can then be implemented to increase the proportion of A2/A2 cows in the herd. This process can take several generations, but it is essential for farmers who want to market their milk as A2.

Talking about Herd Management Practices, Managing a herd for A2 milk production also involves maintaining high standards of animal welfare and nutrition. Healthy cows are more likely to produce high-quality milk, and good management practices can help prevent diseases that could affect milk production.

A growing market for farmer

A2 milk offers farmers a unique opportunity to increase their income through premium pricing, increased consumer demand, market differentiation, direct-to-consumer sales, and potential export opportunities. By investing in the production of A2 milk, farmers can tap into a growing market and secure a more profitable future. Thus, A2 milk can significantly benefit farmers' income.

- **Premium Pricing**

Pure A2 milk often commands a higher price in the market compared to regular A1-A2 mixed milk. This is due to its perceived health benefits and easier digestibility for some consumers. By producing A2 milk, farmers can tap into a niche market willing to pay a premium for this product.

- **Increased Consumer Demand**

There is a growing consumer demand for A2 milk, especially among health-conscious individuals and those with mild milk intolerance. This demand can lead to higher sales volumes and increased revenue for farmers who produce A2 milk.

- **Market Differentiation**

Producing A2 milk allows farmers to differentiate their products in a competitive market. By branding their milk as A2 and highlighting its potential health benefits, farmers can attract a loyal customer base. This differentiation can lead to better market positioning and higher sales.

- **Direct-to-Consumer Sales**

Farmers can also benefit from selling A2 milk directly to consumers, either through farm shops, farmers' markets, or online platforms. This direct sales approach can cut out middlemen, allowing farmers to retain a larger share of the profits.

- **Potential for Export**

In regions where A2 milk is not widely available, there may be opportunities for export. Farmers producing A2 milk can explore international markets where the demand for A2 milk is growing, potentially leading to increased income from exports.

- **Long-Term Health Benefits**

While not directly related to immediate income, the long-term health benefits associated with A2 milk can lead to sustained consumer loyalty. As more consumers experience the benefits of A2 milk, they are likely to continue purchasing it, ensuring a steady income stream for farmers.

- **A2 Milk–an Alternative Bovine Milk for Athletes**

The easy-digest A2 milk is a noticeable alternative for athletes who face health problems including gastro-intestinal discomfort when they consume A1 milk. A2 milk does not cause such serious health problems; besides, it has nearly the same nutritional composition as regular milk.

- **Branding and Marketing**

Farmers can capitalize on this demand by branding their milk as A2 and highlighting its potential health benefits. Effective marketing strategies include clear labeling, educational campaigns, and partnerships with retailers and health professionals. By differentiating their product in the marketplace, farmers can attract a loyal customer base and command higher prices.

Challenges and Considerations

While the potential benefits of producing A2 milk are significant, there are also challenges that farmers must consider.

- **Cost of Genetic Testing and Breeding**

The initial cost of genetic testing and selective breeding can be substantial. Farmers need to invest in testing kits, laboratory

fees, and potentially new breeding stock. However, these costs can be offset by the premium prices that A2 milk commands in the market.

- **Market Competition**

As more farmers enter the A2 milk market, competition is likely to increase. Farmers must continually innovate and improve their practices to maintain a competitive edge. This includes staying informed about the latest research, adopting new technologies, and responding to consumer feedback.

Regulatory and Certification Requirements

In some countries e.g. Australia, there may be regulatory requirements or certification processes for labeling milk as A2. Farmers need to be aware of these regulations and ensure they comply with all relevant standards. Certification can also add credibility to their product and build consumer trust. However, The Food Safety and Standards Authority of India (FSSAI) have instructed food businesses to stop using A1 and A2 labels on milk and milk products. A1 and A2 milk is based on the structure of a protein called beta-casein, but the Food Safety and Standards Regulations, 2011 do not recognize A1 or A2 as a standard for milk.

Conclusion

The distinction between A1 and A2 milk represents a significant development in the dairy industry, offering both challenges and opportunities for farmers. By understanding the genetic differences between A1 and A2 beta-casein, investing in selective breeding programs, and effectively marketing their product, farmers can tap into the growing demand for A2 milk. While there are costs and challenges associated with this transition, the potential rewards in terms of market opportunities and consumer health benefits make it a worthwhile endeavor for many dairy farmers.

Disclaimer: The views expressed in this article are solely those of the author and do not represent the opinions of Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana.

References

1. *Sodhi, M., Mukesh, M., Kataria, R.S., Mishra, B.P. and Joshii, B.K., 2012. Milk proteins and human health: A1/A2 milk hypothesis. Indian Journal of Endocrinology and Metabolism, 16(5), p.856. 10.4103/2230-8210.100685*
2. *Semwal, R., Joshi, S.K., Semwal, R.B., Sodhi, M., Upadhyaya, K. and Semwal, D.K., 2022. Effects of A1 and A2 variants of β-casein on human health—is β-casomorphin-7 really a harmful peptide in cow milk? Nutrire, 47(1), 8. https://doi.org/10.1186/s41110-022-00159-7*
3. *Bolat, E., Eker, F., Yılmaz, S., Karav, S., Oz, E., Brennan, C., Proestos, C., Zeng, M. and Oz, F., 2024. BCM-7: Opioid-like Peptide with Potential Role in Disease Mechanisms. Molecules. 29(9), 2161. https://doi.org/10.3390/molecules29092161*
4. *Jawale, B.,Kaluskar, A., Garde, J., Sabnis, S., 2015. The Reality of the White " A 1 vs A 2 Milk A Critical Review. International Journal of Science and Research. 6(6) 1844-1846.*
5. *Jeong, H., Park, YS. & Yoon, SS. 2024. A2 milk consumption and its health benefits: an update. Food Sci Biotechnol. 33, 491–503.*
6. *Chaudhary, A., Singh, H., Senger, G. S., Singh, S., 2021. A1 and A2 milk – What science claims? Indian Farming. 71(07): 46–48.*
7. *Fernández-Rico, S., Mondragón, A. D. C., López-Santamarina, A., Cardelle-Cobas, A., Regal, P., Lamas, A., Ibarra, I. S., Cepeda, A., Miranda, J.M., 2022. A2 Milk: New Perspectives for Food Technology and Human Health. Foods. 9; 11(16):2387.*
8. *Malca, J. M. H.,Vicente, A. T. K., Abanto-López, M. S., Aldana-Juárez, W.L., Palacios-Zapata, C.M., (2023).Worldwide research on the health effects of bovine milk containing A1 and A2 β-casein: Unraveling the current scenario and future trends through bibliometrics and text mining. Current Research in Food Science. 7, 100602. https://doi.org/10.1016/j.crfs.2023.100602.*

Modeling Dairy Farms: Transforming Tradition Through Technology

Gautami Sarma[1]*, Sumit Gangwar[2]

[1]Assistant Professor, Department of Livestock Production Management, Sanskaram College of Veterinary and Animal Science, Sanskaram University, Jhajjhar, Haryana

[2]Assistant Manager-Technical, Tiwana Nutrition Global Private Limited, Sirhind, Punjab

*gautami.sarma@gmail.com

Introduction

India's dairy industry, the largest in the world, is a vital pillar of the rural economy, contributing significantly to agricultural GDP and providing livelihoods to millions of small and marginal farmers. Despite being a global leader in milk production, Indian dairy farming often lacks the structure, technology, and uniformity required for consistent productivity and profitability. The majority of farmers own fewer than three animals and practice conventional, low-input methods. This leads to poor productivity, suboptimal milk quality, and limited market access. Feed resources are often imbalanced, housing is inadequate, and veterinary support is inaccessible in many rural regions. There is minimal data recording, and reproductive inefficiencies such as delayed conception and repeat breeding are common. In this context, modelization the creation of scientifically planned, economically viable, and environmentally sustainable dairy farm models, emerges as a crucial strategy for the modernization of the sector.

Modelization refers to the systematic design of dairy farms that incorporate best practices in animal husbandry, nutrition, health management, housing, and milk marketing. These model farms act as demonstration units or prototypes that can be replicated in different regions. They serve multiple functions: educating farmers, testing technologies, improving productivity, and acting as reference frameworks for public and private investment.

Key Components of Model Dairy Farm Design

A model dairy farm is characterized by several integrated components. The first is **scientific animal selection.** Selection of animal involves the careful choice of high-yielding dairy animals based on key genetic and performance traits. Selection is guided by detailed milk yield records, pedigree information, and physical conformation. In Indian conditions preference is given to crossbred or indigenous breeds with proven genetic merit. For female animals, present and previous lactation performance is evaluated, while for bulls, only progeny-tested semen from government-certified or registered breeding programs is used to ensure the transmission of superior traits. This approach

enhances productivity, disease resistance, and overall herd quality.

The second major component is **balanced and precision nutrition**. Balanced and precision nutrition is essential for maintaining animal health and maximizing milk production. Diets are formulated based on species (cattle or buffalo), body weight, stage of lactation, and milk output. Total Mixed Rations (TMR) enriched with bypass proteins, bypass fats, green fodder/silage with concentrate and mineral mixtures, ensure complete nutrition. These rations are often calculated using advanced nutritional software or mobile apps to achieve optimal feed efficiency. A scientifically balanced diet supports reproductive health, improves immunity, and enhances milk yield sustainably.

Housing in model dairy farms is thoughtfully designed to prioritize animal comfort, hygiene, and efficient management. For small and medium-scale farmers, open loose housing with adequate ventilation, proper sanitation, and drainage is essential. Simple yet effective designs include concrete flooring near feed mangers for easy cleaning, non-slippery rubber mats or sand-bedded resting zones not only reduce joint stress but also promote comfort to the animals. Integrated farming is often practiced to optimize resources, for example, using cow dung in biogas units to generate cooking fuel and organic manure for crop fields, thereby reducing external input costs.

In larger commercial farms, housing incorporates mechanization to enhance efficiency and reduce labour dependency. Automatic milking machines, mechanical dung scrapers, and water sprinklers help maintain hygiene and save time. The housing layout includes clearly defined zones for feeding, milking, calving, and calf rearing. Solar-powered water heaters and biogas units are also commonly integrated to minimize energy costs and environmental impact. Such thoughtful infrastructure promotes animal welfare, improves productivity, and supports sustainable dairy operations.

Health and reproductive management is vital for maintaining herd productivity and longevity. It includes timely vaccination and regular deworming to prevent disease outbreaks. Routine physiological examinations and growth monitoring ensure early detection of health issues. Heat detection should be done twice daily, using visual signs or tools like pedometers and chin-ball markers. In large mechanized farms, advanced systems such as thermal cameras and AI-based monitoring tools can be used to detect estrus accurately. Timely artificial insemination (AI) after accurate heat detection, followed by pregnancy diagnosis at the appropriate interval, ensures optimal conception rates and maintains a regular calving cycle for sustained milk production.

Record-keeping is central to model farms. Key records include daily milk yield, fat and SNF percent for production records, dates of calving, heat detection, AI, and pregnancy diagnosis for reproduction records, feed intake and ration details, as well as body weight and growth monitoring for nutritional records are maintained either manually or digitally. Such data helps in decision-making and long-term herd improvement.

Finally, **milk handling and marketing** are vital to modelization. Bulk milk coolers, quality testing equipment (for fat, SNF, adulteration), and FSSAI licensing for value-added products allow farms to move up the value chain. Some model farms sell milk directly to consumers under their own brand, while others tie up with cooperatives or private dairies.

Types of Model Dairy Farms in India

Model farms in India can be categorized based on their size and operational goals. At the grassroots level, smallholder model farms consist of 2–5 cows or buffaloes integrated into traditional farming systems. Medium-scale farms with 10–20 cows are semi-commercial in nature, often run by rural youth or self-help groups. These farms incorporate some automation, such as milking machines and silage pits, and are growing in states like Maharashtra and Tamil Nadu. Large-scale commercial dairy model farms with 50–500 cows, mainly crossbred HF or Jerseys, operate in a fully mechanized and professional environment. Another emerging

model is the cooperative- linked dairy farm, where several farmers adopt a shared model and pool their milk for collective marketing under organizations like Amul, Nandini, or NDDB-supported units.

Technology and Innovation in Model Farms

Technology plays a vital role in modern dairy modelization. Smart sensors help monitor animal temperature, activity, and rumen function in real-time, enabling early disease detection. AI-powered software assists in heat detection, ration balancing, and breeding predictions. Mobile applications are now widely available to guide farmers on feeding plans, vaccinations, and market prices.

