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From the Pen of Chief Editor



Biosecurity: A Silent Guardian of Our Future

In an age marked by rapid scientific advancement, global travel, and environmental change, the concept of biosecurity has gained critical importance. Yet, it remains underappreciated by the general public. Biosecurity refers to the strategies and actions taken to prevent the introduction and spread of harmful biological agents—whether they occur naturally, accidentally, or deliberately.

The COVID-19 pandemic served as a powerful reminder of how vulnerable our interconnected world is to biological threats. But pandemics are only one part of the biosecurity spectrum. The rise of biotechnology, while offering tremendous benefits in medicine and agriculture, also presents risks if misused. The potential for gene-editing technologies to be weaponized, or for harmful pathogens to escape from research labs, underscores the need for strict safety measures.

Agricultural biosecurity is another essential aspect. The introduction of invasive pests or plant diseases can devastate food production and economies. Similarly, antibiotic resistance—fueled by overuse in both humans and livestock—poses a growing threat to global health.

To strengthen biosecurity, countries must invest in early detection systems, secure research facilities, and coordinated response strategies. Education and training for scientists, farmers, healthcare workers, and the public are equally important. Biosecurity is not only a governmental responsibility—it requires community awareness and international cooperation.

Furthermore, the ethical dimensions of emerging technologies must be considered. Policies and global agreements must keep pace with innovation to ensure responsible use.

Biosecurity is not just about preventing the next pandemic or protecting crops—it's about safeguarding life itself. As threats evolve, our response must be proactive, informed, and united. In protecting against biological risks, we are investing in a safer, more resilient future for generations to come.

Vishal

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History of Intellectual Property Rights (IPR) in Agriculture and Veterinary Science

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Introduction

Intellectual Property Rights refer to the legal protections granted to creators and innovators over their designs, plant varieties, inventions, animal breeds, and scientific processes. In agriculture and veterinary science, Intellectual Property Rights has played a key role in safeguarding innovations in crop improvement, vaccines, diagnostic kits, animal breeding, and biotechnology. The evolution of IPR in these sectors reflects the changing needs of farmers, researchers, industries, and society from traditional knowledge and farmers' varieties to modern biotechn based products.

Early Developments: Traditional Knowledge and Farmers' Rights

Agricultural innovations existed long time before formal IPR laws. For centuries, local farmers selected and preserved seeds, developed unique breeds, and shared traditional veterinary remedies.

- **Pre-Colonial Period:** Animal breeding and seed selection were largely community based practices without formal recognition or exclusivity.
- **19th Century:** With the rise of agricultural research stations under colonial administrations, some early efforts to catalogue and preserve plant varieties began, but there were no intellectual property protections for farmers.

Traditional knowledge formed the foundation for later scientific discoveries, but it remained outside the scope of formal IPR until recent decades.

Global Milestones in IPR and Agriculture

The 20th century saw significant legal milestones worldwide that shaped IPR in agriculture and veterinary science:

1. 1883 – Paris Convention for the

Protection of Industrial Property:

Established the first international frame for patents and trademarks, indirectly influencing agricultural machinery and agro-chemical innovations.

2. 1930 – U.S. Plant Patent Act:

The first legislation granting patent protection to asexually reproduced plant varieties such as fruit trees and roses.

3. 1961 – International Union for the Protection of New Varieties of Plants (UPOV):

Marked a major shift by providing exclusive rights to breeders of new plant varieties. This laid the foundation for Plant Breeders' Rights (PBR) worldwide.

4. 1980 – Diamond v. Chakrabarty (U.S. Supreme Court):

Allowed patenting of genetically modified microorganisms (GMOs), paving the way for biotechnology patents in agriculture and veterinary fields.

5. 1992 – Convention on Biological Diversity (CBD):

Recognized the sovereign rights of nations over their genetic resources and emphasized benefit-sharing.

6. 1995 – WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS):

Made it mandatory for member countries to provide some form of protection for plant varieties (through patents or sui generis systems), thus globalizing agricultural IPR.

7. 2010 – Nagoya Protocol on Access and Benefit-Sharing:

Strengthened equitable sharing of benefits arising from the use of genetic resources and associated traditional knowledge.

Evolution of IPR in India

India's IPR regime in agriculture and veterinary science evolved significantly after independence:

- **1950s–70s:** Focused on food security and the Green Revolution, with little emphasis on patents for seeds or breeds.
- **1970 – Indian Patents Act:**
Restricted product patents in food, pharmaceuticals, and agrochemicals to ensure affordability, allowing only process patents.
- **1983 – Establishment of the Department of Biotechnology (DBT):**
Boosted research in genetic engineering, animal vaccines, and diagnostics.
- **2001 – Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act:**
Created a sui generis system balancing plant breeders' rights with farmers' rights—one of the most farmer-friendly laws in the world.
- **2002 – Geographical Indications of Goods (Registration and Protection) Act:**
Extended protection to unique local agricultural products and indigenous animal breeds (e.g., Gir cattle, Basmati rice).
- **2003 – Biological Diversity Act:**
Protected access to India's genetic resources and traditional knowledge.
- **2005 – Patent (Amendment) Act:**
Brought India into TRIPS compliance by allowing product patents in agriculture related veterinary medicines, biotechnology, and diagnostics.

IPR in Veterinary Science

Veterinary IPR historically centered on **vaccines, pharmaceuticals, feed additives, diagnostic kits, and breeding technologies.**

- Early vaccine development, such as Louis Pasteur's rabies vaccine (1885), was not patented due to ethical and accessibility concerns.
- In the late 20th century, IPR increasingly covered recombinant vaccines (e.g., Foot-and-Mouth Disease, Brucellosis), molecular diagnostics, and assisted reproductive technologies.
- Animal genetic resources, like indigenous breeds (e.g., Murrah buffalo, Sahiwal cattle), are now protected under biodiversity and geographical indication (GI) frameworks.

Impact of IPR on Agriculture and Veterinary Sectors

- **Innovation Stimulation:** Encouraged private investment in hybrid seeds, animal health products, and agri biotech research.
- **Equity and Access Challenges:** Concerns arose over seed sovereignty, high input costs, and patent disputes.
- **Recognition of Farmers and Indigenous Knowledge:** Laws like the PPV&FR Act and the Nagoya Protocol (2010) emphasized equitable benefit-sharing.

Current Trends and Future Outlook

Modern IPR in agriculture and veterinary science now covers CRISPR-based genome editing, synthetic biology, nanotechnology in packaging, and digital agriculture platforms.

Future developments will likely focus on balancing innovation incentives with sustainability, climate-resilient farming, and ethical animal biotechnology.

Conclusion

The history of Intellectual Property Rights (IPR) in agriculture and veterinary science reflects a dynamic journey from communal seed sharing to advanced genomic patents. While IPR has stimulated innovation and global trade, it also underscores the need for fair benefit-sharing and safeguarding traditional knowledge. A robust and inclusive IPR framework remains crucial for ensuring food security, animal welfare, and equitable growth in the bio-economy.

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Protecting Biotechnological Processes in Animal Husbandry: Strategies for Biosecurity, Data & IP Safeguards, and Sustainable Innovation

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Introduction

Biotechnology is revolutionizing animal husbandry: from artificial insemination (AI), embryo transfer (ET), and advanced reproductive technologies to genomics, precision breeding, diagnostic tools, and gene editing. These innovations ensure higher productivity, disease resistance, and improved welfare, but they also uplift new risks. Protecting biotechnological processes matters for three reasons:

- (A) to prevent biological contamination or accidental spread of pathogens.
- (B) to secure sensitive data and prevent misuse of proprietary processes.
- (C) to secure intellectual property and ensure fair technology transfer.

A layered strategy that joint biosecurity, digital safeguards, legal protections, and capacity building is essential to sustain innovation responsibly.

Biosecurity: the first line of safe biotech

Biosecurity refers to policies and practices that control the risk of introduction, spread, or escape of biological agents. For biotech in animal husbandry, biosecurity spans lab-level procedures to

farm-level containment.

Laboratory and facility controls

Standard Operating Procedures (SOPs): Every laboratory performing biotechnological procedures must have SOPs for sample handling, sterilization, waste management, and incident reporting. SOPs should be regularly reviewed and trained the staff to follow them.

Facility design: Separation of clean and dirty workflows, controlled access, air handling, and appropriate biosafety level infrastructure (BSL-1/2/3 as applicable) prevent cross-contamination risk. Equipment should be validated and calibrated routinely.

Waste and sharps disposal: Effective treatment and traceable disposal of biological waste prevent environmental release of agents or biological material.

Animal-level measures

Pre-procedure screening: Animals used in reproductive or genomic procedures should be screened for relevant microbes (bacterial, viral, parasitic) and quarantined as per need.

Quarantine and isolation: Facilities undertaking embryo transfer or donor herd collections should maintain quarantine protocols and restrict movement

between groups.

Immunization and health monitoring: immunization programs and routine surveillance for emerging threats help maintain herd resilience.

Process controls and traceability

Chain of custody: Documentation for biological samples (semen, embryos, DNA extracts) from collection through storage and deployment is essential.

Cold chain integrity: Cryostorage and transport systems for reproductive materials must be monitored to prevent temperature excursions that can compromise samples.

Traceability systems: Tagging (RFID), unique IDs and digital records ensure provenance and enable rapid response in the event of an incident.

Data and process security: protecting the informational assets

Modern livestock biotechnology generates large volumes of sensitive data: genomic sequences, health records, breeding algorithms, and AI models that predict performance. These are targets for theft, sabotage, or unauthorized reuse.

Digital safeguards

Access control & authentication: Role-based access controls, multi-factor authentication, and least-privilege principles reduces insider and external risk.

Encryption & backups: Sensitive datasets should be encrypted at rest and in transit; robust backup and offsite recovery planning protects against data loss or ransomware.

Secure cloud & local deployments: Choose reputable cloud providers with compliance certifications for storing genomic and personally identifiable data; for highly sensitive processes, hybrid or on-premises solutions may be preferable.

Protecting models and algorithms

Model watermarking and provenance: Embed digital watermarks and metadata in predictive models to establish ownership and track unauthorized reuse.

Audit trails and monitoring: Log access and changes to critical datasets and models; periodic auditing detects anomalous activity.

Secure APIs and devices: Instruments (e.g., automated insemination systems, diagnostics) that connect to networks must be hardened against exploitation.

Cyberbiosecurity intersection

Incident response planning: Integrate cyber incident response with laboratory incident management e.g., a ransomware attack on a breeding database can have quick biosecurity consequences.

Training: Staff must be trained in phishing awareness, safe data handling, and reporting suspicious behavior.

Intellectual property and legal protections

Protecting the economic value of biotechnological processes ensures investment and responsible commercialization.

IP strategies

Patents & plant variety protection: Diagnostic kits, novel processes, and genetically improved breeds may be patentable or eligible for other forms of legal protection depending on jurisdiction. Early IP assessment and strategy is important.

Trade secrets: For procedural know-how (e.g., proprietary culture media, stepwise protocols) where patenting is not required, robust trade-secret protection (restricted access, NDAs, compartmentalization of knowledge) is essential.

Licensing & contracts: Clear licensing terms and material transfer agreements (MTAs) define rights and responsibilities of technology developers and users.

Policy and compliance

National regulation: Compliance with national biosecurity, animal welfare, and patent laws is mandatory. Developers should consult regulatory bodies early to align products development with approval pathways.

Ethical oversight: Institutional review and ethics committees should vet applications of sensitive biotech (e.g., gene editing) to ensure welfare and societal acceptability.

Ethical, welfare, and societal safeguards

Protection is not only used for technical and legal it must consider ethics and public trust.

Animal welfare standards: Biotechnological applications must minimize pain and distress; welfare metrics and ethical review strengthen societal acceptance.

Transparency & stakeholder engagement: Transparency in communication about benefits, risks, and safeguards (farmers, consumers, regulators) reduces misinformation and supports responsible uptake.

Responsible use frameworks: Codes of conduct for researchers and companies help prevent dual-use misuse of technologies.

Sustainable risk management: resilience and continuity

A protective strategy should enable systems to withstand disruptions (cyberattacks, disease outbreaks, supply chain failures).

Redundancy & diversification: Maintain multiple sources for critical supplies (e.g., cryomedia), redundant data backups, and alternative workflows for continuity.

Insurance & financial planning: Risk transfer mechanisms (insurance for livestock biotechnological operations) can mitigate economic fallout from incidents.

Public, private partnerships: Coordinated surveillance and shared infrastructure funded jointly can raise capability, especially in resource-limited regions.

Capacity building and human factors

Peoples are the weak link and the strongest defense.

Training & certification: Regular training on bioethics, cybersecurity, biosafety, and quality systems for veterinarians, technicians, and data managers.

Culture of compliance: Leadership must foster a culture where safety, reporting, and continuous

improvement are rewarded.

Incentives for best practice: Accreditation, procurement preferences, or market recognition for producers who follow high-standard biotech safeguards can accelerate adoption.

Case examples & lessons (illustrative)

Assisted reproduction centers that implements strict quarantine, chain-of-custody, and digital record-keeping reduced disease transmission and improved traceability for exported germplasm.

Programs that encrypted genomic databases and introduce tiered access controls prevented unauthorized export of proprietary breeding indices.

Collaborative frameworks that combined government biosafety guidelines with private-sector IP strategies helped transfer reproductive technologies to smallholder contexts while protecting developers' rights.

Conclusion

Protecting biotechnological processes in animal husbandry department requires a holistic approach: rigorous biosecurity at the lab and farm level, robust digital and cyberbiosecurity measures for data and devices, clear IP and contractual protections, and ethical governance that sustains public trust. Building resilient systems through redundancy, partnerships, and people-centered capacity building ensures that biotechnology can safely deliver productivity, sustainability, and welfare gains in the livestock sector.

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Dairy Cows: Reducing Cells that count – naturally

Many challenges confront today's dairy industry that require farmers to be knowledgeable, innovative, and constantly improving to stay competitive. Mastitis remains the most frequent health problem affecting the dairy industry as it is assessed by somatic cell count (SCC). Udder inflammation lowers milk quality, harms animal welfare and reduces the job satisfaction of dairy farmers. It also leads to substantial economic losses and increased use of antibiotics for mastitis treatment, which poses risks of antimicrobial resistance and milk contamination. A promising and innovative solution is to feed dairy cows with phytogenic feed additives like Anta® Phyt, which can boost their immune systems and prevent mastitis while reducing the need for antibiotics.

Somatic cell count: an ally that comes with drawbacks

In a sense, SCC functions like two sides of a coin. As somatic cells are part of the innate immune system of dairy cows that provides a rapid and nonspecific response to foreign invaders, they are also an indicator of susceptibility to mastitis or poor udder health. White blood cells, such as neutrophils and macrophages, and epithelial cells are the main components of SCC. While the mammary gland's epithelial cells are usually shed and renewed, the white blood

cells migrate to the site of infection and release various substances to kill or neutralize pathogens. They also produce cytokine signalling molecules that regulate inflammation and coordinate the immune response. However, SCC can also negatively affect the udder and milk quality. When SCC is too high or prolonged, it can cause tissue damage and impair milk synthesis. The substances released by white blood cells can degrade the milk components, such as fat, protein, and lactose, and increase the somatic cell score (SCS), a logarithmic transformation of SCC. In the event of high SCS, milk's shelf life and processing value are reduced, increasing the risk of penalties or price deductions from milk buyers. Therefore, SCC is a complex and dynamic parameter that reflects the udder's balance between immunity and threat. A SCC below 200,000 cells/mL is considered normal and safe for individual cows, while a SCC above 500,000 cells/mL indicates clinical mastitis, a severe infection requiring immediate treatment. A SCC between 200,000 and 500,000 cells/mL may indicate subclinical mastitis, a mild infection that does not show visible symptoms but still affects milk quality and yield. Dairy farmers must monitor and manage SCC to optimize milk production, quality, animal

By

**Dr Temitope A Aloba,
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Dr. Eckel Animal Nutrition**

welfare, and profitability.

Feed cow immune system without cutting corners

The SCC threshold between threat and safety is not a fixed value but depends on multiple factors, such as the stage of lactation, the breed of the cow, the season, the age and the type of infection. Regardless, a cow's immune system depends largely on its nutritional status, and when nutrition is compromised, the immune system becomes weaker and more susceptible to bacterial infections in the udder, leading to increased incidence. Antibiotic usage is the first port of call as the primary treatment option for udder inflammation, but it comes with several drawbacks, such as antimicrobial resistance, antibiotic residues in milk and environmental impact. Supplementing dairy cows with phytogenic feed additives like Anta® Phyt ensures killing two

birds with a stone, i.e. enhancing the immune system beyond the average level and reducing antibiotic usage. Anta® Phyt helps herds cope better with infections that affect the udder by providing an antimicrobial effect and modulating the microbiota of the udder, leading to better overall health and performance. In a field study comprising three dairy farms with an average of 180 dairy cows, supplementing dairy cows' diet with Anta® Phyt reduced SCC across the three farms to an average of 196,000/ml compared to the period before and after supplementation withdrawal (Figure 1).

Don't stop at just enough

Dairy herd health management is crucial in the fight against antimicrobial resistance and antibiotic usage. It requires continuous hygiene improvement, frequent animal

check-ups, regular herd screening for common diseases, and isolation of new animals before joining the herd. In addition, dairy cattle need suitable housing (good ventilation, appropriate humidity, low stocking densities, and good hygienic practices) to reduce stress and boost their welfare and immunity. As a crucial part of these management measures, high-performance phytogenes such as Anta® Phyt provide the essential extra benefit. By maximizing herd health and welfare with Anta® Phyt, the host immune function improves, and mastitis and other common dairy cattle diseases decrease, reducing the need for antibiotics. Anta® Phyt makes the difference between acceptable results and excellent performance, between just enough and long-term profitability. Don't settle for less – go for Anta® Phyt.

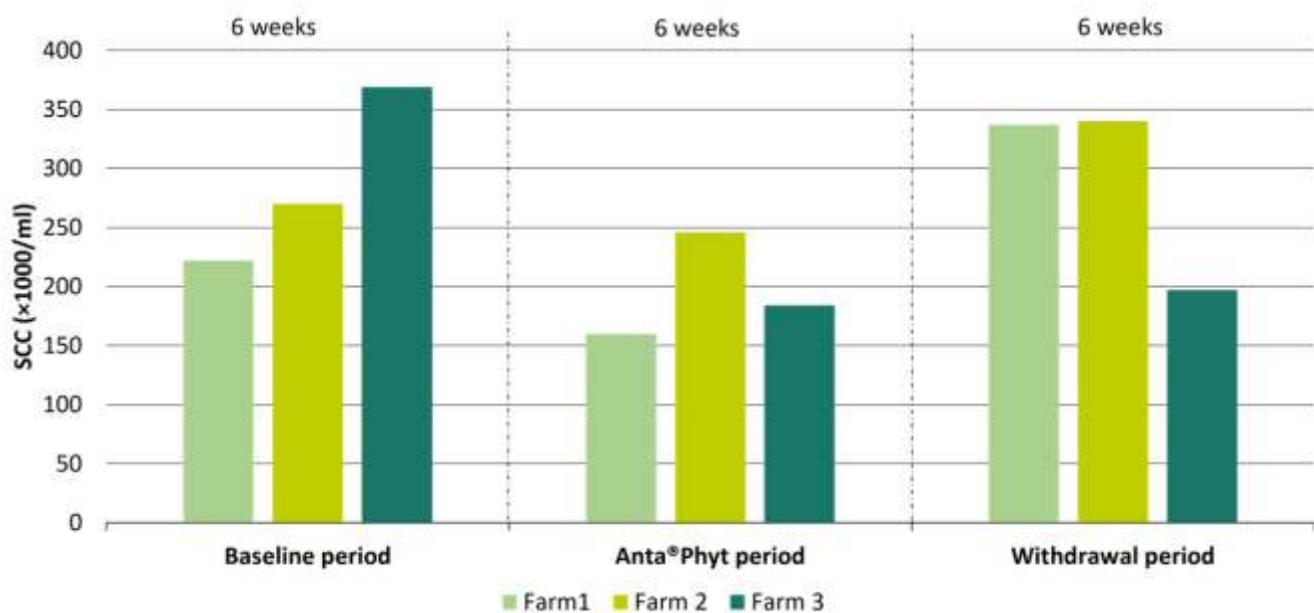


Figure 1: Changes in the SCC of three dairy farms across three different periods of supplementation with or without Anta® Phyt

FROM BARN TO BREAKFAST TABLE

HOW BIOSECURITY SAFEGUARDS MILK QUALITY AND CONSUMER HEALTH

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THE MILKY WAY – A JOURNEY OF TRUST

Richie Agarwal



Building Business Inch by Inch

Every morning, millions of Indian households begin their day with a simple, wholesome glass of milk. This seemingly straightforward staple embarks on a remarkable journey, traversing a complex supply chain from a cow or buffalo's udder to our breakfast tables. Each step in this journey—milking, storage, transportation, processing, and packaging—is a critical link in a chain of trust. The integrity of this chain, and ultimately the health of the

consumer, finds its most crucial foundation not in the dairy plant, but at the very source: the farm.

As the world's largest milk producer and consumer, with output exceeding 230 million metric tonnes annually, India's dairy journey from udder to table is a monumental feat.

This journey's safety and integrity, however, hinge on a critical foundation often hidden from view: on-farm biosecurity. These preventative practices are the essential first link in a chain

of trust, directly connecting the health of animals and the hygiene of farm practices to the well-being of every consumer.

Biosecurity: The First And Most Critical Link

Biosecurity is the first, and arguably most important, barrier against a multitude of risks that can compromise milk. At the farm level, it encompasses everything from animal health management and hygiene protocols to visitor policies and waste disposal.

The core principle is simple: a healthy animal in a clean environment produces safe milk. When biosecurity is weak, the farm becomes a potential hotspot for pathogens, which can then travel through the milk supply, posing direct threats to public health. This is not merely about cleanliness; it is a proactive, scientific approach to risk management that safeguards animal welfare, farmer livelihoods, and consumer health simultaneously.

The Invisible Threat: Zoonotic Diseases And Public Health

One of the most severe consequences of lax biosecurity is the risk of zoonotic diseases—

illnesses that can be transmitted from animals to humans. Milk, being a nutrient-rich fluid, can serve as an excellent vehicle for several dangerous pathogens.

- **Brucellosis:** Often called undulant fever in humans, Brucellosis is primarily contracted through the consumption of raw, unpasteurized milk from infected animals. It causes debilitating symptoms like recurrent fever, joint pain, and fatigue, and can lead to longterm health complications. In India, it remains a significant public health concern, particularly in rural areas.
- **Bovine Tuberculosis (TB):** While primarily a respiratory disease, Mycobacterium bovis, the bacterium causing bovine TB, can be transmitted to humans through contaminated milk, leading to extrapulmonary TB, which can affect the bones, joints, and gastrointestinal tract.
- **Other Pathogens:** Diseases like Q Fever and Leptospirosis can also be transmitted through contact with infected animals or their secretions,

including milk. Furthermore, common bacteria like E. coli and Salmonella, which cause severe food poisoning, can easily contaminate milk in unhygienic environments.

The Impact On Smallholder Farmers

The risk is magnified when considering India's dairy structure, where an estimated 70-80% of the milk is produced by small and marginal farmers owning just 1-3 animals. For these families, cattle are not just a source of income but integral members of the household. Weak biosecurity exposes them directly to these zoonotic diseases daily.

A farmer milking an infected animal without protective measures, or a child playing near the cattle shed, is at high risk of contracting illnesses through touch, saliva, or aerosol droplets. This creates a vicious cycle where animal sickness leads to human sickness, further impoverishing the family and reducing their ability to care for their livestock.

Residues, Contaminants, And The Domino Effect On Cattle Health

Beyond direct infection, poor



Severe consequence of lax biosecurity - is the risk of zoonotic diseases—illnesses that can be transmitted from animals to humans.

biosecurity leads to a cascade of other issues that degrade milk quality and animal health.

- **Antibiotic Residues:** When animals are sick due to preventable diseases (a direct result of poor biosecurity), farmers often resort to antibiotics. Without proper veterinary guidance and adherence to withdrawal periods (the time between the last dose and when milk can be safely collected), antibiotic residues enter the milk. Regular consumption of such milk by humans can contribute to antibiotic resistance, a global health crisis where common infections become untreatable
- **Aflatoxin M1:** This is a toxic carcinogen that can appear in milk. It originates from the feed. When biosecurity protocols for feed storage are ignored, fodder can become contaminated with moulds (*Aspergillus* species) that produce Aflatoxin B1. When cows consume this contaminated feed, their metabolism converts it to Aflatoxin M1, which is excreted in their milk. Long-term exposure is linked to liver cancer and immune suppression.
- **Pesticide and Chemical Residues:** Inadequate pest control or the use of unapproved chemicals in and around the cattle shed can lead to these contaminants leaching into the milk.
- **High Somatic Cell Count**

(SCC): SCC is a key indicator of milk quality. A high SCC primarily indicates mastitis, a painful inflammation of the udder often caused by bacterial infection due to unhygienic milking practices. Milk with a high SCC has reduced shelf life, poor taste, and lower nutritional value.

The impact on cattle health is severe. Animals living in stressful, dirty, and disease-ridden conditions are chronically ill, have lower milk yields, and shorter productive lifespans. This directly hurts the farmer's economic stability.

Training, Awareness, And Farmer Responsibility

The solution to these challenges lies in empowering the most critical link: the farmer. For a smallholder, investing time and resources in biosecurity may seem like a low priority compared to immediate needs. This is where training and awareness become paramount. Farmers need to understand that biosecurity is not an expense, but an investment that pays rich dividends.

- **Farmer Education:** Extension services, cooperatives, and dairy companies must conduct regular training programs in local languages. These should visually demonstrate the direct connection between a clean shed, healthy animals, higher-quality milk, premium prices, and, most importantly, the well-being of their own families.
- **Promoting Responsibility:**

The message must be clear: every farmer is a guardian of public health. The milk they produce nourishes children, the elderly, and families across the country. Adopting good practices is a matter of national pride and responsibility. Simple, low-cost measures can be highly effective and should be promoted first.

How Cooperatives And Private Dairies Can Enforce Biosecurity

Individual farmer efforts must be reinforced by a strong institutional framework. Cooperatives and private dairies, as the primary aggregators of milk, have the scale, resources, and influence to drive widespread change.