Innovative use of renewable energy, such as solar cooling systems for milk storage, and bio-digesters for waste management, makes these farms both economically and environmentally sustainable. Digital platforms are also enabling transparent supply chains by linking farmers to consumers or processors directly.

Training, Demonstration, and Replication

Model dairy farms serve as practical training grounds for thousands of farmers. Government agencies, agricultural universities, and cooperatives often use these farms to conduct workshops, demonstrations, and extension programs. Trainees observe live models of balanced feeding, disease prevention, milking hygiene, and data management. This hands-on experience increases the confidence of farmers and makes them more likely to adopt new practices in their own settings.

Model farms also support start-up entrepreneurs in the dairy sector by acting as incubators. New entrants can test products such as feed supplements, milking machines, or

cooling systems in real farm conditions. This creates a feedback loop between technology developers and end-users, enhancing both innovation and adoption.

Challenges in Model Farm Implementation

Despite their benefits, model dairy farms face several challenges. Initial capital investment is high, especially for infrastructure, equipment, and superior animals. Although subsidies and loans are available under schemes like the Animal Husbandry Infrastructure Development Fund (AHIDF), access to finance remains a barrier for many rural farmers.

Additionally, skilled labor is often unavailable, and managing a modern dairy operation requires technical training. There is also resistance to change, particularly among older farmers who are used to traditional methods. Regional diversity in terms of fodder availability, climate, and breed preference means that models need to be localized rather than standardized.

Government Support and Policy Framework

The Indian government, through various schemes like the Rashtriya Gokul Mission, National Dairy Plan, and Dairy Entrepreneurship Development Scheme (DEDS), is actively promoting model farms. These schemes provide financial assistance, infrastructure grants, and training support to encourage the adoption of scientific dairy practices. NDDB, in collaboration with state federations, has also launched initiatives to set up model farms across districts as centers of excellence.

Public-private partnerships are growing in importance. These companies invest in farmer training, supply chain development, and quality testing. These partnerships are helping to scale the modelization movement beyond pilot projects into mainstream dairy development.

Conclusion

Modelization in the Indian dairy industry marks a turning point in the transformation of traditional dairying into a structured, data-driven, and commercially sustainable enterprise. By offering integrated solutions that blend science, technology, and business strategy, model farms are setting new benchmarks for productivity, profitability, and sustainability. They not only serve as role models for farmers but also attract the younger generation to dairy as a career. As India moves toward higher milk quality standards, export readiness, and climate-resilient farming, modelization will be at the heart of the country's dairy revolution

Nanotechnology Applications in Dairy Processing and Packaging

Manoj Kumar Singh and Jinu Manoj
Department of LPM, COVAS, SVPUAT, Meerut, U.P

Department of VPHE, LUVAS, Hisar, Haryana

Introduction

The use of nanoparticles in the food packaging sector is rapidly expanding. One of the fastest growing areas of nanotechnology research is its application in the dairy industry. The application of nanotechnology in dairy science not only enhances product quality but also addresses sustainability concerns by reducing food waste and optimizing production processes. Nanotechnology holds significant promise in revolutionizing various aspects of dairy science by enhancing the quality, safety and functionality of dairy products. This is achieved through the development of innovative nanostructured materials and advanced delivery systems. Through these it enables more effective preservation, targeted nutrient delivery and improved packaging for dairy products. Applications of nanotechnology in dairy industry include antimicrobial coatings for extended shelf life, nanoencapsulation of bioactive compounds to enhance nutritional value and sensors for real-time quality monitoring of dairy products.

Applications of Nanotechnology in Dairy industry

1. Nanoencapsulation and Nanoemulsions

Nano-sized carriers like nanoemulsions, liposomes, nanofibers, nanocapsules are used to pack probiotics, vitamins, omega-3s, essential oils, bacteriocins and other sensitive bioactives. These systems enhance solubility, stability, absorption and allow controlled release of antimicrobials and nutrients, reducing degradation and sensory impact. Encapsulation protects volatile compounds also and ensures flavor stability over shelf life. In ice creams and desserts, nanotechnology improves texture and creaminess via rheological enhancement. Natural colorants like curcumin or carotenoids in nanoemulsions offer uniform dispersion and resistance to oxidation. Nanoemulsions can mimic fat, enhancing creaminess and mouthfeel in low fat or fat free dairy products.

2. Active and Smart Packaging

Nano-coatings with silver, zinc-oxide or clay-based improve the barrier properties by blocking moisture, oxygen and UV light and offer antimicrobial protection, extending shelf life. Nanosensors embedded in packaging detect spoilage, gas emissions, pathogens and temperature changes in real-time, enabling more robust quality control throughout the supply chain. Oxygen scavengers remove residual oxygen inside packaging

to prevent oxidative spoilage and rancidity and are commonly used in cheese, butter and fermented dairy products. Moisture absorbers are used in cheese packaging and butter wraps to reduce mold growth and texture degradation. Incorporation of UV blockers such as titanium dioxide or opaque layers in milk cartons and cream packaging protect light sensitive vitamins and prevent photo-oxidation preventing development of off-flavors and nutrient loss. Carbon dioxide emitters and absorbers are used in fermented dairy drinks and certain cheeses inhibit microbial growth and maintain product quality by modifying the gaseous environment inside the package.

3. Controlled Delivery of Antimicrobials

Nanostructured delivery systems enhance the effectiveness of natural antimicrobials viz. nisin, essential oils, lactoferrin by protecting them from degradation and enabling sustained release in dairy matrices like cheese, yogurt, and milk. Silver nanoparticles are commonly using antimicrobial films for food packaging due to its toxicity to broad range of microorganisms. It has high temperature stability and low volatility also. Film based on silver nanoparticles has been produced and their antimicrobial effectivity has been reported. Nanocomposites with low silver nanoparticles content give an increased efficacy against E. coli than microcomposites with higher silver. Nanomaterials can be utilised as antibiotic transporters, killing agents or growth inhibitors. The antimicrobial-active organisms may aid in limiting the development of pathogenic and spoilage microorganisms. An antimicrobial nanofilm is particularly attractive due to the nanomaterial's good structural integrity and barrier qualities, as well as the antimicrobial capabilities provided by the antimicrobial chemicals impregnated inside the film.

4. Fortification and Nutrient Delivery

Nanoencapsulation helps integrate vitamins and minerals into dairy without compromising taste or texture. Vitamins (A, D, E, K) and omega-3 fatty acids can be encapsulated in nanoemulsions to prevent degradation and enhance absorption. Nanoemulsions are commonly used in fortified milk, yogurt and cheese. Nano-functional ingredients can also increase bioavailability such as iron in yogurt, probiotics in cheese etc and improve product nutritive value.

5. Nanocellulose and Pickering Emulsions

Pickering emulsions are emerging as innovative stabilizers in dairy formulations, where solid particles often food-grade proteins or polysaccharides replace traditional surfactants to stabilize oil-in-water or water-in-oil emulsions. Common pickering stabilizers using in dairy industry are casein micelles, whey protein aggregates, cellulose nanocrystals and starch granules. Plant-based nanocellulose is used to stabilize emulsions, acting as low-calorie thickeners or fat substitutes in dairy systems. These pickering emulsions exhibit long-term stability and can enhance texture as well as reduce fat content. Nanocellulose aerogels and foams are explored for eco-friendly packaging alternatives, replacing foam plastics. These are used in dairy products such as cream and yogurt to improve texture and stability, especially in low-fat versions. Pickering emulsions are used in cheese analogues to enhance mouthfeel and reduce fat content. Fortified milk and beverages contain these emulsions for enhancing bioavailability of omega-3 oils or fat-soluble vitamins by encapsulating them. Dairy based dressings and sauces with pickering emulsions offer long shelf life with natural stabilizers.

Conclusions

The integration of nanotechnology in dairy science has the potential to drive innovation, improve product performance and meet consumer demands for healthier and more functional dairy products. Nanotechnology holds strong promise for transforming dairy processing, packaging, nutrition and safety. With continued research and regulatory clarity, these innovations could soon become main stream particularly in functional dairy foods, smart packaging and fortified products. However, many of these innovations remain at pilot or early commercialization stages. Challenges such as large-scale production, regulatory approval, safety assessment and consumer acceptance are still being addressed before widespread adoption can occur.

Packaging of Traditional Milk Products: Past Challenges and Modern Solutions

[1]N. Gopalakrishnan, [2]Bagavathi M, [3]Pasupathi Karu

[1]Fourth Professional Year, Veterinary College and Research Institute, Tirunelveli-627358, Tamil Nadu, India.

[2]MVSc Scholar, Animal Physiology Division, ICAR - National Dairy Research Institute, Karnal-132001, Haryana, India.

[3]Professor and Head, Animal Nutrition Department, Veterinary College and Research Institute, Tirunelveli-627358, Tamil Nadu, India.

Introduction

India, was one of the world's largest producers and consumers of dairy products, has witnessed a significant transformation in the way traditional milk-based sweets and staples are packaged. From humble paper cartons to advanced multilayered films, this evolution has been driven by the need for longer shelf life, better hygiene, convenience in transportation, and improved product presentation.

Challenges with Traditional Packaging

- Traditional packaging such as leaves, earthenware, or simple cloth wraps, while eco-friendly and locally sourced, lacked the protection required to ensure hygienic and extended storage, especially under fluctuating climates or long-distance transportation.
- Historically, dairy items were packaged in dokle paper cartons, polyethylene bags, or cardboard boxes. While economical, these materials provided minimal protection against environmental factors. They lacked the robust barrier properties needed to guard against moisture, oxygen, and odors. Consequently, products would quickly become rancid or oxidized, absorb foreign scents, and lose their original texture and flavor. These packaging materials were also inadequate for long-distance transport, limiting the market reach for traditional dairy products.

Advances in Dairy Packaging Technology

With the development of modern packaging technologies, the dairy industry is now equipped with a variety of materials and methods to better preserve product quality and extend shelf life.

Khoa (Mawa)

The packaging of khoa has greatly improved through the use of laminated materials such as paper, aluminum foil, and low-density polyethylene (LDPE). Polycel films in different gauges have also provided good results. Using these laminates, khoa can remain in acceptable condition for up to 10 days at room temperature and for around 60 days under refrigeration.

The introduction of more advanced four-layer laminates consisting of polypropylene, LDPE, aluminium foil, and another layer of LDPE has further extended shelf life to around 14 days at 30°C and up to 75 days in cold storage.

Chhana

Polycel films of various thicknesses have proven to be effective, low-cost packaging solutions for chhana. While not as long-lasting as some advanced laminated options, they offer

sufficient protection for short-term storage and nearby distribution.

Ghee

Traditionally, ghee is packaged in either lacquered or unlacquered tin cans, ranging from small retail sizes of 250 grams to bulk containers holding up to 15 litres.

Today, alternatives like polyethylene bags, polyester-coated cellophane, food-grade PVC, nylon-6, and other laminates are also used. These materials help preserve the aroma and prevent oxidation, making them suitable for extended shelf life and broader market distribution.

Paneer

Paneer is now often packaged in polystyrene or polypropylene tubs, which effectively protect the product from contamination and spoilage.

This packaging can extend the shelf life of paneer up to 180 days under frozen conditions at -18°C and around 30 days when refrigerated at 5°C.

Fermented Products – Dahi, Shrikhand, Misti Doi

Production of fermented dairy items like dahi, shrikhand, and misti doi has shifted to automated assembly-line packaging, particularly in organized dairy sectors.

Recent innovations include the use of lightweight, leak-proof lacquered kulhars developed by the National Dairy Research Institute (NDRI). These clay-based containers not only offer improved shelf life but also provide a more traditional and an eco-friendly alternative to plastic cups.

Rasgulla

Rasgullas are generally packaged in lacquered tin cans that offer hermetic sealing, making the product shelf-stable for up to six months at room temperature. Such packaging is ideal for long-term storage and bulk sales without requiring refrigeration.

Other Sweets – Burfi, Peda, Kalakand

Products like burfi, peda, and kalakand are typically packaged in polypropylene trays covered with transparent colored MXXT films. This packaging sustains product freshness, enhances shelf appeal, and provides ease of stacking and safe transportation.

Advantages of Modern Dairy Packaging

- Modern packaging methods offer substantial benefits over traditional approaches. They significantly extend the product's shelf life under various temperature conditions, ensure better hygiene and safety, and protect the food from microbial contamination, moisture ingress, and oxygen exposure.
- Improved mechanical strength reduces product damage during transit. The newer packaging solutions also support better marketability due to their aesthetics and allow dairy producers to distribute their goods over a wider geographical area.

Research and Innovation Spotlight

Today, the landscape is transformed by significant advancements driven by dedicated research and institutional support. Institutions like the National Dairy Research Institute have played a pioneering role in fostering innovation. Their work on lacquered kulhars is a case in point, exemplifying how indigenous containers can be adapted with a layer of food-safe lacquer to make them impermeable to moisture and more durable, thereby retaining the product's authentic presentation while dramatically boosting functionality. Such inventive approaches marry traditional aesthetics with modern safety and convenience standards, appealing both to consumers trained in tradition and those who value practicality and hygiene.

Conclusion

Packaging has become an essential factor in the quality preservation and commercial viability of traditional dairy products. QR codes and digital labelling not only ensure transparency in sourcing and manufacturing, but also help brands add value through storytelling and product education.

As a result of these continuous advances anchored in research, technology transfer, and collaborative industry initiatives, Indian milk products are now shipped to global destinations without sacrificing freshness, taste, or the nostalgia of their cultural origins. This progress showcases how modern packaging is not just a technological upgrade, but a means of preserving and celebrating the rich culinary heritage of traditional dairy, connecting rural producers to urban and international consumers.

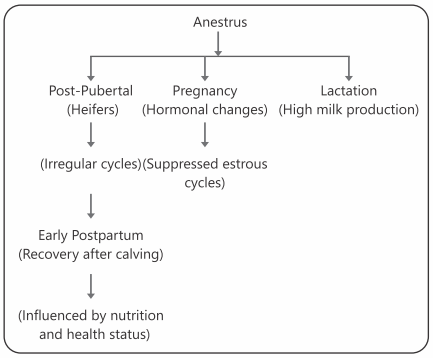
Understanding and Managing Anestrus in Cattle: A Short Guide to Reproductive Health

[1]Madhu Meena, [2]Amanish Kumar
[1]PhD Scholar, Animal Reproduction Gynaecology and Obstetrics
[2]PhD Scholar, Dairy Extension Section
ICAR -National Dairy Research Institute, ERS, Kalyani, 741235

Cattle rearing has been a traditional livelihood in India and is closely linked to agricultural economy. Production efficiency of dairy cattle is largely dependent on reproductive performance. Indigenous cattle playing crucial role in the national economy through supply of draught animal power, milk, cow dung (organic manure) and cow urine (medicinal value). However, infertility in cows due to anestrus has significantly impacted production capacity in India over the past few decades. Addressing this issue is crucial for improving reproductive efficiency and overall productivity in the dairy industry.

Infertility refers to difficulties in timely conception, with anestrus being a significant cause. Infertility is a complex and multifactor problem; anestrus and repeat breeding have been identified as the main factors responsible for this. Anestrus is indeed a significant reproductive issue in cattle and buffalo, particularly in India, where it can have profound effects on productivity and the overall economy of livestock farming. Anestrus refers to the absence of estrus (heat), leading to delayed breeding and lower conception rates. Anestrus is a reproductive disorder characterized by no visible signs of estrus, due to either lack of expression or failure to detect it. The purpose of this short communication is to review the following aspects of anestrus in female cattle: what anestrus is, the types of anestrus, factors affecting it, its causes, the impact of anestrus on reproductive performance, as well as the diagnosis and treatment options available. This short overview aims to enhance understanding and management of anestrus in dairy cattle. Anestrus can be caused by various factors, including nutritional deficiencies, poor management practices, diseases, and environmental stresses.

The physiological mechanisms of anestrus in cows involves a blockage of the GnRH "pulse generator" in the hypothalamus, but other mechanisms are also likely at play, as this approach doesn't work for all cows. The causes of anestrus may differ depending on its stage. Importantly, the mediating factors do not include prolactin, oxytocin, adrenal activity, or direct neural signals from the mammary gland; rather, they are at least partially associated with blood glucose levels and the endogenous opioid peptide system.



Flow chart representation for the situations in which anestrus can occur.

Understanding these factors helps in effective reproductive management in cattle.

Anestrus can be categorized into several types, each with distinct causes and characteristics:

Physiological Anestrus refers to normal periods of anestrus in animals that are not related to infertility, occurring during:

1. Pre-Pubertal Anestrus: Before puberty.
2. Gestational Anestrus: During pregnancy.
3. Lactational Anestrus: During lactation.
4. Post-Partum Anestrus: Early postpartum period.

These stages are natural and do not indicate infertility

Prepubertal Anestrus occurs in young animals where follicular waves resemble those of adults but follicles only develop to the theca interna stage before regressing. This stage is marked by:

- Low LH pulse frequency, leading to insufficient follicle growth.
- Inhibitory effects of opioids on LH secretion.
- High threshold for estradiol's positive feedback on LH surge.

As a result, heifers remain in anestrus until puberty

Gestational Anestrus occurs due to elevated progesterone levels during pregnancy, which negatively feedbacks on GnRH secretion and reduces LH pulse frequency, leading to anestrus.

Postpartum Anestrus refers to the period of anestrus that all females experience after giving birth. This duration varies but is generally short. Notably, the postpartum anestrus period is usually longer in buffalo compared to cattle, even under similar management conditions

Pathological Causes of Anestrus include conditions such as ovarian agenesis, dysgenesis, or disruptions in follicular-luteal dynamics, which can lead to anestrus and infertility, presenting a herd problem. These conditions may be congenital or acquired.

Ovarian Disorders: Conditions like ovarian agenesis, dysgenesis, or other follicular-luteal dysfunctions that impair ovarian activity.

Infections or Diseases: Conditions such as endometritis or systemic diseases that affect reproductive health.

1. **Nutritional Anestrus:**

   Caused by deficiencies in energy, protein, or essential minerals that impair reproductive function.

2. **Environmental Anestrus:**

   Triggered by extreme environmental conditions, such as heat or cold stress, which can disrupt normal reproductive cycles.

3. **Management-Induced Anestrus:**

- Results from factors like excessive suckling, poor breeding management, or stress from handling or housing conditions.

  Each type of anestrus has specific management and treatment implications, emphasizing the need for targeted interventions based on the underlying cause.

Factors affecting anestrus

Nutritional status affects follicular growth and ovulation, with undernutrition being a key cause of anestrus in heifers. In tropical regions, prolonged postpartum anestrus (>150 days) often results from inadequate feed quality.

Reduced intake during late gestation or early postpartum and negative energy balance (NEB) from high metabolic demands after calving delay LH pulsatility and prolong anestrus. Additionally, deficiencies in minerals like calcium, phosphorus, copper, zinc, and manganese hinder reproductive performance, as these minerals are vital for hormone and enzyme function.

Environmental Stress from extreme cold and heat impacts follicle development and estrus expression in cattle and buffalo. While buffaloes are adapted to hot, humid climates, heat stress

significantly reduces ovarian activity, often resulting in anestrus.

Body Condition Score (BCS) indicates an animal's nutritional status and significantly affects reproductive performance. Extremes in BCS (very low or very high) during pre-calving, calving, and early postpartum can delay the onset of cyclicity.

Breed: Dairy cows that are suckled tend to have longer postpartum intervals than those in the beef category.

Parity: First-calving (primiparous) cows take more time to return to first ovulation than cows that have calved before (multiparous).

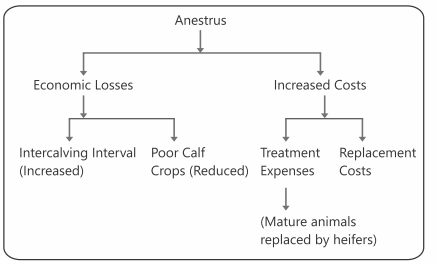
Suckling suppresses postpartum ovarian activity in both cattle and buffalo, leading to an extended period of postpartum anestrus. Additionally, postpartum anestrus is longer in continuously suckled animals compared to those that are restricted or partially suckled.

Season: In the winter are at a higher risk of anestrus. Seasonal changes can affect photoperiod stimulation in the brain. Although dairy cattle are not seasonal breeders, these environmental factors can still influence reproductive performance.

Parasitic Infestations represent a major stress factor, especially in growing cattle, rather than adults. Severe infestations can adversely affect the future productivity and reproductive performance of the affected animals.

Incidence of anestrus is higher in adult cattle and buffalo than the heifers.

Economic impact. This flow chart outlines how anestrus leads to various economic losses in livestock management.



Diagnosing anestrus in cattle and buffalo involves several key steps:

1. **Clinical Examination:** Assess the general health and body condition of the animal. Look for signs of reproductive disorders, such as abnormal discharge or signs of previous calving.
2. **History Taking:** Review the animal's reproductive history, including age, breeding records, and any previous health issues. This refers to the inability of animals to display visible signs of estrus after reaching puberty or 60–90 days postpartum. Initially, they may show symptoms of estrus with regular cyclicity, but then these symptoms cease, and the animals revert to anestrus. Note the duration of anestrus and any management practices, such as nutrition and stress factors.
3. **Hormonal Testing:** Measure hormone levels (e.g progesterone, estrogen) through blood tests to assess ovarian activity.

Progesterone Estimation: True anestrus is characterized by the lack of ovarian progesterone production. Diagnosing it can be confirmed by measuring basal progesterone levels (0.5–1 ng/ml) in blood samples taken every 8–10 days. If progesterone levels exceed 1 ng/ml, it indicates the presence of a corpus luteum, suggesting that anestrus might result from unobserved estrus, silent estrus, or a persistent corpus luteum.

Per Rectal Examination: Pregnancy is a key cause of anestrus and should be excluded through careful examination of the ovaries and uterus during gynaecological checks. In true anestrus cattle the ovaries appear smooth, small, and inactive, with no corpus luteum present. However, follicles may develop to the prematuration stage but subsequently become atretic

4. **Ultrasound Examination:** Perform transrectal ultrasound to evaluate the ovaries and check for the presence of follicles or any abnormalities. Ovarian pathologies that cannot be accurately assessed through per rectal palpation can be visualized using ultrasonography. This method allows for the detection of different stages of follicular growth and

helps identify the type of anestrus present in the animal

5. **Vaginal Cytology:** Collect and examine vaginal swabs to assess the cellular changes related to estrus cycles.
6. **Monitoring Estrus Behaviour:** Keep records of estrus behaviour in the herd. The absence of regular estrus signs can help confirm anestrus.
7. **BSE (Breeding Soundness Examination):** Conduct a thorough reproductive examination to rule out other causes of infertility.

These methods help veterinarians and farmers identify anestrus and implement appropriate management strategies to enhance reproductive performance.

The treatment of anestrus in cattle focuses on addressing the underlying causes and restoring normal reproductive function. Here are common treatment strategies:

1. **Nutritional Management:** Ensure a balanced diet rich in energy, protein, vitamins, and minerals to support reproductive health. Address any deficiencies, particularly in minerals like calcium, phosphorus, copper, zinc, and manganese. Undernutrition, particularly a lack of dietary energy, is a major cause of delayed rebreeding in cattle, especially during late gestation. Cows in poor body condition at calving face extended intervals to postpartum estrus and ovulation due to slowed LH restoration and suckling effects on GnRH secretion.

This can delay follicle development for over 100 days. Although increasing feed intake after calving can help, it's often not cost-effective. The best approach is to help cows regain body condition during the dry period after weaning, when nutrient needs are lowest and gains are most economical. Calving cows in good body condition is ideal. If needed, strategic protein supplementation can improve intake and digestion of low to medium-quality forages during postpartum rebreeding. Ensuring nutrition is managed to maintain a body condition score of 5 to 7 before calving.