Mechanisms for Enforcement:

1. **Quality-Linked Procurement:** The most powerful tool is linking milk price to quality parameters. Milk testing labs at collection centres should routinely check for Somatic Cell Count (SCC), Antibiotic Residues, and Adulterants. Farmers supplying milk with superior quality (low SCC, no residues) should receive a significant price premium. Conversely, milk failing safety tests should be rejected outright.
2. **Standard Operating Procedures (SOPs):** Dairies should provide clear, illustrated checklists of essential biosecurity practices for their supplying farms. This includes:
 - Udder Hygiene: Washing udders with clean water and

drying with a separate cloth before milking.

- **Milker Hygiene:** Hand washing and using gloves.
 - **Footbaths and Tyre Dips:** Placing disinfectant-filled footbaths at the entrance of the cattle shed and tyre dips at the farm gate to prevent the entry of pathogens on footwear and vehicle wheels.
 - **Vaccination Drives:** Organising and subsidising vaccination campaigns against diseases like Foot-and-Mouth Disease (FMD) and Brucellosis.
 - **Cleanliness of Sheds:** Regular removal of manure, proper drainage, and ensuring dry, comfortable bedding.
- 3. Direct Support:** Dairies can negotiate bulk deals for disinfectants, teat dips, and quality feed, making them affordable for small farmers. They can also partner with veterinary services to provide affordable healthcare.

Cost Vs. Benefit

The initial cost of implementing

biosecurity—for disinfectants, footbaths, improved flooring, etc.—can be a barrier for small farmers. However, the benefits far outweigh the costs:

- **For the Farmer:** Reduced veterinary bills, higher milk yield, longer productive life of animals, and premium prices for quality milk lead to increased and more stable income.
- **For the Dairy:** A consistent supply of high-quality raw milk reduces processing costs, enhances product shelf life, and builds a strong brand reputation for safety.
- **For the Nation:** Reduced zoonotic disease burden, lower antibiotic resistance, and a robust "Brand India" dairy industry ready to meet the stringent food safety standards of international markets.

Building A Healthier Future, One Farm At A Time

The journey of milk from the barn to the breakfast table is a testament to a shared contract

of trust. This trust cannot be established at the end of the chain through processing alone; it must be built from the ground up. Strengthening biosecurity at the farm level is the most effective strategy to safeguard consumer health, enhance farmer prosperity, and fortify India's position as a responsible global dairy leader.

By linking farm practices directly to consumer well-being, we create a powerful incentive for change. When consumers demand safe milk, dairies are compelled to invest in their supply chain, and farmers are rewarded for their responsible practices. This virtuous cycle fosters a culture of quality and safety.

Ultimately, a glass of milk should be a symbol of pure nourishment, not a vector of disease. Through collective action—empowered farmers, proactive dairies, and aware consumers—we can ensure that every sip reinforces the foundation of a healthier India, built on the strength of its smallest farms.



Safeguarding the journey of milk demands that biosecurity becomes the non-negotiable foundation of Indian dairying.



Future of Livestock Farming: Pioneering Tomorrow's Agriculture

Executive summary

The livestock sector stands at an inflection point. Surging demand for animal-sourced foods, evolving consumer expectations for quality and animal welfare, and the urgent need to reduce greenhouse gas emissions frame a complex challenge: how to increase productivity while reducing environmental impact and improving animal well-being. This article explores the technological, managerial, economic, and policy pathways that will define the future of livestock farming. It synthesises historical lessons, present realities, and forward-looking strategies across genetics, precision livestock farming (PLF), feed and nutrition innovations, animal health and

welfare, circular systems, market linkages, and policy frameworks. The goal is pragmatic: to lay out a roadmap for dairy and livestock stakeholders to transition from incremental improvements to systemic transformation — resilient, productive, equitable, and sustainable.

Introduction: Why the Future of Livestock Matters

Livestock farming is woven into the fabric of global food systems, rural livelihoods, culture and biodiversity. Dairy and meat products deliver essential nutrients, livelihoods for millions of smallholders, and economic activity across value chains. Yet, the sector is

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under scrutiny: greenhouse gases, land use change, zoonoses, antibiotic resistance and concerns over animal welfare challenge its social licence to operate. Meeting projected demand for animal-sourced foods while simultaneously reducing the sector's footprint requires an integrated transformation — not merely technocratic fixes.

The coming decades will be shaped by climate reality, digitalisation, shifting consumer preferences, urbanisation, and resource constraints. For dairy planners, farm managers, extension services and policymakers, the imperative is clear: adopt innovations that increase efficiency and resilience, reduce environmental costs, protect animal health, and create equitable value for producers.

A Brief History: How Livestock Became Modern Agriculture's Backbone

Historically, livestock provided

multifunctional services — traction, manure, dietary protein and financial security. The 20th century saw intensification and specialization: separate dairy, beef and small ruminant systems, mechanisation, improved genetics and large-scale feed industries. Productivity soared, but so did specialization and environmental impacts.

Three historical lessons shape future thinking:

Intensification can boost output per animal but creates concentration risks (disease, market shocks).

Technological adoption without institutional support often widens inequality (rich farmers benefit first).

Multifunctionality matters: livestock's roles in nutrient cycling, landscape management and livelihood portfolios must be respected in future designs.

Global Drivers Shaping The Next Decades

Key drivers will determine trajectories for dairy and livestock:

Population & consumption

trends: Global population growth and rising incomes in many regions increase demand for dairy and meat — though growth rates will vary by region and demographic cohort.

Climate change: Shifting temperature and precipitation patterns affect feed availability, disease vectors, and heat stress.

Technological progress:

Genomics, sensors, machine learning, robotics and synthetic biology open new management possibilities.

Urbanisation & supply chains:

Urban markets demand traceability, food safety and freshness — pushing investments in cold chains and value-added processing.

Consumer preferences: Animal welfare, environmental footprint and origin transparency influence market access and pricing.

Policy & finance: Carbon accounting, trade policies, and access to finance will affect adoption rates of green technologies.

Understanding these drivers helps stakeholders prioritise investments that are robust to multiple futures.

Productivity and Genetics: Breeding for Efficiency and Resilience

Genetic improvement has been a cornerstone of yield gains in dairy and meat. Future breeding strategies will prioritise:

Feed efficiency: Animals that convert feed into milk or lean

mass with lower inputs reduce production costs and emissions per unit.

Heat tolerance & resilience: As temperatures rise, thermotolerant breeds or genomic markers associated with heat resilience become valuable.

Disease resistance: Selection for innate disease resistance reduces need for antibiotics and improves lifetime productivity.

Methane-reducing traits: Emerging research suggests heritable variation in enteric methane; selecting for low-methane emitters could be part of mitigation.

However, breeding gains should be context-specific. Smallholder systems often require dual-purpose animals and resilience to variable feeds — not traits optimised for confinement. Breeding programs must therefore be participatory, locally relevant and integrated with extension and input supply systems.

Precision Livestock Farming: Data-driven Herds

Precision Livestock Farming (PLF) applies sensors, imaging, wearables, and analytics to monitor animals and systems continuously. PLF's promise is threefold: earlier disease detection, more efficient resource use, and finer control over welfare.

Key PLF components:

Wearables & tags:

Accelerometers, rumination monitors, and GPS can detect estrus, lameness and deviations in feed intake.

Cameras & computer vision:

Automated body condition scoring, behavior analysis and



milk-line monitoring reduce labour needs and improve consistency.

Environmental sensors: Microclimate, gas sensors (ammonia, methane) and feed bunk sensors inform housing and ventilation decisions.

Data platforms & AI:

Integrating data streams with predictive models provides actionable alerts — e.g., flagging cows at risk of metabolic disease.

Adoption barriers include cost, data ownership concerns, connectivity in rural areas, and skills gaps. Business models that bundle hardware, analytics and financing (e.g., pay-per-use) will accelerate uptake, particularly for medium- and large-scale farms.

Feed, Nutrition and Microbial Innovations

Feed represents the largest single input in many systems and is a major source of environmental pressure. Innovations in feed and nutrition are central to emissions reduction and productivity.

Precision feeding and ration optimization

Formulating rations based on individual or group-level production stage and body condition improves feed conversion and reduces waste. Real-time feed intake monitoring enables dynamic rationing.

Novel feed ingredients

Insect meals: High-protein insect-derived meals can substitute fishmeal and reduce reliance on conventional protein sources.

Single-cell proteins: Microbial biomass produced from fermentation using waste

feedstocks offers a scalable protein source.

Algae: Certain microalgae provide concentrated protein and fatty acids; macroalgae supplements are also in trials for methane suppression.

Feed additives and microbial interventions

Methane inhibitors: Chemical inhibitors, encapsulated formulations and selective seaweed extracts have shown substantial methane reductions in trials.

Probiotics and precision microbiome interventions: Modulating rumen microbiota to favour less-methanogenic pathways is an active frontier.

Enzymes and phytase: Improve nutrient digestibility and reduce phosphorus excretion.

Nutrition strategies must be balanced with local feed availability, cost, and farmer capacity to adopt new inputs.

Animal Health, Welfare And Ethical Production

Health and welfare are both ethical imperatives and productivity drivers. Disease outbreaks disrupt supply chains and inflict heavy economic losses. Welfare standards increasingly influence market access and consumer choice.

Preventive health and surveillance

Vaccination, biosecurity, and early-warning systems (enabled by PLF) are cost-effective prevention measures. Integrating on-farm data with regional surveillance helps manage transboundary diseases.

Alternatives to routine antibiotics

Antimicrobial stewardship requires improved husbandry, vaccines, and alternatives such as bacteriophages, competitive exclusion probiotics, and immunomodulators.

Welfare-first housing and handling

Designing housing that minimises stress (comfort, space, social grouping) improves productivity and reduces injuries. Low-stress handling, training, and stockmanship are high-return investments.

Transparency and certification

Traceability systems, welfare labels, and third-party audits can differentiate products in premium markets while assuring consumers of ethical practices.

Environmental Impacts and Mitigation Strategies

The livestock sector's environmental footprint spans greenhouse gas emissions, land use, water consumption, and biodiversity impacts. Mitigation strategies should be multilayered.

Reducing emissions intensity

Efficiency gains: Increased milk yield per cow and shorter generation intervals lower emissions per litre or kilogram.

Dietary methane mitigation: Feed additives and forages that reduce enteric methane can deliver near-term emissions cuts.

Manure management: Anaerobic digestion captures methane and produces biogas; covered storage and improved handling reduce emissions.

Land-use optimization

Avoiding deforestation, restoring degraded pastures,

and intensifying forage production on existing land reduces pressure on natural ecosystems.

Carbon sequestration and regenerative practices

Silvopastoral systems, rotational grazing, cover crops and improved pasture management can increase soil carbon stocks. Credible measurement and permanence safeguards are essential for carbon finance.

Water and nutrient stewardship

Precision application of manure and fertilisers, buffer strips, and constructed wetlands reduce nutrient runoff and protect water quality.

An integrated approach combining mitigation and adaptation yields the greatest resilience.

Circularity, integrated systems and landscape approaches

Circular models close nutrient loops and valorise by-products. Examples include:

Manure-to-energy: Biogas plants providing on-farm energy and nutrient-rich digestate for crops.

Crop-livestock integration: Crop residues as feed, manure as fertiliser, and diversified rotations improve system efficiency.

Agroforestry & silvopasture: Trees in grazing lands offer shade, fodder, carbon storage and biodiversity benefits.

Landscape-level planning that aligns watershed management, biodiversity corridors and agricultural production strengthens ecological functioning and social acceptance.

Economic models, value chains and market transformation

The future of livestock will be affected by market structures, finance access and new value propositions.

New business models

Service models: Sensors-as-a-service, herd-health subscriptions, and data-driven advisory services lower entry costs.

Aggregation models:

Cooperatives and producer companies improve bargaining power and enable investments in processing and cold chains.

Vertical integration: Supply chain players integrating backward into production can ensure quality but may marginalise small suppliers.

Value chains & added value

Traceability, origin marketing, value-added dairy products (specialty cheeses, probiotic yogurts), and sustainability labels can earn price premiums.

Finance & risk management

Climate risk insurance, index-based livestock insurance, and innovative credit products tied to performance metrics can increase resilience.

Policy-driven carbon markets and payments-for-ecosystem-services can provide additional revenue streams, but require robust monitoring.

Policy, regulation and incentives for a sustainable transition

Public policy shapes production incentives, research priorities and market frameworks. Effective policy levers include:

Research & extension

funding: Public investment in regionally relevant breeding,

feed trials, and PLF adaptation accelerates uptake.

Standards & labelling: Welfare and environmental standards must be enforceable and aligned internationally to avoid trade barriers.

Fiscal incentives: Subsidies for methane-reducing additives, manure digesters, and tree-planting can speed adoption.

Land-use planning: Protecting high-conservation areas while incentivising restoration on degraded lands reduces expansion pressure.

Policymakers must balance short-term food security needs with long-term sustainability objectives, ensuring that smallholders are not disadvantaged by well-intended regulations.

Case studies & promising pilots

Below are concise, illustrative examples of pathways showing promise (names are anonymised for brevity):

Case A: Precision dairy pilot in a peri-urban region

A medium-scale dairy unit deployed wearables and smart feeders across 300 cows. Within 12 months, mastitis incidence dropped by 22%, average daily milk yield increased 6%, and feed conversion improved by 8%. The farm adopted a subscription payment model for analytics, reducing upfront capital needs.