2. **Plant-Based Heat Inducers:** Plants have historically been used for animal treatment. Indigenous herbal preparations like Prajana HS, Janova, Sajani, Heat Up, Heat Raj, Fertivet, and Aloes Compounds are commercially available and have proven effective in restoring cyclicity, achieving notable success rate.
3. **Utero-Ovarian Massage:** This technique is one of the oldest and most straightforward methods to induce estrus in anestrus cattle. It is also cost-effective and has proven to be effective.
4. **Use of Lugol's iodine:** One potential mechanism for the intrauterine use of Lugol's iodine is its role as a chemical irritant, which helps replace the uterine mucosa with new tissue. This new endometrial tissue releases luteolytic factors (like PGF2α) that reach the corpus luteum through the utero-ovarian pathway, leading to luteolysis. This can trigger the estrous cycle if anestrus is due to a persistent corpus luteum (PCL). However, Lugol's solution is now discouraged for treating anestrus because of its irritating nature and harmful effects on the endometrium.
5. **Health Management:** Treat any underlying diseases or infections that may affect reproductive performance. Implement regular veterinary check-ups and vaccinations.
6. **Hormonal Therapy:** Use hormonal treatments, such as prostaglandins or gonadotropins, to stimulate ovarian activity. Administer progesterone to regulate estrous cycles, especially in cases of silent heat.

- **Use of Progesterone Alone:** The use of progesterone alone to stimulate the early resumption of oestrous cycles in suckled or dairy cows
- **Use of Progesterone Followed by Chorionic Gonadotropin:** The treatment involves administering chorionic gonadotropin after a period of progesterone therapy to promote ovarian follicle development and increase oestradiol production. This method has been evaluated in both suckled and milking cows, but the outcomes have varied.
- **Use of Progesterone Followed by Estradiol:** Estradiol has been utilized to stimulate ovulation and promote the expression of estrus after progesterone treatment in several studies.
- **Use of Estradiol in Conjunction with Progesterone**
- **Use of GnRH Analogues with Progesterone**
- **Use of GnRH Analogues with PGF2α**

7. **Breeding Management:** Employ artificial insemination (AI) techniques and synchronization protocols to enhance breeding efficiency. Monitor estrus closely and use tools like heat detection aids. Restricting the breeding season to 45–55 days.
8. **Environmental Management:** Reduce stress by improving housing conditions and managing temperature extremes. Provide adequate shade and water in hot climates.
9. **Addressing Suckling Issues:** Consider weaning strategies if suckling is suppressing ovarian activity, particularly in cows with prolonged anestrus. In suckled cows, temporarily removing calves can effectively shorten the interval to first ovulation. Isolating calves from their mothers, rather than keeping

them in adjacent pens, further decreases the postpartum interval (PPI). However, these methods often result in reduced estrous expression before ovulation and shorter estrous cycles unless combined with progesterone treatment. Judiciously implementing complete, partial, or short-term weaning practices.

10. **Culling:** In cases of chronic anestrus with no response to treatment, consider culling animals that do not return to reproductive cycles. Minimizing the effects of dystocia and stimulating estrous activity using a sterile bull and estrous synchronization techniques.

Implementing these strategies can help improve reproductive performance and reduce the incidence of anestrus in cattle.

Prevention of anestrus is preferable to treatment and can be achieved through effective farm management practices that promote animal health. Key strategies include:

1. **Nutrition:** Ensure a balanced diet that supports ovarian activity. Prevent negative energy balance, especially in high-yielding animals, by providing adequate rations during the pre- and postpartum periods.
2. **Supplementation:** Include vitamins, minerals, and antioxidants in the feed to enhance reproductive health and support the restoration of cyclicity.
3. **Health Management:** Conduct regular health checks and vaccinations to prevent diseases that can impact reproduction.
4. **Stress Reduction:** Minimize environmental stressors, such as extreme temperatures and poor housing conditions.
5. **Monitoring:** Keep accurate records of reproductive performance to identify and address issues early.

By focusing on these preventive measures, farmers can enhance reproductive efficiency and reduce the incidence of anestrus in their herds.

Conclusion

Effective management of anestrus in dairy cows is crucial for improving fertility and reproductive performance. Key strategies include ensuring adequate nutrition, particularly during late gestation and the postpartum period, and maintaining optimal body condition at calving. Monitoring and addressing hormonal and physiological factors, along with strategic supplementation, can help facilitate timely estrus and ovulation. By prioritizing these practices, producers can enhance reproductive efficiency and ultimately improve herd productivity.

The Dairy Expo (TDEX) 2025 Marked a Resounding Success in Its 3rd Edition

The Dairy Expo (TDEX) 2025 returned for its 3rd edition with remarkable energy, successfully bringing together the feed, pharmaceuticals, and equipment sectors under one roof. Held from **21–23 August 2025 at the India Expo Center & Mart, Greater Noida, Delhi-NCR,** the event once again reinforced its position as a leading platform for the Dairy and livestock industry.

This year's edition witnessed **100+ exhibitors and sponsors**, represented some of the most influential names in the sector. With participation from over **20 countries,** the exhibition truly lived up to its global stature. The event also drewed **200+ VIP attendees** and more than **8,000 visitors**,

making it one of the most vibrant gatherings in the livestock exhibition space. In addition to the overwhelming footfall, the show received **extensive media coverage**, further amplifying its reach and impact across the industry.

Running concurrently with **The**




Poultry Expo and **The Aquaculture Expo**, TDEX created a unique ecosystem where the Dairy, Poultry, and Aquaculture industries came together on a single platform. This tri-expo collaboration offered attendees and exhibitors a broader scope to explore opportunities, forge cross-sector partnerships, and engage with multiple segments of the livestock value chain.

One of the key highlights of the event was its role in providing an **unmatched platform for product launches.** Many companies took advantage of the expo to introduce their latest innovations in feed, veterinary pharmaceuticals, vaccines, equipment, and technology solutions. For businesses, it proved to be a golden opportunity to **enhance brand presence** and strengthen relationships with both existing and potential customers.

Visitors, on the other hand, found immense value in being able to **network with industry leaders, benchmark against competitors, and explore new markets.** The event also facilitated conversations on **emerging trends, sustainability, and technological advancements** that are shaping the future of the Dairy sector. For many, the expo was not just about business, but also about knowledge sharing and discovering new perspectives that could guide future growth.

The presence of **international delegations** added further weight to the show, as it enabled Indian companies to connect with global buyers, investors, and partners. This created avenues for collaborations that extended beyond domestic boundaries, opening doors to exports, joint ventures, and technology transfers.

Organised by **Pixie Expomedia** and supported by leading industry bodies, **TDEX 2025** stood as a testament to the dynamic growth of the Indian Dairy sector. The organisers ensured seamless execution, with a focus on creating a professional environment conducive to business discussions and meaningful engagements. The well-structured stalls, informative sessions, and networking opportunities received widespread appreciation from participants.

Attendees unanimously agreed that the expo had once again delivered on its promise of **being the ideal opportunity to engage with the fastest-growing segments of the livestock industry.** The 3rd edition not only celebrated the resilience and innovation of the Dairy sector but also demonstrated how collaboration across allied industries can accelerate progress for all stakeholders involved.

As the curtains came down on TDEX 2025, the industry walked away with renewed enthusiasm, stronger connections, and a clearer vision for the future. The event proved to be more than just an exhibition—it was a true reflection of the evolving livestock landscape in India and beyond.


navfarm
Why Choose Navfarm?


INTERNATIONAL


MS VED ENGINEERING


ShahTe


LIVESTOCK
FUTURE

Poultry Planner and Dairy Planner Announce Official Media Partnership with ILDEX Indonesia 2025

Haryana, India – Poultry Planner and Dairy Planner, two of the leading industry-specific publications catering to the poultry and dairy sectors, are proud to announce their official media partnership with ILDEX Indonesia 2025. This strategic collaboration will further strengthen the global presence of these premier publications while supporting the growth and innovation of the livestock, dairy, meat processing, and aquaculture industries in Indonesia and beyond.

ILDEX Indonesia 2025, one of the most anticipated international livestock, dairy, meat processing, and aquaculture exhibitions, will take place from September 17 to 19, 2025, at Jakarta International Expo, Indonesia. With a focus on industry advancements, cutting-edge technology, and networking opportunities, ILDEX Indonesia serves as a key platform for professionals, suppliers, and decision-makers from across the globe.

As an official media partner, Poultry Planner and Dairy Planner will have an exclusive stall at the event, providing a hub for industry professionals to engage, exchange insights, and explore the latest trends in the poultry and dairy sectors. This partnership marks a significant milestone in expanding the reach of these magazines, bringing valuable knowledge and business opportunities to stakeholders in the region.

A Strategic Collaboration for Industry Growth

The partnership between Poultry Planner, Dairy Planner, and ILDEX Indonesia 2025 reflects a shared commitment to fostering innovation, knowledge-sharing, and business development in the livestock and dairy industries. Through this collaboration, Poultry Planner and Dairy Planner will:

- **Offer In-Depth Coverage:** Providing comprehensive coverage of ILDEX Indonesia 2025, including exclusive interviews, panel discussions, and insights from industry leaders.
- **Facilitate Networking:** Engaging with exhibitors, attendees, and key stakeholders to foster meaningful business connections and knowledge exchange.
- **Showcase Innovations:** Highlighting the latest technological advancements and trends in the poultry and dairy sectors, offering a platform for businesses to showcase their products and solutions.
- **Host Interactive Sessions:** Organizing live discussions, presentations, and networking sessions at the event stall to encourage industry engagement.

About ILDEX Indonesia 2025

ILDEX Indonesia is recognized as one of the premier international trade exhibitions for the livestock

and dairy industry. The event brings together global industry leaders, investors, suppliers, and policymakers, providing a unique opportunity to explore market trends, business prospects, and innovative solutions shaping the future of the sector.

With a strong emphasis on emerging technologies, sustainability, and best practices, ILDEX Indonesia serves as a crucial meeting point for industry professionals seeking to expand their knowledge and business reach.

Commitment to Industry Excellence

Speaking about the partnership, Mayank Arya, Project Manager with Team of Poultry Planner and Dairy Planner, stated, "We are thrilled to join hands with ILDEX Indonesia 2025 as an official media partner. This collaboration aligns with our mission to provide industry professionals with valuable insights and updates, while also creating opportunities for knowledge exchange and business growth. With our presence at the event, we look forward to engaging with global leaders and driving impactful discussions on the future of poultry and dairy industries."

As part of the collaboration, Poultry Planner and Dairy Planner will also release special editions focused on ILDEX Indonesia 2025, featuring expert opinions, market trends, and exclusive insights into the evolving landscape of the poultry and dairy sectors.

Join Us at ILDEX Indonesia 2025

Poultry Planner and Dairy Planner invite industry stakeholders, business leaders, and professionals to visit their stall at ILDEX Indonesia 2025 to explore opportunities, discuss industry trends, and engage with thought leaders.

About Poultry Planner and Dairy Planner

Poultry Planner and Dairy Planner are leading publications dedicated to delivering in-depth analysis, market trends, and industry news in the poultry and dairy sectors. With a strong readership across India and international markets, these magazines serve as a vital resource for professionals looking to stay informed and ahead of industry developments.

Posted On: 29 JUL 2025 5:43PM by PIB Delhi

Ministry of Fisheries, Animal Husbandry & Dairying

FACILITIES FOR DAIRY FARMERS

In order to complement and supplement the efforts made by the States and Union Territories in adopting advanced breeding techniques, scientific feeding practices and improving milk productivity, Government of India has taken following steps across the country including drought-prone and climate-vulnerable regions:

(I) Implementation of Nationwide Artificial Insemination Programme under Rashtriya Gokul Mission to extend Artificial insemination coverage in the districts with less than 50% coverage. Under the component Artificial insemination services with semen of high genetic merit bulls is made available free of cost at the farmers' doorstep.

(ii) Implementation of Accelerated breed improvement programme using bovine In-Vitro Fertilization Technology (IVF) for faster genetic upgradation of bovines. Incentive at the rate of Rs. 5000 per assured pregnancy is made available to dairy farmers for adopting this technology.

(iii) Accelerated breed Improvement programme using sex sorted semen for production of female calves with more than 90% accuracy. Under the component incentive upto 50% of the cost of sex sorted semen on assured pregnancy is made available to farmers.

(iv) National Programme for Dairy Development (NPDD) is implemented with following 2 components: (a) Component ''A'' of NPDD focuses on creating/strengthening of infrastructure for quality milk testing equipment as well as primary chilling facilities for State Cooperative Dairy Federations/ District Cooperative Milk Producers' Union/ Self Help Groups (SHGs)/ Milk Producer Companies/ Farmer Producer Organizations. (b) Component ''B'' of the NPDD scheme "Dairying through Cooperatives" aims to increase sale of milk and dairy products by increasing farmer's access to organized market, upgrading dairy processing facilities and marketing infrastructure and enhancing the capacity of producer owned institutions.

(v) Department of Animal Husbandry and Dairying (DAHD), Government of India, is implementing the National Livestock Mission-Entrepreneurship Development Programme (NLM-EDP). In NLM-EDP, 50% capital subsidy, up to Rs. 50 lakh, is provided for the establishment of poultry, sheep, goat, pig, horse, camel, and donkey breeding farms, as well as feed and fodder units (Hay/Silage, Total Mixed Ration, fodder block making units, Seed grading units).

(vi) Animal Husbandry Infrastructure Development Fund (AHIDF): AHIDF provides interest subvention at the rate of 3% per annum for creation/ strengthening of livestock product processing and diversification infrastructure thereby providing greater access for unorganized producer members to organized market.

(vii) Department of Animal Husbandry and Dairying has developed 1962 Farmers App in collaboration with National Dairy Development Board that provides advisory services on Ration balancing and educates farmers on optimizing animal feeding using locally available resources, ensuring a balanced intake of protein, energy, and minerals. The Ration Balancing functionality is also being extended to field workers for assisting the farmers in adopting scientific ways to arrive at optimal Ration Balancing in terms of cost and productivity.

(viii) Government of India has extended Kisan Credit Card (KCC) facility to Animal Husbandry and Fisheries farmers for their working capital requirements wherein farmers either individual or joint borrower, Joint Liability Groups or Self Help Groups including tenant farmers having owned/rented/leased sheds are eligible.

The details of funds released/allocated under the

National Livestock Mission, and Livestock Health and Disease Control Programme (LHDCP) implemented for disease control, vaccination and health management of cattle and poultry is at Annexure-I and II.

No specific study has been commissioned by the the Department of Animal Husbandry and Dairying regarding impact of climate change on livestock productivity, disease patterns and fodder availability. However, in order to complement and supplement the efforts of the States and Union Territories to build resilience against climate change and safeguard the livelihoods of dairy farmers, Department of Animal Husbandry and Dairying is implementing Rashtriya Gokul Mission for development and conservation of indigenous breeds, genetic upgradation of bovine population and enhancement of milk production and productivity of bovines. Indigenous cattle are well known for their quality of heat tolerance, disease resistance and ability to withstand extreme climatic conditions and least affected by future climate warming.

As per Indian Council of Agriculture Research (ICAR) a project National Innovations on Climate Resilient Agriculture, is launched with the aims to enhance the resilience of Indian agriculture to climate change and variability through strategic research and technology demonstrations. The project focuses on developing and implementing climate-resilient technologies in crops, livestock, and natural resource management.

Further, as per ICAR-Indian Grassland and Fodder Research Institute (IGFRI), Jhansi several location specific fodder varieties tolerant to moisture stress have been developed and released for cultivation in different agro-climatic conditions. Details of climate resilient fodder varieties developed is given at Annexure-III

Annexure I

State wise details of funds released under National Livestock Mission (NLM) in last 3 years

S. No	State/Union Territories	2022-23	2023-24	2024-25
1	Andhra Pradesh	6009.28	1260.00	786.50
2	Bihar	0.00	0.00	0.00
3	Chhattisgarh	0.00	75.00	50.00
4	Goa	0.00	0.00	0.00
5	Gujarat	0.00	155.00	100.00
6	Haryana	0.00	407.50	975.00
7	Himachal Pradesh	0.00	0.00	0.00
9	Jharkhand	0.00	64.00	0.00
10	Karnataka	0.00	250.00	725.00
11	Kerala	0.00	0.00	50.00
12	Madhya Pradesh	0.00	350.00	500.00
13	Maharashtra	0.00	65.00	30.00
14	Odisha	446.00	0.00	250.00
15	Punjab	369.66	0.00	0.00
16	Rajasthan	0.00	0.00	100.00
17	Tamilnadu	0.00	0.00	150.00
18	Telengana	0.00	0.00	50.00
19	Uttar Pradesh	0.00	100.00	771.00
20	Uttarakhand	0.00	198.48	306.25
21	West Bengal	296.63	0.00	200.00
22	Arunachal Pradesh	261.85	473.70	181.25
23	Assam	0.00	0.00	0.00
24	Manipur	0.00	0.00	170.30
25	Meghalaya	0.00	0.00	0.00
26	Mizoram	0.00	201.99	0.00
27	Nagaland	0.00	50.00	193.90
28	Sikkim	93.21	93.21	0.00
29	Tripura	0.00	183.47	0.00
30	Andaman & Nicobar Islands	0.00	0.00	0.00
31	Chandigarh	0.00	0.00	0.00
32	Dadra & Nagar Haveli and Daman & Diu	0.00	0.00	0.00
33	Delhi	0.00	0.00	0.00
34	Jammu & Kashmir	675.35	0.00	250.00
35	Lakshadweep	0.00	0.00	0.00
36	Puducherry	0.00	0.00	0.00
37	Ladakh	308.295	0.00	27.50

Annexure-II

State wise details of funds allocated under Livestock Health and Disease Control Programme (LHDCP) in last 3 years

S. No	State/Union Territories	2022-23	2023-24	2024-25
1	Andaman & Nicobar Islands	80.00	0.00	84.50
2	Andhra Pradesh	1376.05	8534.26	7605.85
3	Arunachal Pradesh	0.00	621.28	654.25
4	Assam	558.47	2299.69	4696.50
5	Bihar	895.66	266.48	5481.63
6	Chandigarh	0.00	2.77	7.82
7	Chhattisgarh	158.80	621.51	3488.98
8	Daman and Diu & Dadar Nagar Haveli	0.00	0.00	0.00
9	Goa	0.00	78.11	94.56
10	Gujarat	0.00	5.80	1558.05
11	Haryana	2754.15	2203.77	5314.55
12	Himachal Pradesh	0.00	236.49	1405.67
13	Jammu & Kashmir	0.00	1099.81	1185.75
14	Jharkhand	240.00	850.36	1796.97
15	Karnataka	532.04	2255.78	1900.00
16	Kerala	466.15	5038.76	4677.62
17	Ladakh	86.97	383.95	883.04
18	Lakshadweep	0.00	45.23	166.16
19	Madhya Pradesh	0.00	0.00	2381.47
20	Maharashtra	352.73	11243.90	9232.00
21	Manipur	0.00	877.94	2518.57
22	Meghalaya	314.01	271.32	660.01
23	Mizoram	0.00	138.53	517.41
24	Nagaland	135.34	268.09	340.77
25	NCT Delhi	0.00	101.13	84.51
26	Odisha	0.00	318.10	1240.09
27	Puducherry	48.00	11.48	48.52
28	Punjab	0.00	0.00	397.93
29	Rajasthan	0.00	635.11	5968.58
30	Sikkim	232.57	251.07	312.61
31	Tamil Nadu	0.00	644.51	2259.60
32	Telangana	0.00	0.00	400.00
33	Tripura	0.00	59.76	573.37
34	Uttar Pradesh	7339.84	19259.84	15076.02
35	Uttarakhand	535.10	1998.69	1957.16
36	West Bengal	670.00	3639.00	4034.63

Posted On: 05 AUG 2025 2:56PM by PIB Delhi

Ministry of Fisheries, Animal Husbandry & Dairying

National Programme For Dairy Development

Department of Animal Husbandry and Dairying (DAHD) is implementing Central Sector Scheme- "National Programme for Dairy Development (NPDD)" across the country since 2014-15 with the aim to enhance quality of milk and milk products and increase share of organized procurement, processing, value addition and marketing. The infrastructure created/strengthened under the scheme benefits all the milk producers associated with the State Cooperative

Annexure-I

State-wise details of number of DCS organized, milk producers enrolled & increase in milk procurement under NPDD scheme (as on 31.07.2025)

S. No	State	DCS organized / Revived (Nos.)	Additional Farmer Member enrolled (in '000 Nos.)	Additional Average Daily Milk Procurement (TKgPD)
1	Andhra Pradesh	3483	237432	371.13
2	Arunachal Pradesh	0	0	0.00
3	Assam	0	0	0.00
4	Bihar	8285	509496	796.61
5	Chhattisgarh	0	768	16.20
6	Goa	0	0	0.00
7	Gujarat	935	33097	4215.20
8	Haryana	0	0	0.00
9	Himachal Pradesh	359	4939	106.00
10	Jammu & Kashmir	1775	79150	245.00
11	Jharkhand	256	15782	119.82
12	Karnataka	2033	274937	1561.10
13	Kerala	0	63188	249.90
14	Ladakh	10	700	2.90
15	Madhya Pradesh	0	0	57.42
16	Maharashtra	369	35362	192.90
17	Manipur	50	1043	4.30
18	Meghalaya	51	1185	0.00
19	Mizoram	3	60	0.80
20	Nagaland	54	1342	4.10
21	Odisha	973	57416	161.70
22	Pondicherry	7	600	33.00
23	Punjab	2144	28935	1513.92
24	Rajasthan	4245	173896	836.14
25	Sikkim	287	6938	50.40
26	Tamil Nadu	1278	87072	818.80
27	Telangana	640	15895	225.91
28	Tripura	6	530	0.00
29	Uttar Pradesh	4179	77152	398.18
30	Uttarakhand	416	52700	82.90
31	West Bengal	70	3532	3.70
	Grand total	**31908**	**1763147**	**12068.03**

Nos.-Numbers, TKgPD-Thousand Kilogram Per Day

Milk Federations/ Unions/ Producer Companies covered under the scheme.

Under NPDD scheme, about 31,908 dairy cooperative societies (DCS) have been organized/revived with 17.63 lakh additional milk producer enrolment and increase of 120.68 lakh kilogram per day milk procurement. State-wise details of number of DCS organized, milk producers enrolled & increase in milk procurement is at Annexure-I.

Under NPDD scheme, about 61,677 village level milk testing laboratories and 5,995 Bulk Milk Coolers with chilling capacity of 149.35 lakh litres have been established. In addition, 279 number of dairy plant laboratories have been upgraded with milk adulteration detection systems including FTIR Technology based Milk Analyser. State wise details of village level laboratories, Bulk Milk Coolers and dairy plant laboratories established/upgraded is at Annexure-II.

Under the revised NPDD scheme, DAHD has approved State-wise targets for organization of 21,902 new dairy cooperative societies

Annexure-II

State wise details of village level laboratories, Bulk Milk Coolers and dairy plant laboratories established/upgraded under NPDD scheme (as on 31.07.2025)

S. No	State	Strengthening of village level laboratory (Nos.)	Bulk Milk Cooler (BMC)		Strengthening of dairy plant level Laboratory (Nos.)
			Number	Capacity (KL)	
1	Andhra Pradesh	3848	53	320.00	7
2	Arunachal Pradesh	0	0	0.00	0
3	Assam	0	0	0.00	1
4	Bihar	7413	72	199.00	12
5	Chhattisgarh	95	29	58.00	6
6	Goa	0	0	0.00	1
7	Gujarat	5533	2088	7305.00	5
8	Haryana	513	59	48.00	5
9	Himachal Pradesh	335	47	88.00	13
10	Jammu & Kashmir	2232	58	275.00	3
11	Jharkhand	339	13	26.00	5
12	Karnataka	5621	686	2080.00	50
13	Kerala	2160	108	392.50	11
14	Ladakh	0	0	0.00	0
15	Madhya Pradesh	1135	201	181.00	16
16	Maharashtra	639	95	199.50	23
17	Manipur	61	38	8.40	1
18	Meghalaya	107	100	41.76	4
19	Mizoram	46	9	4.50	4
20	Nagaland	0	28	14.50	3
21	Odisha	1023	38	109.00	14
22	Pondicherry	95	15	14.50	1
23	Punjab	6014	497	687.50	19
24	Rajasthan	7355	980	1171.50	17
25	Sikkim	588	225	73.10	3
26	Tamil Nadu	8967	485	1531.00	24
27	Telangana	2128	22	19.50	3
28	Tripura	158	11	11.50	1
29	Uttar Pradesh	3897	32	70.00	13
30	Uttarakhand	1275	2	4.00	11
31	West Bengal	100	4	2.00	3
	Grand total	**61677**	**5995**	**14934.76**	**279**

Nos.-Numbers, KL-Thousand Litres

across the country during 2025-26. A total financial outlay of Rs. 407.37 Crore has been approved which includes Rs.211.90 Crore as the Government of India's share and Rs. 195.47 Crore as the share of the implementing organizations. As per the information provided by States, till date, about 1804 dairy cooperative societies have been organised providing employment opportunity to about 37,793 number of new milk producers during 2025-26.