Case B: Smallholder cooperative silvopasture initiative

A cooperative of 120 smallholders established silvopasture plots with fodder shrubs and fruit trees. Year-on-year resilience to dry spells

improved; household incomes diversified from fruit sales and fodder savings. Soil organic matter increased measurably after three seasons.

Case C: Regional manure-to-biogas hub

A cluster model where several small farms delivered manure to a central anaerobic digester supplied biogas to a local processing plant. Digestate was sold as a premium organic fertiliser. The hub model made technology accessible without individual farm-scale investment.

These cases underscore that appropriate technology, financing innovation and collective action are critical success factors.

Barriers, risks and social considerations

Transitions carry risks: inequitable adoption, technological lock-in, loss of livelihoods for marginal producers, and unforeseen ecological impacts.

Equity and inclusivity

Smallholders may lack capital, connectivity or skills to adopt advanced PLF or feed innovations. Tailored extension, affordable service models and cooperatives are needed to ensure inclusive benefits.

Data governance and privacy

Who owns and benefits from farm data? Clear rules and farmer-centric business models prevent exploitation and promote trust.

Technological dependency and resilience

Overdependence on imported technologies or inputs can undermine resilience. Local capacity building and diversified

sourcing reduce vulnerability.

Unintended ecological outcomes

Intensification must avoid externalising impacts (e.g., feed production causing deforestation). Holistic lifecycle assessments are essential.

Roadmap: practical steps for farmers, advisors and policymakers

The following roadmap offers actionable steps across actors.

For farm managers and producers

- 1. Audit & benchmark:** Know your baseline — productivity, emissions intensity, feed efficiency and animal health metrics.
- 2. Prioritise high-return changes:** Improve nutrition, biosecurity and basic welfare — these often deliver immediate gains.
- 3. Adopt data incrementally:** Start with low-cost sensors or on-batch sampling, then scale to herd-level analytics.
- 4. Collaborate:** Join cooperatives or producer groups to aggregate demand for inputs, services and finance.
- 5. Diversify income:** Value-added products, biogas co-products and agroforestry reduce revenue volatility.

For advisors and extension services

- 1. Contextualise innovations:** Translate technology into locally relevant practices and metrics.
- 2. Train in data literacy:** Help farmers interpret outputs and convert alerts into interventions.
- 3. Facilitate finance linkages:**

Work with microfinance, banks and impact investors to design farmer-friendly products.

For policymakers and funders

- 1. Invest in public goods:** Genetics, feed crop breeding, disease surveillance and regional extension.
- 2. Design equitable incentives:** Subsidies and payments should be accessible to smallholders and avoid perverse outcomes.
- 3. Support measurement systems:** Fund MRV (measurement, reporting and verification) infrastructure for carbon and welfare metrics.
- 4. Promote market access:** Invest in rural roads, cold chains and digital marketplaces.

Conclusion: toward regenerative, resilient dairy and livestock sectors

The future of livestock farming

need not be a binary choice between productivity and planet. With thoughtful application of genetics, nutrition, data, and circular principles — underpinned by inclusive policy and fair markets — it is possible to produce more with less harm. The transition is complex and will differ across geographies and systems. Yet the path ahead is clear: integrate sustainability into the core of livestock business models, measure what matters, and design incentives that reward environmental stewardship and animal welfare.

The dairy sector, given its intimate ties to human nutrition and rural livelihoods, has an outsized role. By piloting innovations, sharing lessons, and crafting supportive policies, the sector can become a model of how food systems adapt to 21st-century realities.





Revolutionizing the Barnyard: Recent Advances in Livestock Technology

The livestock industry has undergone a significant transformation in recent years, driven by advances in technology. From artificial intelligence (AI) and robotics to genomics and precision agriculture, these innovations are improving the efficiency, sustainability, and welfare of livestock farming. In this article, we'll explore some of the most exciting recent developments in livestock technology, and examine their potential impact on the industry.

1. AI-Powered Farming

Artificial intelligence is being increasingly used in livestock farming to optimize feeding, breeding, and health management. AI algorithms can analyze data from sensors and cameras to detect early signs of illness or stress in animals, enabling farmers to take prompt action.

- **Predictive Analytics:** AI-powered predictive analytics can help farmers forecast disease outbreaks, allowing them to take proactive measures to prevent them. For example, AI algorithms can analyze data on temperature, humidity, and animal behavior to predict the likelihood of a disease outbreak.
- **Automated Decision-Making:** AI can automate decision-making processes, such as determining the optimal feeding schedule for a herd or identifying the most suitable breeding candidates. For instance, AI algorithms can

analyze data on animal growth rates, feed consumption, and genetic profiles to determine the optimal feeding schedule.

- **Real-Time Monitoring:** AI-powered monitoring systems can track animal behavior, health, and nutrition in real-time, enabling farmers to respond quickly to any issues that arise. For example, AI-powered cameras can monitor animal behavior and detect early signs of illness or stress.

2. Robotic Milking and Feeding Systems

Robotic milking and feeding systems are revolutionizing dairy farming by increasing efficiency and reducing labor costs. These systems use sensors and automation to milk cows and provide them with tailored nutrition.

- **Increased Efficiency:** Robotic milking systems can milk cows around the clock, increasing milk production and reducing labor costs. For instance, robotic milking systems can milk cows every 8-10 hours, increasing milk production by up to 10%.
- **Improved Animal Welfare:** Robotic feeding systems can provide cows with tailored nutrition, improving their health and welfare. For example, robotic feeding systems can provide cows with a diet that is tailored to their individual nutritional needs.
- **Data-Driven Decision-Making:**

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Robotic systems can provide farmers with valuable data on milk production, cow health, and feeding patterns, enabling them to make data-driven decisions. For instance, robotic systems can provide farmers with data on milk production, enabling them to identify areas for improvement.

3. Genomic Selection

Genomic selection is a technology that allows farmers to select breeding animals based on their genetic potential. This approach is improving the accuracy of breeding programs, enabling farmers to produce healthier, more productive animals.

- **Improved Breeding Accuracy:** Genomic selection can improve the accuracy of breeding programs by identifying genetic markers associated with desirable traits. For example, genomic selection can identify genetic markers associated with improved milk production or disease resistance.
- **Increased Productivity:** By selecting breeding animals with desirable genetic traits, farmers can produce more productive animals. For instance, selecting breeding animals with genetic traits associated with improved milk production can increase milk yields.
- **Reduced Disease Incidence:** Genomic selection can help reduce the incidence of genetic diseases by identifying and selecting against genetic markers associated with disease. For example, genomic selection can identify genetic markers associated with inherited diseases, enabling farmers to select against these traits.

4. Precision Agriculture

Precision agriculture involves using advanced technologies such as drones, satellite imaging, and sensors to optimize crop yields and reduce waste. In livestock farming, precision agriculture is being used to optimize grazing management and reduce the environmental impact of farming.

- **Optimized Grazing Management:** Precision agriculture can help farmers optimize grazing management by identifying the most productive grazing areas and monitoring soil health. For example, drones equipped with sensors can monitor soil moisture and nutrient levels, enabling farmers to identify the most productive grazing areas.
- **Reduced Waste:** Precision agriculture can help reduce waste by optimizing feeding and reducing the amount of feed wasted. For instance, sensors can monitor feed consumption and adjust feeding schedules accordingly.
- **Improved Environmental Sustainability:** Precision agriculture can help reduce the environmental impact of farming by optimizing fertilizer and pesticide use. For example, sensors can monitor soil nutrient levels and adjust fertilizer application accordingly.

5. Virtual Fencing

Virtual fencing is a technology that uses GPS and wireless communication to create virtual boundaries for livestock. This approach is reducing the need for physical fences, enabling farmers to manage their land more flexibly and reducing the risk of animal escapes.

- **Increased Flexibility:** Virtual fencing enables farmers to create flexible grazing patterns,

reducing the need for physical fences. For example, virtual fencing can enable farmers to create rotational grazing patterns, improving soil health and reducing erosion.

- **Reduced Labor Costs:** Virtual fencing can reduce labor costs by automating the process of monitoring and managing animal movement. For instance, virtual fencing systems can alert farmers when animals are approaching a virtual boundary, enabling them to take prompt action.
- **Improved Animal Welfare:** Virtual fencing can improve animal welfare by reducing the risk of animal escapes and injuries. For example, virtual fencing can prevent animals from escaping onto roads or into neighboring properties.

6. Livestock Monitoring Systems

Livestock monitoring systems are being used to track the health, behavior, and nutrition of animals in real-time. These systems use sensors and data analytics to provide farmers with insights that can inform their management decisions.

- **Real-Time Monitoring:** Livestock monitoring systems can track animal health, behavior, and nutrition in real-time, enabling farmers to respond quickly to any issues that arise. For example, sensors can monitor animal temperature, enabling farmers to detect early signs of illness.
- **Data-Driven Decision-Making:** Livestock monitoring systems can provide farmers with valuable data on animal health, behavior, and nutrition, enabling them to make data-driven decisions. For instance, data analytics can identify trends in

animal behavior, enabling farmers to adjust their management strategies accordingly.

- **Improved Animal Welfare:** Livestock monitoring systems can improve animal welfare by enabling farmers to detect early signs of illness or stress. For example, sensors can monitor animal behavior, enabling farmers to detect early signs of stress or anxiety.

Conclusion

Recent advances in livestock technology are transforming the industry, enabling farmers to produce more efficiently, sustainably, and humanely. From AI-powered farming to genomic selection, these innovations are improving animal welfare, reducing environmental impact, and increasing productivity. As these

technologies continue to evolve, we can expect to see further improvements in the livestock industry, benefiting both farmers and consumers alike.

Future Directions

The future of livestock technology holds much promise, with several exciting developments on the horizon. Some potential future directions include:

- **Increased Adoption of AI and Robotics:** As AI and robotics technologies continue to evolve, we can expect to see increased adoption in the livestock industry.
- **Integration of Livestock Monitoring Systems:** Livestock monitoring systems are likely to become increasingly integrated, enabling farmers to access a range of data and insights from

a single platform.

- **Development of New Genomic Selection Tools:** New genomic selection tools are likely to be developed, enabling farmers to select breeding animals with even greater accuracy.
- **Increased Focus on Sustainability:** The livestock industry is likely to place increasing emphasis on sustainability, with technologies such as precision agriculture and virtual fencing playing a key role.

Overall, the future of livestock technology looks bright, with several exciting developments on the horizon. As these technologies continue to evolve, we can expect to see further improvements in the livestock industry, benefiting both farmers and consumers alike.





Safeguarding Calf Health: Dairy Farm Biosecurity Strategies

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Introduction

Promoting strong health in dairy calves is fundamental for ensuring their future productivity and welfare on the farm. Calves represent a key investment, and since they are born without a developed immune system, they are particularly susceptible to various diseases. It's crucial for dairy producers to maintain calves' well-being and steady growth so they mature into productive, fertile, and healthy adult cows.

Calves face exposure to many pathogens commonly present on dairy farms, which can originate from adult cattle, pets, birds, nearby wildlife, or even humans. Professionals visiting the farm—such as veterinarians, hoof trimmers, nutritionists, and sales personnel—can inadvertently introduce or spread these pathogens. Managing all these risk factors requires dairy farmers to recognize and understand them, as well as to implement effective practices to minimize disease transmission. Biosecurity protocols have been established as a practical set of tools to help farmers mitigate these risks and protect calf health.

Pathogen/Infection transfer

Pathogens can be transferred

through multiple routes, which makes managing animal health particularly complex on dairy farms. These routes include contamination from pasture, irrigation water, rodents, wildlife, insects, and even humans, as well as through contact with infected animals, whether healthy or ill. For instance, bacteria like Salmonella may be present in the environment, contaminated water sources, or wildlife such as squirrels and deer; insects can carry viruses like Blue Tongue. The wide diversity of pathogens and their host species underscores the importance of strict hygiene, segregation based on age or lactation stage, and the use of high-quality feed and water to prevent disease transmission.

Research indicates that transmission pathways are complex, involving environmental reservoirs, intermediate hosts, and direct contact with contaminated objects or surfaces. Infections such as Salmonella, Campylobacter, Listeria monocytogenes, and E. coli can enter the farm via contaminated water, feed, or contact with wildlife, and can be spread through fecal-oral routes, inhalation, or direct contact with infected animals. Maintaining strict farm hygiene, appropriate animal separation, and

| Major Pathogen Transfer Routes a Dairy Farm | |
|--|--|
| From older or sick cattle to calves by direct animal contact or manure contact | Purchasing new cattle with unknown health status nor quarantining (e.g., certificates) |
| Pathogen transfer through feedstuffs | Purchase of semen or embryos |
| Pathogen transfer through drinking water | Rats, mice, insects, foxes, squirrels, birds |
| Wildlife (deer) | Vehicles and people |

high standards of feed and water quality are fundamental measures to reduce the risk of infection transfer within dairy operations.

Table 1: Overview of major pathogen transfer routes.

General management measures

In order to give a foundation to the Biosecurity Protocols it is strongly advised to implement general management measures. These measures assist in adopting the most adequate mentality and attitude on the dairy farm for controlling diseases. Table 2 provides an overview of relevant general management measures. With regard to the third domain in Table 2, it could be envisaged to install large billboards at the farm entrance, pointing the visitors to the rules to comply to when entering that farm. A specifically designated parking place for (professional) visitors should be considered. This too may cut off an infection transfer route.

Table 2: An overview of general management measures.

| |
|--|
| Cleanness & Hygiene |
| Identify all things that calves come in contact with and keep these clean Maintain a well-bedded, disinfected maternity pen and calving utensils. After birth, calves should be put into individual calf hutches; the navel disinfected. Bottles, nipples, buckets, tube-feeders must be cleaned and disinfected after use after weaning, calves should be grouped in clean disinfected group pens (5-6 calves). |
| Calf Treatment |
| If calves are to receive injections, be sure that needles are sterile and syringes new. If calves are to be fed by tube-feeder, make sure these are clean, disinfected, dry. |
| People Management |
| It is adequate to assign calf feeding, treatment and all handling to specific persons. These persons should apply high hygiene levels to themselves (boots, overall, hands) Professional visitors (vet, nutritionist) should adopt strict hygiene rules of the farm Other professional visitors (feed delivery; cattle truck) should adopt these rules too. All visiting people should disinfect their hands, put on clean boots and overall, when entering the farm, specifically when entering animal barns. |

Biosecurity protocols

A biosecurity program is like an assurance policy for animal health and productivity; in neither of them the zero-risk does exist. Moreover, it is quite common that the implementation of a biosecurity

program is less costly than having several diseased animals. Together with the farmer or farm manager, the veterinarian can take the lead in developing a biosecurity program.

Biosecurity programs are based on three pillars:

- a) An analysis of the prioritized prevalent and potential threats (infections) and risks.
- b) The management of these risks.
- c) The communication about the risks (explaining to employees; need of compliance)

Analysis of threats and risks

The farmer and veterinarian discuss about the major threats (infections) present on or expected for the dairy farm. In this context this paper will not elaborate on cheese-making farms for reasons of simplicity. It could be worthwhile to identify first whether the farm produces milk or animals (culled cattle; sold calves) too. Let us assume for simplicity reasons that the farm produces milk only. Then, it should be established which are

the most prevalent diseases on the farm needing attention and which other non-prevalent diseases might become a real threat and, hence, should be prioritized too. This yields a short list. An example shortlist may comprise the most

important mastitis pathogen (e.g. Staph. aureus) on the farm, combined with Mortellaro disease and BVD. The following step is to determine by which routes these pathogens enter the farm, how they survive and are possibly shed by the animals. Next step is to identify the most relevant risk factors contributing to the occurrence of these diseases and assess their respective impact (minor; moderate; high). When no information on impact is available from literature, the veterinarian can make a qualitative assessment of the risk factor impact. Then the biosecurity program can be further developed.

Developing the biosecurity program

The sound foundation of a biosecurity program is the implementation of "general management measures". Foundation because these measures may adjust management attitude and mentality, as well as that of farmworkers. As addressed before, the biosecurity program is further based on the analysis of threats (hazards or diseases) and their associated risk factors. This analysis results in the definition of "critical management points". Examples of such Critical Management Points (CMP) are presented in Table 3. CMP should be adapted for the individual farm regarding applicability and ease of understanding. Limiting the animal movements onto and within the farm, as well as limiting possible contacts between animals on one side and vehicles/vectors/people on the other side represent important control measures in biosecurity. Separation of cattle in different management groups, such as fresh cows, mid-lactation, end-lactation, dry cows, but also in calf-age groups means that each group

is an epidemiological management unit. Contacts between groups must be avoided. Management should be adapted to the specificities of each group individually. Epidemiologically spoken, it is not necessary to control all risk factors for a disease. Given the commonly multifactorial nature of diseases in ruminants, it is sufficient to eliminate or reduce the impact of several relevant risk factors to get rid of a disease.

Table 3: An example of Critical Management Points (CMP) on a dairy farm.

| Exposure Area | Example | CMP |
|---------------------------|---|---|
| New additions to the herd | Cows, calves, embryos, semen | Certificates of Health and Origin. Clinical inspection of animals. Diagnostic testing for given pathogen(s). Quarantine for new cattle. |
| Feed & Water | Forages, water, concentrates, milk replacer | Water microbiological quality testing. Preventive measures on water sources. GMP certificates for concentrates. Milk replacer from a certified company. |
| Animal contacts | Neighboring cattle, cattle returning from show, clinics, wildlife | All contacts must be minimized. Returning cattle are to be considered as "new additions" (see above). Calves should be separated in age-groups. |
| Vectors & Vehicles | Rodents, truck/lorry, tractors, people | Implement a rodent control program. Trucks/lorries to be disinfected at farm entrance. Strict hygiene instruction for people (on farm or visitors). Male calves sold for fattening should leave the farm from a sole designated area. Apply a Good Drug Administration Code of practice. |
| Health management | | If indicated, give short trainings (e.g. injection techniques). Keep records of disease and treatment in calves. |

GMP = produced under a good manufacturing code of practice.

Prevention

With regard to prevention, Noordhuizen [4] presents a listing of 93 management measures contributing to prevention of occurrence of infectious diseases. These measures can be regarded as being an essential part of a Good Dairy Farming Code of Practice. Most of the measures are well-known but now compiled into one

practical document. Examples of measures are the routine monthly scoring of body condition in dry cows and fresh cows; the recalculation of feed rations for calves at each feed change; checking growth rate in older calves at least twice yearly; checking housing hygiene weekly; checking barn climatic conditions daily.

When a calf is removed from a hutch: put the hutch outside in a designated cleaning area.

1. Remove straw, manure and dirt.
2. Clean it with high pressure

water.

3. Disinfect, rinse and let the hutch dry in the air.

When young calves are being fed, they should be checked routinely on clinical signs of illness; findings should be noted on a scoring card. Severely affected calves should be separated from group mates and put in a separate sick-pen. Treatment should be recorded and follow a Calf Treatment Advisory Plan, designed by the veterinarian.

The veterinarian may draw Checklists for the individual dairy farm, which may assist the farmer in his awareness of risks on his farm. Table 4 presents a self-assessment farmer's checklist for assessing the risk level for Infectious Bovine Respiratory disease (IBR, BHV-1). For young calves particular checklists can also be developed. A short example is given in Table 5. One may deduce from this Table 5 that the better the hygiene and the better the management quality, the lesser the calves will be at risk of diseases such as respiratory disease or diarrhea.

Table 4: Anternal farmer's checklist for assessing the risk of IBR on a dairy farm.

| Yes | No | N-A | Your Answer to the Topic Named |
|-----|----|-----|---|
| | | | You purchase cattle from non-IBR-free-certified farms |
| | | | You voluntarily put cattle from forenamed farms in pasture and or in barns |
| | | | You participate in cattle shows where non-IBR-free cattle is potentially present |
| | | | You graze your calves and maiden heifers next to pastures where cattle from other farms graze |
| | | | Your cattle sometimes escape from their pasture and make contact with cattle from other farms |
| | | | Neighboring cattle sometimes escape and make contact with your cattle |
| | | | You use sometimes semen from non-EU-certified sources |
| | | | You let professional visitors enter your farm without complying to hygiene rules set (boots, gloves, overall) |

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You use sometimes semen from non-EU-certified sources

You let professional visitors enter your farm without complying to hygiene rules set (boots, gloves, overall)

N-A means not applicable.

Table 5: Part of a Checklist for scoring management practices in young calf rearing.

| Farming Area | Best Management | Moderate Management | Poor Management |
|------------------------------|-----------------|---------------------|-----------------|
| Birth management | | | |
| Navel disinfection 7% | Yes | — | No |
| Calf rubbed dry | Yes | — | No |
| Calf housed | In hutch | With its dam | In straw pen |
| Cleaning & disinfection | Yes | — | No |
| Colostrum period 1 | Yes | No | No |
| 1st colostrum within 2h | 1½ - 2½ L | — | No |
| Quantity 1st colostrum | Serum IgG | Serum IgG | Serum IgG |
| Colostrum quality | >2000 mg/L | 1000-2000 mg/L | < 1000 mg/L |
| 1st colostrum for 2nd meal | Yes | — | No |
| 2nd meal max 8 h after 1st | Yes | — | No |
| Colostrum period 2 | Yes | No | No |
| 1st colostrum in freezer too | Yes | — | No |
| Colostrum intake/day/calf | 4-6 L | — | < 4 L or > 6 L |
| Colostrum meals/day/calf | 3 | 2 | Unlimited |
| Colostrum hygiene | Good | Moderate | Poor |

Conclusion

The changes to be made on a dairy farm in the context of a biosecurity program do, in general, not require large investments while the benefits

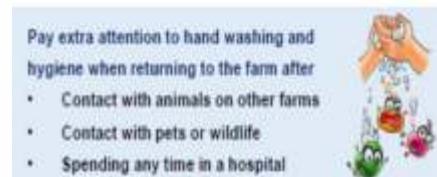
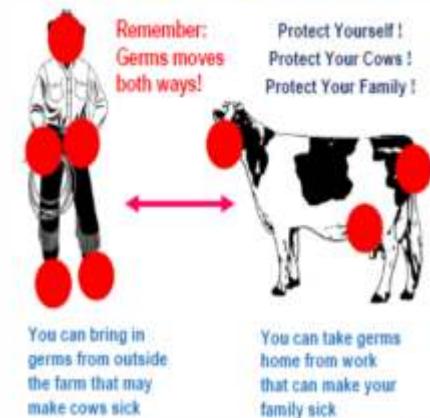


of improvement are high. The appropriate, successful implementation of such a program depends on the proper understanding of the relevance and the benefits produced, as well as on the compliance. The herd veterinarian also plays a role in the communication process on the farm. When deemed necessary, a short hands-on training sessions for specific issues within the program for specific farmworkers can be developed.

A biosecurity program is not a panacea, functional on all farms at the same time; moreover, it must be tailor-made for each individual

extension of an on-going herd health and productivity management program on the dairy farm, mainly because several issues addressed in the forenamed above are also part of these herd health and productivity management programs. The difference might be in the organization and structuring of biosecurity actions, management measures and checklists in protocols.

Farm workers' hygiene





Rabies in Animals: Vaccination Protocols and Critical Insights

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Rabies in animals is lethal viral encephalitis that targets the central nervous system, resulting in progressive inflammation of the brain and spinal cord. As a zoonotic pathogen, the virus possesses the capacity to transmit from animals to humans as well as other susceptible species, most commonly through the saliva of an infected mammal, typically via a bite. Clinical manifestations are variable, but frequently include abrupt alterations in behavior such as unexplained aggression or marked lethargy, progressive paralysis, hyper salivation, and neurological dysfunction. Once overt clinical signs develop, the disease is almost invariably fatal.

Clinical Forms of Rabies

Rabies in animals generally

presents in two distinct clinical forms:

- **Furious Rabies:**

This classical manifestation is characterized by marked excitability, heightened hyperactivity, and uncharacteristic aggressiveness. Affected animals may attempt to bite or snap indiscriminately at objects, other animals, or humans

- **Paralytic (Dumb) Rabies:**

This variant is typically associated with progressive paralysis, most notably involving the throat and mandibular muscles, resulting in dysphasia and excessive salivation. Although such animals may not display overt



aggression, they remain infectious and capable of transmitting the virus through their saliva.

Etiology and Transmission

Rabies is caused by the rabies virus (genus *Lyssavirus*, family *Rhabdoviridae*). Transmission occurs predominantly through the saliva of infected animals, most often via bites. In rare circumstances, infection may also occur when contaminated saliva gains access to mucous membranes (such as the eyes, mouth, or nasal passages) or to breaches in the skin, including open wounds. For instance, an infected animal licking an unhealed cut may facilitate viral entry. All mammals, including domestic species such as dogs and cats, as well as wildlife reservoirs like bats, foxes, and raccoons are susceptible and capable of transmitting rabies.

Modes of Transmission

- **Saliva:** The rabies virus is shed in the saliva of infected animals.
- **Bites:** The primary and most common mode of transmission is through the bite of an infected host.
- **Other Exposures:** Transmission may also occur if infected saliva contaminates an open wound, abrasion, or mucous membrane (such as the conjunctiva, oral cavity, or nasal passages). For example, licking of an unhealed cut by a rabid animal can serve as a source of infection.

Clinical Symptoms

Rabies in animals is characterized by a spectrum of neurological and behavioral signs. Early

manifestations often include sudden changes in temperament, ranging from unexplained aggression to unusual docility. As the disease progresses, clinical features such as paralysis, incoordination and staggering gait, dysphasia, hyper salivation, and seizures become evident. These signs are not pathognomonic and may vary between species, as well as between the two recognized forms of rabies:

- The **furious form**, dominated by hyper excitability and violent behavior.
- The **paralytic (dumb) form**, characterized by progressive paralysis with minimal aggression.

Prevention and Control

Since rabies is incurable once clinical signs appear, prevention is the only effective strategy. Key preventive measures include:

- **Routine vaccination of companion animals** (dogs, cats, ferrets) in strict accordance with veterinary and legal guidelines.
- **Responsible pet management**, such as

confinement, supervision, and avoidance of contact with stray or wild animals.

- **Public health interventions**, including the prompt reporting and management of stray or suspected rabid animals.
- **Wildlife control strategies**, such as oral rabies vaccination programs, and structural measures like sealing entry points in homes to prevent bat incursions.

Management of exposed animals is determined largely by vaccination status:

- **Unvaccinated animals:** Generally subjected to euthanasia or strict, prolonged quarantine in line with local regulations.
- **Previously vaccinated animals:** Typically managed with an immediate booster dose of rabies vaccine followed by close veterinary observation.