As on date, total 4019 Mobile Veterinary Units (MVUs) are operational in the country including 406 in Madhya Pradesh and 340 in Andhra Pradesh. In addition, about 96,86,350 livestock farmers and 2,01,49,217 animals have been benefited from the service provided through these MVUs. In Bhind district of Madhya Pradesh, till date, 15,307 livestock farmers and 19,472 animals have been benefitted by the doorstep delivery of MVUs. State-wise details of MVUs operational, number of livestock farmers benefitted and animals treated through MVUs is at Annexure-III.

Annexure-III

State-wise details of Mobile Veterinary Units (MVUs), number of livestock farmers and animals benefited

S. No	States/UT	Number of MVUs Operational	Number of Livestock Farmers benefitted (Total cumulative)	Number of Animals treated (Total cumulative)
1	Andhra Pradesh	340	2049550	2211886
2	Arunachal Pradesh	25	43318	51326
3	Assam	159	261511	627616
4	Bihar	307	233072	583058
5	Chhattisgarh	163	609605	2847011
6	Delhi	3	187	201
7	Goa	2	602	804
8	Gujarat	127	450369	699480
9	Haryana	70	47903	204591
10	Himachal Pradesh	44	17549	18047
11	Jammu & Kashmir	50	26737	48103
12	Jharkhand	236	66525	101907
13	Karnataka	275	386714	571415
14	Kerala	29	22556	25034
15	Ladakh	9	1649	1449
16	Madhya Pradesh	406	855434	1008773
17	Maharashtra	80	101080	206554
18	Manipur	33	9127	9067
19	Meghalaya	17	308	3011
20	Mizoram	26	35765	55280
21	Nagaland	16	18347	47754
22	Puducherry	4	2084	7609
23	Rajasthan	536	905948	3598443
24	Sikkim	6	3546	5580
25	Tamil Nadu	245	342676	1092710
26	Tripura	13	5678	39383
27	Uttar Pradesh	520	3040776	5707893
28	Uttarakhand	60	142245	287102
29	West Bengal	218	5489	88130
	Total	4019	9686350	20149217

This information was given by Union Minister of State, Ministry of Fisheries, Animal Husbandry and Dairying, Prof. S.P. Singh Baghel, in a written reply in Lok Sabha on 5th August, 2025.

CLFMA of India Sets Bold Agri-Export Agenda at 58th AGM & 66th National Symposium

Industry leaders unite to shape the roadmap for animal agriculture in India with a strong focus on agriculture exports

Two-day power meet in Hyderabad puts agri-exports, rural livelihoods, and global leadership on centre stage

Hyderabad, 23rd August 2025: The Compound Livestock Feed Manufacturers Association (CLFMA) of India successfully concluded its 58th Annual General Meeting (AGM) and 66th National Symposium on 22nd & 23rd August 2025 at the Taj Deccan, Banjara Hills, Hyderabad. Themed "Animal Agriculture in India – The Way Forward", the two-day event brought together policymakers, industry leaders, sector experts, and stakeholders to shape a unified roadmap for India's animal agriculture sector, with a strong emphasis on boosting agriculture exports.

The symposium highlighted the immense potential of India's poultry and aquaculture sectors, with the poultry industry growing at an impressive 8% annually, making it both one of the most affordable sources of protein and a vital contributor to rural income. Export opportunities in markets such as the UAE, Maldives, Bhutan, and Bahrain, along with 65% vertical integration, are enabling cleaner, healthier products and stronger global competitiveness. At the same time, challenges like avian influenza and rising kidney infections in states such as West Bengal, Assam, and Telangana pointed to the urgent need for better vaccination, stronger biosecurity, and greater R&D investments. Aquaculture discussions underlined the huge untapped domestic opportunity, with 76% of India's 1.4 billion population consuming non-vegetarian food and over 80% not meeting daily protein requirements, positioning the sector as critical for nutrition and economic growth. While rising US tariffs on shrimp exports pose challenges, they were reframed as opportunities to boost domestic demand, enhance farmer returns, and create value-added products for Indian consumers.

With government support through schemes like FIDF and PM-MKSSY, and by fostering stronger industry-government partnerships, both poultry and aquaculture are set to become more resilient, competitive, and future-ready.

While there are challenges, there's also an incredible amount of potential waiting to be unlocked. Whether it's poultry, dairy, fisheries, or aquaculture, the way forward lies in collaboration, innovation, and sustained effort. It lies in coming together — as farmers, industry leaders, policymakers, and academia — and working towards solutions that are practical, scalable, and sustainable.

Mr Divya Kumar Gulati, Chairman at CLFMA of India, said, "India is home to the world's largest livestock population and accounts for 13% of global milk production. The sector contributes 30.23% to agricultural GVA and 5.5% to the national economy, making it a cornerstone of national growth, rural prosperity, and nutritional security. Yet, this is only the beginning of our growth story. With the right policies, stronger cold-chain and processing infrastructure, and faster adoption of innovation, we can evolve from being the world's largest producer to one of its most influential exporters. CLFMA remains committed to working with all stakeholders to turn this vision into reality."

"We have also proposed the establishment of:

- Export Oriented Zones (EOZs)
- Livestock Export & Domestic Development Authority

These strategic bodies will significantly enhance ease of doing business and boost the global competitiveness of the Indian poultry sector by ensuring:

- Access to raw materials at global price parity.
- A simplified regulatory framework for domestic and international trade.
- Market creation and diversification through government-to-government collaboration and coordinated branding strategies through FTA."

The symposium was graced by eminent dignitaries, including Prof. S. P. Singh Baghel, Hon'ble Minister of State for Fisheries, Animal Husbandry & Dairying, and Ministry of Panchayati Raj, Government of India; Sri Vakiti Srihari, Hon'ble Minister for Animal Husbandry, Dairy Development & Fisheries, Sports and Youth Services; Sri Sabyasachi Ghosh, IAS, Special Chief Secretary, Government of Telangana; and Dr. Muthukumaraswamy B., Joint Secretary (NLM), Department of Animal Husbandry & Dairying.

The CLFMA delegation included:

- DY. Chairman Mr Sumit Sureka
- DY. Chairman Mr Naveen Pasuparthy
- DY. Chairman Mr Abhay Parnerkar
- DY. Chairman Mr Abhay Shah
- Hon. Secretary Mr Nissar F. Mohammed
- Treasurer Mr R. Ramkutty
- Convenor, Mr Vijay Bhandare

A special highlight of the event was the launch of the CLFMA Souvenir, encapsulating the association's achievements, sector insights, and future vision. The programme concluded with a networking dinner, live performance, and the

felicitation of sponsors, media representatives, guests, and invitees, marking a celebratory end to two days of engaging discussions and knowledge exchange.

About CLFMA of India:

Founded in June 1967 as The Compound Livestock Feed Manufacturers Association, CLFMA of India is the apex body for the country's livestock sector. It represents over 250 members across various sub-sectors, including feed manufacturing, poultry, dairy, aquaculture, animal nutrition, and veterinary services.

CLFMA is recognised by Central and State Governments, livestock farmers, government agencies, agricultural universities, veterinary colleges, and national research institutes. As the voice of the Indian livestock industry, CLFMA advocates for sustainable growth, industry standards, and policy development, contributing significantly to the advancement of the animal protein value chain in India and internationally. The theme "Animal Agriculture in India – The Way Forward" aims to highlight the path towards a future-ready livestock sector — one that embraces innovation, technology adoption, policy support, and responsible practices. This includes:

Strengthening value chains across dairy, poultry, fisheries, and small ruminants

Adoption of digital tools, genomics, precision nutrition, and climate-smart practices

Encouraging public-private partnerships, infrastructure investment, and scientific R&D

Empowering women and youth, promoting entrepreneurship, and ensuring inclusive growth






Media Contact:
Aayushi Narula | aayushi.narula@communicateindia.com | +91 9138269425
Stuti Sinha | stuti.sinha@communicateindia.com | +91 7486925576
Hesha Parekh | hesha.parekh@communicateindia.com | +91 9833113169

5,465 Families Will be Adopted By Krishna Milk Union

The Krishna Milk Union has committed to guiding 5,465 "Golden Families" under the state government's ground-breaking P4 (Public-Private-People-Partnership) project, marking a major step towards ending poverty and strengthening rural communities.

As a major force in the production and distribution of dairy products, the union seeks to improve the lives of the impoverished in rural areas, support the welfare of dairy farmers, and provide thousands of direct and indirect job opportunities.

District Collector G Lakshmisha received commitment documents from Krishna Milk Union Chairman Chalasani Anjaneyulu during a community outreach event in Munagacherla, Nandigama Mandal.

The union declared that it has adopted 5,465 families from several mandals: 1,192 from Penuganchiprolu, 1,255 from Vissannapeta, 1,524 from Vatsavai, 747 from Vijayawada Rural, and 747 from Chandarlapadu.

Anjaneyulu described the union's aim to examine these families' economic situation and provide complete assistance to empower them. This includes interest-free loans of up to Rs 1 lakh from the KDCC to buy dairy animals, as well as assistance for food and veterinary services.

The union will set up community dairy units (Gokulams) to promote sustainable dairy farming.

A Rs 1 crore program was started by Krishna Milk Union to provide one lakh subsidised doses of sexed semen for high-quality cattle breeding, increasing milk production, along with additional family health services. Lakshmisha commended the Krishna Milk Union for their dedication to using dairy farming to revolutionise the rural economy. To help end poverty, he called on individuals, businesses, unions, and organisations to join the P4.

"The efforts of Krishna Milk Union to adopt thousands of families demonstrate a strong commitment to this cause, and the dairy industry has the potential to transform the rural economic landscape," he said.

A ₹90 cr High-tech Dairy Plant In Namakkal, TN, Is Almost Finished And Will Transform The Way Milk Is Processed.

With 80% of the building of a Rs 90-crore high-tech dairy processing factory in Namakkal already completed, the project is almost complete and represents a significant advancement for the dairy industry in the area.

The project, which has the support of the National Dairy Development Board (NDDB), is anticipated to start full-scale production by January 2026 after trial operations start in November 2025.

When the plant is up and running, it will be able to process two lakh gallons of milk every day, making it one of Tamil Nadu's biggest and most sophisticated dairy facilities.

From chilling and pasteurisation to packaging and shipping, the completely automated facility will manage every step of milk processing, guaranteeing effectiveness and quality across the supply chain.

In addition to the civil construction being almost finished, project officials have verified that 90% of the machinery has already been purchased, with 40% of it being put on-site.

In order to fulfil the deadline for trial and full operations, departments have been instructed to speed the remaining work.

By expediting the milk procurement process and guaranteeing on-time payments, the factory is anticipated to directly assist over 15,000 dairy farmers in the district.

Farmers will increase their revenue and efficiency through quicker handling and less spoiling. About 1,000 indirect jobs in related industries like quality control, maintenance, packing, and transportation are also expected to be created by the plant.

The factory offers a more consistent supply of dairy products and Aavin milk for consumers.

It is anticipated that almost 4 lakh residents of Namakkal and the surrounding areas will gain from fewer shortages and supply delays, particularly during times of peak demand like festivals.

According to officials, the Namakkal factory would serve as a prototype for Tamil Nadu's contemporary dairy infrastructure.

The project intends to improve rural livelihoods and employment while fortifying the state's milk supply chain by fusing state-of-the-art technology with an emphasis on farmer welfare.

As The Trade Spat continues, China expands its investigation into EU Dairy goods

One front in a larger trade fight with Washington and Brussels, China expanded on Monday its anti-subsidy probe into dairy imports from the European Union by six months. When the European Commission, which is in charge of the bloc's trade policy, opened an anti-subsidy probe into Chinese-made electric vehicles in 2023, trade tensions between China and the EU exploded. In what is generally believed to be retribution for Europe's EV move, China then began looking into imports of EU dairy, pork, and brandy.

Citing the intricacy of the issue, which involves some EU cheese, milk, and cream products, China's Ministry of Commerce announced that it had extended the duration of its anti-subsidy probe to February 21, 2026. Beijing levied charges on EU brandy manufacturers in July, but spared big cognac producers as long as they sell at or above a minimum price.