The overarching principle remains clear: **preventive vaccination and early intervention are indispensable in breaking the rabies transmission cycle.**



Pre-exposure (Pre-bite) Vaccination Schedule

Pre-exposure vaccination is an essential component of rabies prevention, providing effective protection for domestic and productive animals against this invariably fatal disease. A vaccination plan should always be designed by a qualified veterinarian, taking into account the animal's species, age, health status, and regional regulations. The following outlines general guidelines applicable to commonly vaccinated species.

General Best Practices

- Vaccinate only clinically healthy animals and avoid periods of illness or stress.
- Perform deworming 1–2 weeks prior to vaccination to enhance efficacy.
- Ensure that vaccination is administered by a licensed veterinarian in strict compliance with national and local laws.
- Maintain accurate and detailed vaccination records for each animal.

Species-specific Guidelines

Dogs

- Primary vaccination: First dose at 12–14 weeks of age.
- Booster: Administered 21–30 days after the initial dose.
- Revaccination: Annual booster is recommended in rabies-endemic regions. In certain cases, vaccines with validated 3-year duration of immunity may be used.

Cats

- Primary vaccination: First dose at approximately 90 days (12 weeks) of age.

- Revaccination: Annual boosters are typically required, although triennial vaccines are available in some jurisdictions.

Cattle, Sheep, and Goats

- Primary vaccination: First dose at 3–6 months of age, depending on the vaccine used.
- Revaccination: A 2-year interval is standard, though annual boosters are advisable in endemic zones.

Buffaloes

- Prophylactic vaccination: Annual revaccination is strongly recommended in areas with persistent rabies risk.

Post-exposure (Post-bite) Vaccination Schedule

In cases of potential exposure, **immediate intervention** is critical:

1. Wound management:

Vigorously wash the wound with soap and running water for several minutes to physically reduce viral load. Apply a virucidal antiseptic such as povidone–iodine.

- #### **2. Supportive care:** Ensure tetanus immunization is current, following national guidelines. Wounds should not be sutured or tightly covered.

Rabies Vaccination Protocols

- **Intramuscular regimen:** Four doses on Days 0, 3, 7, and 14, with a possible fifth dose on Day 28 depending on risk and protocol.
- **Intradermal regimens (WHO-recommended):**
 - Two-site, 7-day schedule: 0.1 ml administered intradermally at two sites on Day 0, with repeat doses at two sites on Days 3 and 7.

- Thai Red Cross schedule (widely practiced in India): 0.1 ml at two intradermal sites on Days 0, 3, 7, and 28.

Conclusion

Rabies continues to stand as one of the most devastating zoonotic diseases, marked by its near-universal fatality once clinical signs appear. Its impact extends beyond animal health, permeating public health and livestock productivity, and imposing profound economic burdens on communities worldwide. The dual clinical manifestations furious and paralytic demonstrate the insidious variability of the disease, while its modes of transmission underscore the ease with which it can traverse species boundaries.

Yet, despite its lethality, rabies is entirely preventable. Vaccination, both pre-exposure and post-exposure, remains the single most effective and indispensable weapon in breaking the cycle of transmission. Strategic immunization of domestic pets, livestock, and in some cases wildlife reservoirs, coupled with rigorous wound management and adherence to international vaccination protocols, provides a proven shield against this ancient scourge.

The broader lesson is unambiguous: rabies is not merely a medical or veterinary concern but a One Health challenge, demanding coordinated efforts that unite human, animal, and environmental health sectors. Sustained vaccination campaigns, strict biosecurity measures, and community engagement are not optional but imperative. In the fight against rabies, prevention is not only possible it is powerful, cost-effective, and life-saving.

NDRI Kalyani holds Animal Health Camp to promote scientific livestock farming and this farmer empowerment

Agartala, 8th October 2025: The ICAR-National Dairy Research Institute (NDRI), Eastern Regional Station, Kalyani, West Bengal, successfully held a one-day Animal Health and Input Distribution Camp at the Conference Hall of Bagma Agri Producer Company Limited (BAPCL), located in Bagma, Gomati District, Tripura. This event was organized under the NDRI-NEH Project aimed at improving livestock health, productivity, and the income of farmers in the North Eastern region.

During the event, Dr. Ashok Santra, Principal Scientist at NDRI, highlighted the crucial roles that both agriculture and animal husbandry play in the livelihoods of farmers in the northeastern states. He pointed out that integrated farming has become increasingly significant in light of irregular rainfall and the impacts of climate change on crops.

The program saw attendance from Nimai Das, Pradhan of South Bagma Gram Panchayat, along with senior



scientists from NDRI, including Dr. M. Karunakaran, Dr. Ajoy Mandal, and Dr. Mohan Mandal. Also present were Dr. Afsana Sarkar, Veterinary Officer in Bagma; Dr. Debajyoti Sarkar, Veterinary Officer in Kakraban; Sudip Majumder, Managing Director of BAPCL; and Md. Farukul Islam, Chief Executive Officer of BAPCL. More than 120 livestock farmers from Gomati, South Tripura, Khowai, and Sepahijala districts participated in

the camp, where they received chicklets, ducklings, livestock feed, mineral mixtures, vitamins, calcium supplements, and other vital veterinary supplies.

You are not alloyyed to do this In his speech, Dr. Santra encouraged farmers to implement scientific approaches in action on the current page!!

livestock rearing to enhance production and profitability. Sudip Majumder expressed gratitude to NDRI, Kalyani, for its ongoing commitment to supporting livestock-based livelihood development in Tripura.

An interactive session was also conducted, allowing farmers to engage with experts on practical issues concerning disease control, nutrition, and animal care. The camp highlighted the robust partnership between ICAR-NDRI and BAPCL in empowering rural farmers.



A Road to Madison Paved in Gold at the International Red & White Show

MADISON, WIS. – Golden-Oaks Temptres-Red-ET was named Grand Champion of the International Red & White Show on Thursday, October 2. In addition to topping the show, Temptres also claimed the award for Best Udder. She is owned by Milk Source, Fischer, Steincrest & Crescentmead from Kaukauna, Wis. Premium Apple Crisp Lilly-Red, the winning Aged Cow, took home both the Reserve Grand and Reserve Senior Champion honors. Lilly is owned by Butlerview Farm of Chebanse, Ill.

Intermediate Champion went to the winning Senior Three-Year-Old, Luck-E Altitude Attie-Red-ET, owned by Rick & Tom Simon and ALH Genetics USA Inc. of Farley, Iowa. Standing next to Attie was Rocky-Run MV Arcadia-Red-ET of Golden Oaks Farm, of Wauconda, Ill., taking home Reserve Intermediate Champion honors.

Junior Champion was claimed by Milksource Shay-Red-ET, owned by Milk Source LLC & Jeremy Holthaus, from Kaukauna Wis, who received the Norman E. Magnussen Memorial Award. Following as the

Reserve Junior Champion is Ms Believe In Faith-Red-ET, the winning Fall Heifer Calf. She is owned by T & S Krohlow, William Schultz III, and Yvonne Preder of Black Creek, Wis.

Elmvue Farm, Johnstown, N.Y., claimed Premier Exhibitor, while Luck-E Holsteins of Hampshire, Ill. was named Premier Breeder. In the heifer show, Jacob & Claire Betley, of Pulaski, Wis., took home Premier Breeder honors and T & S Krohlow, William Schultz III, and Yvonne Preder from Black Creek, Wis., won Premier Exhibitor. Farnear Altitude-Red-ET was the Premier Sire and Mr Blondin Warrior-Red-ET was the Premier Sire of the Heifer Show for the fourth consecutive year.

Official judge, Adam Hodgins of Kincardine, Ontario, Canada, and associate judge, Joel Phoenix of Cannington, Ontario, Canada, evaluated 320 Red and White cattle.

Serving as the meeting place of the global dairy industry, World Dairy Expo brings together the latest in dairy innovation and the best cattle in North America. The global dairy industry returned to Madison, Wis. for the 58th event, September 30 –

October 3, 2025, when the world's largest dairy-focused trade show, dairy and forage seminars, a world-class dairy cattle show and more were on display.

The Grand Champion of the International Red and White Show went to Golden-Oaks Temptres-Red-ET, owned by Milk Source, Fischer, Steincrest & Crescentmead from Kaukauna, Wis. Reserve Grand Champion went to Premium Apple Crisp Lilly-Red, owned by Butlerview Farm of Chebanse, Ill.

Junior Champion was claimed by Milksource Shay-Red-ET, owned by Milk Source LLC & Jeremy Holthaus, from Kaukauna Wis. The Reserve Junior Champion is Ms Believe In Faith-Red-ET, owned by T&S Krohlow, William Schultz III, and Yvonne Preder from Black Creek, Wis.

Intermediate Champion went to Luck-E Altitude Attie-Red-ET, owned by Rick and Tom Simon and ALH Genetics USA Inc. of Farley, Iowa. Rocky-Run Mv Arcadia-Red-ET of Golden Oaks Farm, of Wauconda, Ill., was Reserve Intermediate Champion.



CLFMA of India Delegation Strengthens U.S.-India Agricultural & Livestock Collaboration Through Knowledge Exchange



CLFMA of India delegation visited the United States to study sorghum, corn, and dairy farming practices and engage with top agricultural stakeholders. Meetings included live farm demonstrations, industry interactions, and discussions with senior U.S. officials, including the Governor and Agriculture Secretary of Iowa. On October 6, 2025, The Compound Livestock Feed Manufacturers Association (CLFMA) of India successfully concluded a week-long

delegation visit to the United States, marking a significant step in advancing international cooperation in agriculture and livestock feed. Invited by the U.S. Grains Council, the delegation, led by Chairman Divya Kumar Gulati, engaged with policymakers, industry leaders, and farmers to explore best practices in sorghum (jowar), corn, and dairy production.

The visit commenced in San Antonio, Texas, where the delegation participated in a

series of technical sessions led by experts from the United Sorghum Checkoff Program, Kansas State University, Clemson University, and the U.S. Grains Council. Discussions spanned global sorghum markets, grain standards, sustainable farming practices, and the role of sorghum in poultry, swine, and pet food diets. Sessions also highlighted efficiencies within the U.S. grain supply chain and emerging trends in global demand.

Next, the delegation travelled to Amarillo, Texas, to witness sorghum cultivation and processing firsthand. Visits included Will Braack and Kathy Broman Farms, Joe Rohrbach Farms, and the Richardson Seed Company in Vega. The program also featured a tour of Myles Frische Farms and an engagement with Bunge in Etter, Texas, offering an in-depth look at planting, harvesting, and supply chain operations. The Texas leg concluded with a debrief session hosted by the United Sorghum Checkoff Program in Amarillo.

In Iowa, the delegation explored the integrated grain-to-feed ecosystem through visits to POET Bioprocessing facilities in Jewell and Shell Rock, as well as Mark Mueller's farm in Waverly, where the team was hosted for a farmer-organized cookout. Additional stops included Stuart Swanson Farms in Galt, the Gold Eagle Feed Mill in Eagle Grove, and Dutchland Dairy in Rolfe, providing insights into ethanol production, feed manufacturing, and large-scale dairy operations.

The Iowa program culminated in strategic engagements, featuring a high-level meeting with the

Governor of Iowa at the State Capitol, followed by discussions with the Iowa Agriculture Secretary and members of the Iowa Corn Growers Association. These interactions focused on agricultural policy, trade, and technology adoption, underscoring opportunities for long-term collaboration in livestock feed and dairy sectors.

This visit reinforces ongoing efforts under the MoU signed between CLFMA and the State of Iowa (September 2024), and the sister-state agreement between Maharashtra and Iowa (August 2025). Both frameworks aim to facilitate joint research, knowledge sharing, and adoption of sustainable practices in the livestock feed and broader agricultural sector.

Commenting on the visit, Divya Kumar Gulati, Chairman, CLFMA of India, said, "This visit provided invaluable insights into advanced agricultural practices, particularly in sorghum, corn, and dairy production. With India's animal feed market valued at approximately USD 14.34 billion in 2024 and projected to reach USD 21.02 billion by 2034, the need for sustainable and efficient feed solutions is paramount.

Engaging with U.S. counterparts has highlighted the importance of knowledge exchange in addressing challenges such as feed shortages and productivity gaps. By adopting proven practices and fostering international collaboration, we aim to enhance the sustainability and competitiveness of India's livestock sector."

The CLFMA delegation included:

- Divya Kumar Gulati, Chairman
- Abhay Shah, DY Chairman
- Abhay Parnekar, DY Chairman
- Nissar F. Mohammed, Honorary Secretary
- Ramkutti, Treasurer
- Sameer Chotai, President – East Zone
- Sumeet Surekha, DY Chairman
- Suresh Deora, Immediate Past Chairman
- Naveen Pasupathy, DY Chairman

Through direct engagement with U.S. farmers, industry representatives, and policymakers, the CLFMA delegation reinforced India's commitment to sustainable agricultural practices, livestock feed innovation, and international collaboration.

National Workshop on Standardization of Traceability Protocols for Indian Livestock Sector for Achieving Viksit Bharat Organized



A National Workshop on Standardization of Traceability Protocols for Indian Livestock Sector for Achieving Viksit Bharat was successfully organized today in New Delhi. The event was jointly hosted by the Bureau of Indian Standards (BIS) and the ICAR–National Research Centre on Mithun, Medziphema, Nagaland, in collaboration with the Indian Meat Science Association.