In June, Beijing rolled over an anti-dumping probe into European pork, of which it is also a significant importer. According to Alexander Anton, secretary general of the European Dairy Association, which represents the sector at the EU level, the extension of the year-old dairy investigation was anticipated since more technical inspections by Chinese authorities were previously planned for early September.

Given brandy's distinct structure as an industry dominated by a few large companies, the EU dairy sector is not expecting the kind of settlement agreed for the latter, Anton continued.

In order to avoid charges that would affect French dairy shipments to China valued at approximately 650 million euros ($759 million) annually, producers

in France are hoping for a political solution to the EV issue, according to Francois-Xavier Huard, CEO of industry organisation FNIL.

A spokesman for the European Commission stated in April that the EU and China had decided to investigate establishing minimum prices for EVs manufactured in China as an alternative to the tariffs the EU had imposed the previous year.

Cattle Farmers are urged by the DoL To Start Producing Dairy Milk

To increase the profits from cattle farming, the Department of Livestock (DoL) is urging cattle producers nationwide to think about producing milk. Mr. Dudley Woksen, a livestock officer and long-time supporter of the cattle sector, told the Daily Post that if farmers focused on dairy production, Vanuatu's cattle industry may increase in economic value. According to him, producers should stop concentrating solely on producing beef.

The DoL's drive to increase dairy milk output is viewed by observers as a first step towards diversifying the nation's cattle business and promoting the creation of a variety of dairy products produced in Vanuatu. According to Mr. Woksen, "a safe minimum of 5 litres can be extracted from a local breed cow each day for a period of eight months after calving," which equates to 1,120 litres of milk during that time frame, demonstrating the possibility for small-scale dairy farming. Fresh dairy milk produced by the DoL is being sold in Port Vila and Luganville every day during business hours for VT500 every 1.5 litres.

"In contrast to selling a cow for just VT60,000, farmers can earn VT370,000 from the 1,120 litres produced by a single cow in eight months at VT500 per 1.5 litres," Mr. Woksen stated. "Don't sell your cattle for the price of a goat if you are farming them." The Department of Labour in Luganville revealed that, aside from other services offered to farmers, dairy is the department's sole source of daily revenue.

According to the livestock officer, the government has acknowledged the importance of the cattle sector and is making it a priority to promote it through initiatives like the Cattle Restocking Programme (CRP). But he also pointed out that farmers needed to abandon conventional practices. "Dairy production does not require large land tracts for cattle raising, unlike what many people believe. "Milk can be produced all year round with at least two cows on two to three hectares," he stated.

Even though indigenous breed cows produce less milk than imported dairy breeds, he continued, high-quality dairy milk can still be obtained from them. "The stress-free tropical environment and the year-round availability of green pastures make our local breeds' milk unique in terms of quality, but dairy cows produce more volume," he said. The DoL trained small-scale livestock farmers from the Canal Fanafo area council as part of the CRP earlier this year. Particularly for smallholders, the instruction covered a variety of cow farming techniques, such as producing beef, dairy, and root crops on the same piece of land.

Participating in the CRP as a cattle farmer from Jubilee Farm in Canal Fanafo, Mr. Greg Tavoasese claimed the program had helped him bring his dairy farm back to life. As a model for other small-scale farmers in the region, he anticipates starting milking shortly after the DoL establishes a new stockyard. Another Fanafo farmer claimed that because they lacked the skills and resources necessary to produce high-quality milk, they had previously depended on selling carcasses to make ends meet.

According to Mr. Woksen, Vanuatu is already well-known in the area for its superb beef, and if output rises, this reputation may also apply to dairy. The DoL in Santo made VT1.5 million from dairy sales in 2022–2023 at a price of no more than VT300 a bottle, with a daily target of 20 litres. At VT300 per 1.5 litres, milk sales have generated almost VT322,000 for the first two

quarters of this year. However, the cost of 1.5 litres has increased to VT500 as of August 1, 2025.

China Continues Its Anti-Subsidy investigation into Dairy products from the EU

A statement from China's Ministry of Commerce stated that the "complexity of the case" is the reason for the six-month extension of the probe to February 21, 2026. After the EU took steps to impose high import taxes on Chinese electric cars (EVs), Beijing launched the investigation in August 2024, focussing on imports of some cheese, milk, and cream.

Beijing's subsidies, according to the EU, enable Chinese automakers to undercut rivals in Europe. Beijing disputes that assertion and declared what were largely interpreted as retaliation investigations against imported dairy, cognac, and pork from Europe. Last October, the EU levied additional import duties on Chinese EV imports of up to 35%.

Following Beijing's protest, the World Trade Organisation announced in April that it would appoint an expert panel to evaluate the EU's ruling. Beijing extended its probe into hog products from the EU until December in June. In July, it levied taxes on EU brandy, but big producers were spared if they adhered to a minimum price.

At an EU-China summit in Beijing that month, European Council President Antonio Costa stated that the group desired "concrete progress on issues related to trade and the economy." However, there are still significant trade disagreements, and the EU is concerned that subsidised Chinese goods may overtake European markets. Although they have not yet come to an agreement, the two parties are also debating establishing minimum prices for Chinese EVs.

Dairy Companies Reduce Added Sugars In School Milk By Nearly 60% As The New School Year Begins

As part of a voluntary, industry-led initiative, the nation's school milk processors have decreased added sugars in flavoured milk products distributed in schools by over 60%. The International Dairy Foods Association (IDFA) today published the findings of the Healthy School Milk Commitment, which was launched in April 2023 by 37 school milk processors representing over 95% of the school milk volume in the US. The Commitment requires dairy firms to supply safe, nutritious school milk options with fewer calories and no more than 10 grammes of added sugar per 8-ounce serving by the 2025-2026 academic year. According to the most recent IDFA survey, the current average amount of added sugar in flavoured milk is 7.2 grammes per serving, indicating that all companies have met or exceeded the pledge.

Added sugar levels in flavoured milk products sold in schools have decreased by 57% since 2006, largely to the voluntary, proactive efforts of America's school milk processors. Flavoured milk calories have also decreased throughout the same time period, from 166 to 123 per 8-ounce serve.

The industry's efforts are far surpassing a US government target

set in 2024. IDFA launched the Healthy School Milk Commitment in 2023, marking the first voluntary, proactive industry commitment to foods offered in schools. One year later, the US Department of Agriculture (USDA) amended its school meal guidelines to reflect the IDFA Commitment's guarantee of 10 grammes or fewer. Now, school milk processors have outperformed their own pledge ahead of federal rules coming effect. As the 2025-2026 school year begins, the typical flavoured milk product contains all 13 essential nutrients and only 7.2 grammes of added sugar per serving. Since 2023, dairy firms have reformulated 24 different products. Flavoured milk offers pupils with one of the most complete vitamin packages while accounting for less than 4% of added sugars in children's diets aged 2 to 18. In fact, the total sugar content of flavoured milk supplied in schools is lower than that of 100% fruit juice provided in schools, such as apple and orange juice, and it contains more nutrients.

"By slashing added sugars in school milk, America's dairy companies are fulfilling their pledge to America's parents and children to offer wholesome, nutritious milk options with fewer calories and the same essential nutrients," said Michael Dykes, D.V.M., president and CEO of IDFA. "Thirty-seven milk processors have worked for more than two years to reformulate their products to reduce added sugars, lower calories, remove artificial colours and offer new lactose-free options. IDFA, our nation's dairy farmers, and school milk processors will continue to make significant contributions to providing wholesome and safe milk options to students all year."

The USDA's school meal programs, which include lunch and breakfast, feed 30 million children each day. The IDFA Healthy School Milk Commitment was expanded in late 2023 to include the USDA's Summer Food Service Program, which provides healthy meals and snacks to up to 3.2 million low-income children and teens during the summer months while schools are not in session. Earlier this year, dairy businesses pledged to eliminate all certified artificial colours from dairy products in school meals, including milk, by 2026, underscoring the dairy industry's commitment to child nutrition.

According to the most recent Dietary Guidelines for Americans report, children are not receiving enough essential nutrients for growth, development, healthy immune function, and overall wellness. Healthy milk and dairy options in school meals—including lactose-free and reduced-lactose options—are the most important opportunity of the day for children to get the critical nutrients they need. Today, more than two-thirds of the milk consumed by children in school is flavoured.

Dairy Markets are Under Pressure from the Global milk glut, Which Increases Concerns About Price Instability

According to a research released by Maxum Foods in August 2025, growing milk output in major countries is pushing commodity prices lower, causing turmoil in the global dairy markets. Since supply from the US, EU, and New Zealand is increasing faster than demand, product values are declining, and producers and processors around the world face an uncertain future.

The paper notes that following a brief period of price stability earlier this year, market fundamentals have weakened. Although supply shortages have subsided in the EU, feed availability is still at risk due to a hot, dry summer. Although milk and cheese production in the US is expanding rapidly, slow domestic demand and slow exports are causing inventories to accumulate and prices to decline.

A major player in the world dairy trade, New Zealand is predicted to have another successful season, with milk production marginally exceeding that of the previous year. Global trade is still going strong, but export momentum is being hampered by consumers' growing resistance to high costs.

But the situation in Australia is different. Hay prices have risen since May due to ongoing feed shortages in the south, even if rainfall has improved in certain areas. It is anticipated that this stress would reduce milk solids production by 2% for the 2025–2026 season and has resulted in the greatest herd culling rates in three years.

According to Maxum Foods, the global outlook is becoming even more complex due to changes in US fiscal policies and geopolitical events. The analysis warns of increased dangers for the global dairy business as growing production jeopardises long-term price stability, as supply is predicted to surpass demand in the upcoming months.

Fonterra pioneers SL's National Competency Standard for Operators of Dairy Equipment

The first National Competency Standard for dairy machine operators in Sri Lanka has been formally handed over by Fonterra Brands Lanka in partnership with the Tertiary and Vocational Education Commission (TVEC), National Apprentice and Industrial Training Authority (NAITA), Labour Department, and eight other dairy industry peers, including Milco (Pvt.) Ltd, Maliban Milk Products (Pvt.) Ltd, Richlife Dairies Limited, Ceylon Cold Stores PLC, Chello Dairy Products (Pvt.) Ltd, Nestlé Lanka Limited, Pelwatte Dairy Industries Ltd, and Lion Brewery (Ceylon) PLC.

Vocational Education Deputy Minister Nalin Hewage graced the transfer ceremony, which marked a significant turning point in the nation's vocational education history.

This program demonstrates a common goal of formalising skills in the dairy industry and enabling seasoned machine operators with years of experience and high skill levels but no formalised degree. The dairy industry was positioned as a proactive contributor to national skills development thanks to the Competency Standard, which was created, sponsored, and validated through a multi-stakeholder effort over the course of a year.

With the implementation of the Competency Standard through NAITA's training network, machine operators in Sri Lanka will have more access to formal recognition and improved career opportunities.

Hewage praised the initiative, saying, "Fonterra Brands Lanka is a well-known brand in the business, having made major contributions to the nation and being a trailblazer in this important project with other stakeholders. We really appreciate these team efforts on behalf of the ministry.

"This was a much-needed qualification, which is a great value addition not only to those already in the industry but also to newcomers," said the director general of TVEC. There was a significant need for the initiative, thus it was created. We are grateful to everyone who helped make it happen.

By bringing formal vocational requirements and real-world industry experience together, the Competency Standard is anticipated to work as a nationwide standard for vocational training in the dairy industry. Additionally, it emphasises how crucial public-private collaborations are to promoting long-term workforce development.

"This Competency Standard is the culmination of a year of intense collaboration, motivated by our belief that every skilled individual deserves formal recognition," the general manager of Fonterra Brands Lanka Sri Lanka and Local Emerging Markets revealed. To realise this vision, not only for our workers but for the entire industry, we are honoured to have collaborated with the NAITA, TVEC, Labour Department, and our colleagues in the field. Fonterra is prepared to provide the utmost

assistance going ahead as a company, as a member of the dairy industry, and as a proud participant in Sri Lanka's advancement to help upskill the workforce and promote the development of the nation.

This project is a significant addition to Sri Lanka's vocational education system and goes beyond a business milestone. The dairy sector is contributing to the development of a workforce that is more competent, competitive, and prepared for the future by setting an example of teamwork and a common goal.

Hispanic Cheese Production is Being Revolutionised by Dairy Farmers of America's Most Recent Acquisition

Dairy Farmers of America (DFA), a farmer-owned international dairy cooperative, has announced the purchase of W&W Dairy in Monroe, Wisconsin, demonstrating its dedication to innovation and expansion in the cheese sector. W&W Dairy, its licensed brands, and a cutting-edge production plant devoted to creating a variety of traditional Hispanic cheese products, such as queso fresco, cotija, queso blanco, quesadilla, panela, and para freir, are all included in this deal. The market for Hispanic cheese has enormous development potential, according to Ken Orf, head of DFA's cheese, taste, and flavours division.

According to him, the Hispanic cheese industry is expected to develop at a rate that is more than three times faster than the cheese category. "This strategic acquisition strengthens DFA's position for growth in this crucial dairy category for both our owned brands and our customers' brands by adding a second plant in our network that is exclusively focused on producing Hispanic cheese."

The Monroe location complements DFA's current Houston, Texas, plant, which produces the prestigious La Vaquita brand, which is well-known for its high-quality Hispanic cheeses, cremas, and drinkable yoghurts. DFA may now develop operational synergies that expand its product diversification and market reach thanks to Monroe's inclusion. The Monroe facility will continue to run on a daily basis despite the ownership transition, with the current management remaining in place and job prospects being provided to its 97 employees.

DFA increased its capabilities earlier this year when it purchased the Lineville facility in Green Bay, Wisconsin, owned by Winona Foods. This facility broadens DFA's product line to include non-dairy sauces and condiments, cheese spreads, cheese sauces and processed cheese products. Orf claims that these calculated investments not only benefit their farmer-owners but also spur new cheese category innovation, enabling DFA to stay ahead of changing customer preferences and industry trends.

Dairy Farmers of America is proving its commitment to expanding its cheese capabilities across a range of consumer categories with these purchases. Without a doubt, DFA's progressive strategy will improve its market position and allow the cooperative to provide its farmer-owners with more value while satisfying the constantly shifting demands of customers. By these calculated actions, DFA positions itself as a leader in both established and developing cheese markets, demonstrating the inventiveness and dedication to expansion that characterise its approach to the dairy sector.

India's Opposition To US Dairy Imports: A Proclamation Of Tradition, Sustainability, And Public Health

The United States announced a massive 25% tariff on all Indian exports, which will go into force on August 1, 2025, in a rapid and seismic escalation. India's refusal to permit the import of American dairy products, citing worries over the feed used for cows, is one of the main obstacles in the ongoing trade negotiations between the US and India. The disagreement strikes to the heart of India's cultural values, food sovereignty, and long-term sustainability objectives, despite the fact that it may seem like a technical regulatory matter. A fundamental gap in agricultural techniques and ethical perspectives is reflected in the debate.

More than 80 million smallholder farmers are supported by India's dairy industry, which is the biggest in the world. Over Rs 1.03 lakh crore in local revenue could be at risk each year if the dairy industry is opened to American imports, according to estimates.

In the trade talks between the US and India, dairy has become a contentious issue. The labelling of American dairy as "non-vegetarian milk," which is used in India to refer to milk produced from cows that have been fed animal products, is among the most controversial topics. Animal byproducts including blood meal, meat scraps, poultry waste, and even animal remains are frequently used in commercial cattle feed in the United States. While this is permissible under US law, India finds it undesirable.

India requires strict documentation that imported milk comes from cows that are fed only plant-based diets. The United States has raised concerns about this certification requirement in World Trade Organisation (WTO) forums, claiming it is arbitrary and restrictive and that it is an unwarranted non-tariff trade barrier.

India has socio-economic and ecological justifications in addition to religious ones. By Indian standards, milk from such cows is considered unsatisfactory. This position has clear religious justifications because milk and milk products are revered, employed in ceremonies, and have profound cultural and spiritual meaning. The milk also loses its suitability for conventional eating if the cow is fed in a manner that deviates from its natural behaviour.

Modernising the Dairy Sector in Himachal Pradesh: A New Era for Rural Livelihoods

New milk processing facilities in Nahan, Nalagarh, Mohal, and Rohru have been approved by the Himachal Pradesh government. A bulk milk cooler in Jhalera, Una, and a milk chilling centre in Jalari, Hamirpur, are also planned. The goals of this program are to improve the state's dairy infrastructure, increase farmer earnings, and support the rural economy.

Since more than 90% of the state's population lives in rural areas and works as a farmer, Chief Minister Sukhvinder Singh Sukhu underlined the importance of making dairy development a top priority. "With these new plants, milk collection will rise, ensuring fair returns for farmers while enhancing the quality of milk procurement," he said.

The Himachal Pradesh Milk Federation (Milkfed) is about to introduce an Enterprise Resource Planning (ERP) system in an effort to increase operational effectiveness and transparency. With the use of this platform, farmers will have mobile access to vital information such as up-to-date information on milk collection, payment status, quality testing, and procurement rates. In order to ensure that farmers can precisely track milk supplies and payments, the ERP system digitises records in an effort to reduce manual errors and prevent malpractices. It is anticipated that this digital strategy will speed up bill processing, allowing for timely payments to be

transferred to farmers' accounts. "Due to our determined efforts, Milkfed's milk procurement has reached unprecedented levels while improving quality standards," said the chief minister.

In Dhagwar, Kangra district, a state-of-the-art milk processing factory is now under construction, further enhancing the state's dairy capabilities. When it is up and running, it will provide dairy farmers with fair and satisfying rates for a range of dairy products, such as curd, lassi, butter, ghee, paneer, flavoured milk, khoya, and mozzarella cheese. "The State Government is resolute in enhancing rural livelihoods via ongoing investments in animal husbandry and dairy infrastructure," stated the chief minister.

By introducing India's first Minimum Support Price (MSP) Scheme for milk procurement, Himachal Pradesh has also established a national standard. According to the plan, the cost of purchasing cow and buffalo milk is Rs. 51 and Rs. 61 per litre, respectively, and a transport subsidy of Rs. 2 per litre is provided for delivery to registered centres that are more than two kilometres away. (ANI)

NDDB Siliguri Provides Training For Female Dairy Cooperative Secretaries

The Eastern Regional Demonstration & Training Centre of the National Dairy Development Board (NDDB) in Siliguri, West Bengal, recently held a 21-day residential training program exclusively for women in an effort to improve the professional skills of Dairy Cooperative Society (DCS) secretaries. Kosi Milk Union sponsored the initiative under the auspices of the Japan International Cooperation Agency (JICA).

The workshop, which aimed to increase the knowledge, abilities, and general effectiveness of administering cooperative organisations, was attended by 15 female participants. Cooperative principles and bylaws, the duties and responsibilities of DCS secretary, committee management, milk procurement, and quality control were just a few of the many topics that were discussed in the course.

Member connections, extension services, and animal husbandry—including important topics like nutrition, breeding, and animal health—were given particular attention. Along with specific lessons on record-keeping and member participation, participants received training in administrative and financial management.

In order to ensure that theory was accompanied by practical experience, hands-on training covered milk testing, equipment handling, silage preparation, urea straw treatment, and vermicomposting. The initiative is a big step towards empowering women in the dairy cooperative industry and bolstering small-scale dairy businesses.

Editorial Calendar 2025

Publishing Month: **January** Article Deadline : **28th, Dec. 2024** Advertising Deadline : **30th, Dec. 2024** Focus : **Opportunities and Challenges**	Publishing Month: **February** Article Deadline : **28th, Jan. 2025** Advertising Deadline : **30th, Jan. 2025** Focus : **Budget**	Publishing Month: **March** Article Deadline : **26th, Feb. 2025** Advertising Deadline : **28th, Feb. 2025** Focus : **Summer Stress Management**	Publishing Month: **April** Article Deadline : **28th, March 2025** Advertising Deadline : **30th, March 2025** Focus : **Cold Chain**
Publishing Month: **May** Article Deadline : **28th, April 2025** Advertising Deadline : **30th, April 2025** Focus : **Nutrition**	Publishing Month: **June** Article Deadline : **28th, May 2025** Advertising Deadline : **30th, May 2025** Focus : **Milk - Production & Preservation**	Publishing Month: **July** Article Deadline : **28th, June 2025** Advertising Deadline : **30th, June 2025** Focus : **Monsoon Management**	Publishing Month: **August** Article Deadline : **28th, July 2025** Advertising Deadline : **30th, July 2025** Focus : **Sustainability**
Publishing Month: **September** Article Deadline : **28th, August 2025** Advertising Deadline : **30th, August 2025** Focus : **Processing & Packaging**	Publishing Month: **October** Article Deadline : **28th, September 2025** Advertising Deadline : **30th, September 2025** Focus : **Disease Prevention**	Publishing Month: **November** Article Deadline : **28th, October 2025** Advertising Deadline : **30th, October 2025** Focus : **Biosecurity**	Publishing Month: **December** Article Deadline : **28th, November 2025** Advertising Deadline : **30th, November 2025** Focus : **Winter Stress**

Subscription Rates

Time Period

1 Year	**INR 2400**	**USD**	**250**
3 Year	**INR 6500**	**USD**	**650**
5 Year	**INR 10000**	**USD**	**1000**

**18% GST Extra*

We wish to subscribe the following

Poultry Planner
☐ 1 Year ☐ 3 Year ☐ 5 Year
from_____to_____

Dairy Planner
☐ 1 Year ☐ 3 Year ☐ 5 Year
from_____to_____

Poultry Times of India
☐ 1 Year ☐ 3 Year ☐ 5 Year
from_____to_____

Grand Total: _____

Contact Name : _____

Company Name : _____

Postal Address : _____

City : _____ State : _____ Mob. No._____

Postal Code : _____ Country : _____

Payment Details:

Send DD or Cheque in favour of Pixie Expomedia Pvt. Ltd. payable at Karnal
Address: C/o OmAng Hotel, Namaste Chowk, Near Janta Petrol Pump, KARNAL - 132001 (Haryana) INDIA or Transfer money to Canara Bank
Bank address: Sector 12; U Estate Karnal
Account Type: Current
Account Name: Pixie Expomedia Pvt. Ltd.
Account Number: 120000991579
IFSC Code: CNRB0003264 | Swift Code: CNRBINBBBFD | PAN No. AAMCP6787A

For more detail, contact:

pixie expomedia
CREATE • CONNECT • CONQUER

Pixie Expomedia Pvt. Ltd.
C/o OmAng Hotel, Namaste Chowk, Near Janta Petrol Pump, KARNAL - 132001 (Haryana) INDIA

Date:_____ Company's Stamp & Signature

By signing this form I acknowledge that I have read and agree to the quoted cost above

5% GST Extra* **Advertisement Tariffs

Advertisement Type	Single Issue (INR)	Single Issue (USD)		Advertisement Type	Single Issue (INR)	Single Issue (USD)		Advertisement Type	Single Issue (INR)	Single Issue (USD)	
Front Cover	30,000	500	☐	Back Cover	20,000	300	☐	Centre Spread	25,000	400	☐
Front Gate Fold 1A	25,000	400	☐	Back Gate Fold 1A	20,000	300	☐	Full Page Random	10,000	200	☐
Front Gate Fold 2A	25,000	400	☐	Back Gate Fold 2A	20,000	300	☐	Up to Page 9	15,000	250	☐
Front Inside	20,000	300	☐	Back Inside	18,000	275	☐				
Front Opening	20,000	300	☐	Back Opening	18,000	275	☐				

IRIS

MONEY

doesn't talk, it swears

Happy cow Plus milk

4 Benefits

1. Money Plus Improves milk yield
2. Improves the fat percentage
3. Improves reproductive performance
4. Helps in better growth

2 Goals

1. More Milk
2. More Profit !!!

FOR FURTHER INFORMATION
please contact +91 80 48663242 or admin@irides.in
or visit our website www.irides.in

INTERNATIONAL EXHIBITION ON DAIRY SECTOR

THE Dairy EXPO

4th Edition

26-28 Feb. 2026

New Grain Market,
Karnal

Event Highlights

100+	20+	200+
Exhibitors / Sponsors	Countries	VIP Attendees

Extensive Media Coverage	8000+
	Visitors

Organised by

pixie expomedia
CREATE • CONNECT • CONQUER

Concurrent Events

THE POULTRY EXPO 4th Edition

THE AQUA CULTURE EXPO

Media Partner

POULTRY PLANNER

DAIRY PLANNER

+91 9991708200 | 9991705005
info@thedairyexpo.in | www.thedairyexpo.in