Addressing the gathering, Dr. Raghavendra Bhatta, Deputy Director General (Animal Science), ICAR, emphasized that as the world's largest livestock-producing nation, India must prioritize traceability to ensure food safety,

quality assurance, consumer trust, and access to premium markets. He underscored the importance of digital animal tracking, geo-tagging, and disease traceability, while also acknowledging challenges related to smallholder systems, digital literacy, and farmer incentives. Dr. Bhatta stated that the FAO has recognized traceability as a key determinant of global competitiveness and called for the development of a robust, farmer-centric traceability framework in India. He commended ICAR–NRCM for its pioneering initiatives in livestock traceability.

Ms. Varsha Joshi, IAS, Additional Secretary, Department of Animal

Husbandry and Dairying, appreciated the efforts of Dr. Girish Patil and his team at ICAR–NRC Mithun for leading the national project on traceability. She elaborated on the National Digital Livestock Mission (NDLM) and the Bharat Pashudhan App, underscoring that traceability has been integral to DAHD's digital livestock ecosystem since its inception. Ms. Joshi highlighted how digital tracking enables monitoring of animals throughout their lifecycle from birth to slaughter ensuring food safety and residue compliance. She urged BIS to expedite the development of traceability-related standards, enhance farmer training, and

promote supply chain integration to boost India's livestock export potential.

In his Welcome Address, Dr. Sanjay Pant, Deputy Director General (Standardization-II), BIS, highlighted the pivotal role of BIS in formulating standards across diverse sectors. He shared that BIS has so far developed over 24,000 standards and funded 200 R&D projects, many of which have directly contributed to new standard development.

Dr. Suneeti Toteja, Senior Director (FAD), BIS, presented on "Research-Driven Standardization – BIS Perspective", outlining mechanisms for collaborative research and the translation of R&D outcomes into standards.

Dr. Girish Patil S., Director, ICAR–NRC on Mithun, presented

the outcomes of the BIS-funded project on Standardization and Validation of Farm-to-Fork Traceability System in the Meat Sector. He provided an overview of the Indian livestock landscape, global best practices, and progress made toward developing draft national traceability standards. Dr. Patil demonstrated the Tralexho app, a digital tool for traceability management, highlighting its flexibility and backend functionalities. He emphasized the need to include feed traceability, antibiotic residue monitoring, and body condition scoring in comprehensive traceability systems.

A dynamic discussion followed, with participants from various agencies deliberating on the draft standards. It was agreed that traceability implementation would begin in pilot and voluntary modes,

followed by phased expansion. A Working Group of 10–15 experts will be constituted to refine and finalize the draft standards.

Participants underscored the importance of inter-agency coordination, capacity building, and farmer awareness for successful traceability adoption. The discussions recognized that while poultry traceability is relatively easier to implement, multi-species traceability in India will require integrated digital solutions, regulatory backing, and sustained stakeholder collaboration.

The workshop marked a significant step toward developing comprehensive national standards for livestock traceability, strengthening India's position in global livestock trade, and contributing to the vision of "Viksit Bharat 2047."



Recipients of the Inaugural Doug Willams Booth Awards



MADISON, Wis. – More than 450 companies from across the globe traveled to attend and showcase new technologies at the 2025 World Dairy Expo Trade Show. Representatives from 39 states and 15 countries visited with Expo attendees, taking advantage of the large, diverse crowd at the Alliant Energy Center, who enjoy looking through the engaging booths throughout the Trade Show.

Every year, exhibitors compete to develop the most eye-catching, interactive and stylish booths to win awards in the following divisions: New Booth, Outdoor Booth, Showstopper Booth, Interactive Booth and Best of Show.

The division award winners are presented the Doug Williams

Memorial Booth Award. This award was presented on October 1 by the World Dairy Expo Commercial Exhibitor Committee, World Dairy Expo Staff and the Doug Williams Family.

Winners:

New Booth: JLG Industries

Outdoor Booth: Jaylor

Showstopper Booth: Nedap

Interactive Booth: Madero Dairy Systems

Best of Show: GEA Farm Technologies, Inc.

Doug Williams, who passed away in January 2025, was a familiar face to those visiting Kuhn North American's booth at Expo for 30 years. Doug served on Expo's Commercial Exhibitor Committee for 24 years and was the Chairman of the committee, as well as a member of Expo's Executive Committee for six years and Expo's Board of Directors for 10 years. Always quick with a smile, a helping hand and sound business acumen, Doug's contributions to Expo were many, and those qualities were only a fraction





of why he was also honored as a Friend of Expo in 2014. World Dairy Expo is pleased to honor Doug's memory with these awards for trade show excellence.

Serving as the meeting place of the global dairy industry, World Dairy Expo brings together the latest in dairy innovation and the best cattle in North America. The global dairy industry returns to Madison, Wis. for the 58th event, September 30th – October 3rd, 2025, when the world's largest dairy-focused trade show, dairy and forage seminars, a world-class dairy cattle show and more will be on display. Download the World Dairy Expo mobile event app, visit worlddairyexpo.com or follow WDE on Facebook, Twitter, LinkedIn, Spotify, Instagram or YouTube for more information.

Jaylor team awarded Outdoor Booth Award for their display outside New Holland Pavilion

1.
 Front row L to R: Aleah Kidd, Zadie Kidd, Guy Dion, Terri Willams, Maiken Kidd, Alan Vaage, Larry Kortuem, Roberto Martelo, Bill Hageman, Joe Coburn
 Second row L to R: Jenny Smith, Parker Willams, Lauren Pierce, Jayden Willams. GEA awarded . Best of Show award.
 Front row L to R: Aleah Kidd, Zadie Kidd, Guy Dion, Terri Willams, Maiken Kidd. Second row L to R: Jenny Smith, Parker

Willams, Lauren Pierce, Jayden Willams, Matt Daley, Cheryl DeCraene, Robin Matthayasack, Stephanie Finn, Jamie Fox, Joe Coburn. Third row L to R: Mark Heald, Trent Brooks, Scotty Bates, heather Crawford, Scott Hercula, Andy Hugher. Third row L to R: Andy Lenkaitis, John Brooks, Dan Gudmunson, Mark Walker, Chad Buchanan. Fourth row L to R: John Culb, Parimal Mehta, Jacob DeLay. JLG Industries awarded the New Booth award.

Front row L to R: Aleah Kidd, Zadie Kidd, Guy Dion, Terri Willams, Maiken Kidd, Bill Hageman, Mariah Ryder, Emily Bryan. Second row L to R: Jenny Smith, Parker Willams, Marty Molthen, Lauren Pierce, Jayden Willams, Jamey Patla, Brandon Neal, Matthew Dewalt, Robert Barger, Pete Perrin. Third row L to R: Charles Clenn, Jose Martinez, Zane Clevenger, Mike Burhoe, Joe Coburn.



Yili Wins Two IDF Dairy Innovation Awards at the World Dairy Summit

SANTIAGO, Chile, Oct. 23, 2025 /PRNewswire/ -- Themed "Nourishing a Sustainable World," the 2025 World Dairy Summit was held from October 20 to 23 in Santiago, Chile. Organized by the International Dairy Federation (IDF), the summit brought together industry representatives, experts, scholars, and organizations from the global dairy industry to

explore new pathways for innovation and sustainability.

At the event, Yili's booth—blending elements of Chinese culture with the spirit of the Chilechuan grassland—showcased the company's flagship products, including liquid milk, milk powder, yogurt, and cheese.

From October 19 to 23, Yili Group representatives were engaged with the event's

full agenda. Liu Chunxi, Senior Executive President of Yili Group, was invited to the meeting of the IDF Task Force on the Paris Dairy Declaration on Sustainability; Dr. Yun Zhanyou, Vice President of Yili Group, was re-elected to the IDF Board; Ignatius Szeto, Assistant President of Yili Group, delivered a keynote speech titled "The Role of Dairy Consumption in Healthy Aging."





Dr. Yun Zhanyou re-elected to the IDF Board

Yili Representative re-elected to the IDF Board

At the IDF Board of Directors meeting held on October 19, Dr. Yun Zhanyou, Vice President of Yili Group, was re-elected for a new two-year term in recognition of his outstanding contributions to shaping global dairy policies, deepening international collaboration, and fostering closer dialogue between China's dairy sector and the global

industry.

Dr. Yun stated at the meeting, "I wish to express my gratitude to IDF and all member country representatives for their trust. I look forward to continuing to work hand in hand with global dairy colleagues to advance the industry's higher-quality development."

Yili recognized with IDF Dairy Innovation Awards

The IDF Dairy Innovation

Awards are among the most influential and widely recognized accolades in the industry. This year, Yili received five nominations, leading its global peers. At the awards ceremony on October 21, Yili secured two awards for its outstanding innovation and sustainability practices.

Yili's Xinhuo Bone Energy Formula Milk Powder received the Innovation in Dairy Products for Human Nutrition award.



Yili honored with 2025 IDF Dairy Innovation Awards

AMBPOMIAL's "For a Bluer Ocean" Limited-Edition Eco-Packaging received the Innovation in Packaging and Transparency for Dairy Products award.

Laurent Damiens, Chair of the judging committee for the IDF Dairy Innovation Awards, presented Yili with the trophy and certificate. He noted that this marked the fourth consecutive year Yili has received the awards and commended the company for its strong

innovation capabilities and global industry leadership.

In recent years, Yili has been recognized consistently at the IDF Dairy Innovation Awards. These honors span multiple fields, including product innovation, sustainable packaging, food safety and quality management, consumer nutrition, women's empowerment, sustainable agriculture and climate action, as well as

marketing and communication.

Looking ahead, Yili will further deepen collaboration with global partners to jointly build a resilient and sustainable global dairy ecosystem, thereby advancing the vision of "World Integrally Sharing Health."

The issuer is solely responsible for the content of this announcement.

According to Amit Shah, India's dairy industry has expanded by 70% during the past 11 years.



India's dairy industry has advanced significantly over the last 11 years, according to Union Home Minister Amit Shah, who also noted that the industry has risen by 70% during this time and is currently the fastest-growing in the world.

He said that India's dairy industry has grown by 70% in terms of capacity under Prime Minister Narendra Modi's direction.

As part of initiatives to support the cooperative sector, Shah declared that India's dairy industry is the fastest-growing in the world after launching the recently built Sabar Dairy Plant facility at Industrial Model Township here.

The Rs 325 crore plant, which will have cutting-edge machinery, is anticipated to create both direct and indirect jobs.

With a daily capacity of 150 metric tonnes of curd, 3 lakh litres of buttermilk, 10 lakh liters of yoghurt,

and 10 metric tonnes of sweets, the recently opened Sabar Dairy factory here is the biggest facility in the nation for producing curd, buttermilk, and yoghurt. Sabar Dairy is the name of the Sabarkantha District Cooperative Milk Producers' Union, which is based in Gujarat.

Shah, who also holds the

cooperation portfolio, stated that during the last four years, this Ministry, in coordination with all state governments, has built a solid foundation for the cooperative system.

Shah stated that the number of milch cattle has increased from 86 million in 2014-2015 to 112 million. Milk production has risen from 146 million to 239 million tons, he stated.

According to Shah, up to eight crore farmers work in the dairy business, and per capita milk availability has increased from 124 grams to 471 grams.

Many improvements have occurred in the dairy sector over the last 11 years, resulting in increased prosperity for farmers, he added, noting that India has emerged as the world's leading milk producer.

Shah also emphasized the White Revolution 2.0 project, stating that



by 2028-29, milk procurement by dairy cooperatives is likely to increase to 1,007 lakh kg per day from current levels.

He also stated that we will build a method to ensure that India has the world's most advanced plants.

Meanwhile, Shah stated that Sabar Dairy's new plant here will serve the demands of the entire National Capital Region and Northern states.

Sabar Dairy serves farmers from Rajasthan, Haryana, Maharashtra, Punjab, Uttar Pradesh, and Bihar.

It will spread throughout Haryana, increasing farmers' revenue, he added.

Gujarat Vidhan Sabha Speaker Shankarbhai Chaudhary, Union Ministers of State Rao Inderjit Singh and Krishan Pal, Gujarat Minister Bhikhusinh Parmar, Chairman of Sabar Dairy Shamalbhai B Patel, Amul chairman Ashok Chaudhary, Haryana Minister Arvind Sharma, and Haryana BJP president Mohan Lal Badoli were among those in attendance.

AIC intends to offer parametric insurance solutions to individuals and livestock.

According to its chairman and managing director, Lavanya R. Mundayur, the Agriculture Insurance Company of India (AIC), the biggest farm insurer in the nation, intends to broaden its



parametric product line beyond crops to include coverage for livestock and even individuals.

When certain criteria are exceeded, parametric insurance automatically initiates claim payouts by defining a quantifiable trigger, like temperature or rainfall.

For example, we once created a really intriguing cover for female agricultural laborers, albeit it hasn't been widely promoted yet. It was parametric income-loss protection that was activated by severe weather events like heat waves or cyclones. According to Mundayur, in an interview with Business Standard in New Delhi, "the cover would automatically trigger a pre-agreed payout if the temperature crosses a certain threshold or if wind speed crosses a certain level leading to

cyclone, which in turn leads to loss of workdays."

The idea was created for fishermen on a pilot basis. The goal is to safeguard against catastrophic, unforeseen disasters that significantly impair revenue, including intense drought or cyclones, rather than to cover everyday occurrences.

For the last three years, AIC and the Kerala Co-operative Milk Marketing Federation, also known by its trade name Milma, have partnered to offer heat-index-based livestock insurance in certain state districts. These goods are now in modest pilot programs with the goal of expanding to wider demographic groups.

We've come to the realization that we already have the know-how to create these term sheets that are tailored to the individual requirements of every customer. Additionally, we have robust pricing capabilities that are backed by our internal models. Over the years, our staff of actuaries and price specialists has been honing these

skills, but we haven't done much to promote them. We've put them into practice in a few areas, and we're now working to expand them," Mundayur stated.

If the government provided subsidies support, that might be feasible. Currently, less than 1% of the nation's cattle are covered by insurance. Using the current NCIP (National Crop Insurance Portal) infrastructure to combine livestock insurance under one roof has been discussed. "These plans are still developing, but that could be a real game-changer.

Arunachal Minister Requests NDDB Assistance for State's Dairy Development

Gabriel D. Wangsu, Arunachal Pradesh's Minister for Animal Husbandry, Veterinary and Dairy Development, paid a visit to the National Dairy Development Board



(NDDDB) headquarters in Anand, Gujarat, on Thursday, accompanied by senior state department officials. During the three-day journey, Minister Wangsu emphasized the importance of developing a comprehensive plan for the northeastern state's dairy sector. "We need to come down to work on the ground," he stated during a meeting with NDDDB Chairman Dr. Meenesh C Shah, emphasizing the need of moving from planning to implementation.

The Minister raised many important issues about Arunachal Pradesh's dairy sector. "We are in a state of confusion regarding the breed of animals and how to upgrade our local breeds," Wangsu stated, emphasizing the necessity for technical assistance. He also emphasized the significance of fodder availability, adding that 'fodder is highly vital and the key' for long-term dairy development.

Wangsu also emphasized the nutritional needs of military troops stationed in the state, saying, "It is important for us that we take care of

the nutritional balance of our citizens and military stationed in the border state." He encouraged the NDDDB to provide comprehensive support for improving dairy development in Arunachal Pradesh while taking into account the state's unique agro-climatic circumstances. "A survey is required to assess the agro-climatic conditions in Arunachal Pradesh. "We need a perfect roadmap and master plan," he said.

Wangsu emphasized Arunachal Pradesh's commitment to aligning with NDDDB's vision for sustainable dairy development, expressing hope that technical assistance from NDDDB would address challenges such as establishing milk processing and chilling plants, forming dairy cooperatives, cattle breeding farms, fodder management, and so on. In response to the state's needs, the NDDDB Chairman pledged the state administration of his full support and promised that a team of senior NDDDB officials will visit Arunachal Pradesh to conduct study and draft a detailed development plan suited

to the state's specific requirements.

Minister Wangsu visited several NDDDB facilities, including research laboratories and the Fodder Demonstration Unit of Indian Dairy Machinery Company (IDMC) Limited, Manure Management. He also met with farmers and the Solar Pump Irrigators' Cooperative Enterprise of Mujkuvu to learn about innovative dairy farming practices and technologies. He was accompanied by Hage Tari, Secretary of AHV&DD, and other senior state department personnel.

China's Inner Mongolia hosts the third annual conference of the National Center of Technology Innovation for Dairy.

The third annual conference of the





National Center for Technology Innovation in Dairy (NCTID) took place in Hohhot, Inner Mongolia, on September 27–28. NCTID presented its Top Ten Achievements for 2025 during the conference, emphasizing significant innovations that raised the bar for the sector. World-class dairy cattle breeding, the advancement of breast milk research, the expansion of production of essential ingredients, the improvement of sophisticated dairy processing technologies, the creation of dairy products for healthy aging, and the promotion of sustainability in the industry are some of these accomplishments.

NCTID General Manager He Jian gave an update on the Center's status and future prospects. "The past three years have been a formative period of exploration for NCTID, during which we established an open and collaborative industry platform," he said. "Looking ahead, we will sharpen our focus on research with business incubation at the core, while elevating the annual conference into a high-level, professional scientific forum."

At the conference, researchers from top universities such as New Zealand Bioeconomy Science Institute, Beijing Technology and

Business University, Inner Mongolia University, and China Agricultural University also presented their findings. The Bioeconomy Science Institute's latest advancements in food science were discussed by Dr. Stefan Clerens, Science Group Manager of Smart Foods & Bioproducts. Using gut-brain axis cell models for screening can lower R&D risks and offer robust support for product innovation, he emphasized in his discussion about a development pipeline for brain-health foods.

The Focal Point on Dairy Research in China, a special publication of Nature that highlighted the joint accomplishments of NCTID and its member organizations, including Yili, is proof that NCTID's global prominence is still growing. It draws attention to the Center's crucial role in promoting innovation and development in the dairy sector and bridging the gap between research and industrial application.

The results of a 2025 collaborative study, A Survey of the Intellectual Property Legal Environment in Southeast Asia and Strategic Recommendations for Dairy Companies' Overseas Expansion, were also made public by NCTID and the Inner Mongolia Intellectual

Property Protection Center. Under the direction of Yili Group, NCTID has emerged as a key player in the development and use of advanced technologies, promoting advancements in the industry as a whole and aiding in the superior growth of China's dairy industry. In the future, NCTID intends to collaborate more freely, involving governments, businesses, academic institutions, research centers, and supply chain partners. The Center wants to better support China's dairy industry's long-term growth by delivering more inclusive public services and innovations more frequently.

In just nine months, livestock exports reached \$447.5 million.

According to the Ministry of Agriculture and Environment, Vietnam's livestock exports increased 18.6% year over year to an estimated US\$447.5 million in the first nine months of 2025.

Specifically, meat, edible offal, and by-products brought in \$151 million, up 27.4%, while milk and dairy products brought in \$89 million, down 4.9%. According to figures, export revenues totaled \$53.7 million in September alone.

The ministry has urged communities to extend successful biosecure and circular farming models and to foster connections between businesses and farmers in response to tighter international market restrictions and heightened competition. This will improve domestic animal husbandry, increase foreign investment in high-tech farming, and strengthen control throughout the production chain.



In an attempt to foster a positive business climate, increase livestock production associated with processing for greater added value, and promote trade, authorities, associations, and provinces have also been directed to strengthen their efforts against the cross-border smuggling of animals and related products.

The ministry also advocated for creating disease-free areas, improving market research and forecasts, and assisting businesses with market expansion and production planning. By taking these actions, the livestock industry in Vietnam hopes to maintain its growing pace and become more globally competitive.

Meenesh C. Shah, head of the National Dairy Development Board, says India is ready for the second "White Revolution."

On Saturday, October 11, 2025, Meenesh C. Shah, Chairman of the National Dairy Development Board (NDDDB), declared that India is prepared for the second "White Revolution" and emphasised the necessity for the country's dairy industry to begin concentrating more on value addition and exports in order to boost margins and

farmer incomes. In honour of the UN-proclaimed "International Year of Cooperatives" observance and the NDDDB diamond jubilee festivities, Mr. Shah was speaking at a state-level seminar that was held in collaboration with the Kerala Cooperative Milk Marketing Federation (Milma).

According to him, White Revolution 2 entailed bolstering dairy cooperatives throughout the nation and expanding milk procurement to over 10 crore litres per day over the following four to five years by enlisting more farmers. "White Revolution 2 is now being conceptualised," he stated.

According to him, NDDDB has started programs pertaining to nutrition, health, and breeding in an effort to increase productivity, which is a significant obstacle in the industry. According to him, addressing milk and milk product adulteration and increasing the organised milk sector's share are additional issues.

60% to 65% of milk in the nation is still handled by the unorganised sector, notwithstanding the dairy industry's advancements. According to him, NDDDB is aiming towards increasing the organised milk sector's contribution from 65% to

70%. According to him, increasing the proportion of value-added products is another priority.

Cooperatives must strive for a significant portion of value-added goods in order to give farmers a higher pay for producing the same amount of milk. According to Mr. Shah, developing the nation's dairy industry for the export market over the next ten to twenty-five years is equally crucial. According to him, India's exports currently make up .5% of the world market. He stated that vaccination programs have guaranteed a decrease in FMD outbreaks, but that the prevalence of FMD in India is a significant obstacle that must be addressed before considering exports.

The seminar was opened by Minister for Animal Husbandry J. Chinchurani, who stated that Kerala has the potential to become the biggest milk producer in India. By reducing production costs and increasing productivity, the State hopes to achieve milk production self-sufficiency, she stated.

Mani Viswanath and Valsalan Pillai, the chairs of the Thiruvananthapuram and Ernakulam Regional Co-operative Milk Producers' Unions, Shalini Gopinath, the director of dairy



development, Asif K. Yusuf, the managing director of Milma, K.S. Mani, S. Rajeev, the executive director of NDDDB, and Jorty M. Chacko, the chief executive officer of Kerala Bank, were also in attendance.

Nestle Drops Their Effort to Lessen the Climate Impact of Dairy

The largest food businesses in the world, including Nestle SA, Danone SA, and Kraft Heinz Co., established a significant partnership less than two years ago to reduce methane emissions from their hundreds of thousands of dairy suppliers.

However, Nestle's logo disappeared from the initiative's website last month. The Swiss food giant's officials acknowledged that they have left the Dairy Methane Action Alliance initiative.

The business refused to provide further details about its choice to withdraw. An official from the corporation commented, "Nestle regularly reviews its memberships of external organizations." "We have made the decision to no longer be a member of the Dairy Methane Action Alliance as part of this process."

Officials from Nestle, however, commended the alliance's work and stated that the firm is still dedicated to cutting its dairy emissions as part of its larger plan to cut climate pollution in half by 2030.

It's uncertain if Nestle's departure will weaken the other alliance members' determination. Danone, Starbucks Corp., General Mills Inc., Bel Group, and Lactalis USA are among the participants who informed Bloomberg this week that they are continuing the endeavor.

One environmental group that has long urged food producers to take active action against methane emissions from their dairy and meat supply was disturbed by the well-known deviation.

According to Nusa Urbancic, CEO of the charity Changing Markets Foundation, "Nestle's quiet withdrawal from [the alliance] is a troubling move at a time when scientists are telling us that cutting methane is our best shot to curb global warming."

Approximately 80 times as much heat is trapped by methane as by carbon dioxide. However, the powerful gas only remains in the atmosphere for roughly 12 years, whereas CO2 remains there for centuries. Accordingly, methane levels in the atmosphere would rapidly drop with even small reductions, aiding in the cooling process.

However, that is a really difficult task. For centuries, methane concentrations in the atmosphere remained at roughly 700 parts per billion. Since the beginning of the Industrial Revolution, its concentration has almost tripled to 1,935 parts per billion (ppb) due to landfills, oil and gas extraction, and rising demand for dairy and beef. Dairy products alone are thought

to be responsible for almost 8% of methane emissions from human activity, according to one industry source.

Members of the Dairy Methane Action Alliance outlined a strategy to address this issue when the group was established during the December 2023 United Nations climate conference in Dubai. By the end of 2024, the companies promised to measure and report methane emissions from their dairy products and to release an action plan to mitigate these pollutants. However, the endeavor got off to a poor start, and the due date for these reports was postponed by a year.

By disclosing its overall methane emissions, which it claimed decreased by 21% between 2018 and 2024, without providing specific numbers for its dairy supply, Nestle, on the other hand, circumvented the alliance's recommendations.

The alliance now consists of ten businesses, including more recent additions like Starbucks and Agropur, a sizable dairy cooperative in Canada, even after Nestle left. As of right now, four alliance members have released action plans, and seven have revealed their dairy-methane emissions.



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 |

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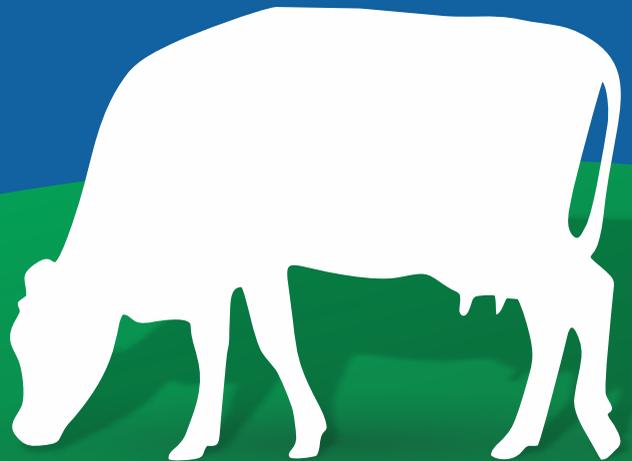
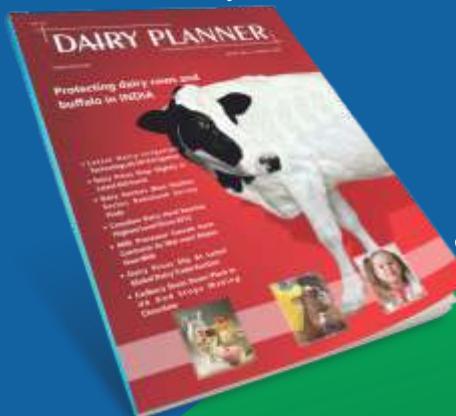
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