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HEALTH
Benefits of A2 Milk

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

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

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

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

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

BENEFITS OF DRINKING MILK

Calcium for strong bones

Protein for muscles

Vitamin D for absorption

Phosphorus for growth

Hydrates with nutrients

Potassium for heart health

From the Pen of Chief Editor

Budgeting a Sustainable Future for India's Dairy Industry

The dairy industry remains one of the most resilient pillars of India's agricultural economy, supporting millions of farmers and contributing significantly to rural livelihoods. As budgetary discussions take center stage each year, the focus on the dairy sector becomes increasingly crucial—not just as a food industry, but as a driver of inclusive growth, nutrition security, and employment.

A well-structured budget for the dairy industry must balance short-term relief with long-term sustainability. Rising input costs, including feed, fodder, energy, and veterinary care, continue to squeeze farmer margins. Budgetary provisions aimed at subsidizing feed resources, improving fodder availability, and promoting cost-effective nutrition solutions can directly enhance productivity and profitability at the farm level.

Infrastructure development is another critical area requiring sustained financial attention. Investments in milk collection centers, cold chain logistics, processing units, and value-addition facilities can significantly reduce post-harvest losses and ensure better price realization for producers. Budgetary support for modernizing cooperatives, Farmer Producer Organizations (FPOs), and private dairies can strengthen the entire supply chain and improve market access.

Animal health and genetics also deserve priority in budget planning. Increased allocations for vaccination programs, disease surveillance, artificial insemination, and breed improvement initiatives are essential to boost milk yield and ensure herd health. Equally important is support for veterinary services and skill development, enabling farmers to adopt scientific dairy management practices.

In recent years, sustainability has emerged as a key theme in agricultural budgeting. Encouraging investments in biogas plants, manure management, water conservation, and climate-resilient dairy practices can help reduce the sector's environmental footprint while creating additional income streams for farmers. Financial incentives for green technologies will be vital in aligning dairy growth with climate goals.

Ultimately, a progressive dairy budget must recognize farmers as entrepreneurs and dairy as a future-ready industry. By prioritizing innovation, infrastructure, animal welfare, and sustainability, budgetary policies can empower the dairy sector to remain competitive, profitable, and resilient—ensuring that India's dairy industry continues to nourish both the nation and its economy.

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PRESS RELEASE

ARTICLE

How Technology Licensing is Shaping the Future of Veterinary Startups

Artificial Intelligence and Intellectual Property in Animal Breeding

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Introduction

Artificial intelligence (AI) is rapidly reshaping animal breeding by introducing new ways to analyze data, predict genetic potential, and optimize breeding decisions. Technologies such as machine learning, genomic analysis, and automated decision-support systems are now widely used in livestock production, aquaculture, and poultry breeding. While these developments promise higher productivity, improved animal health, and better resource efficiency, they also raise complex questions about intellectual property (IP). Traditional IP frameworks were not designed with AI-driven biological innovation in mind, creating legal and ethical challenges that require careful consideration.

AI Applications in Animal Breeding

AI plays a crucial role in modern animal breeding by processing large volumes of genetic and performance data that exceed human analytical capacity. Through genomic selection, AI systems can predict desirable traits such as milk yield, growth rate, disease resistance, and fertility with high accuracy. AI is also used in precision breeding, where algorithms recommend optimal mating combinations to maximize genetic gain while controlling inbreeding.

In addition, AI-based monitoring tools analyze data from sensors, cameras, and wearable devices to track animal health and behavior. These systems help breeders detect diseases early and make informed decisions that improve animal welfare. As AI systems learn and improve over time, they become valuable assets in breeding programs, increasing the importance of protecting the underlying technologies and data.

The integration of Artificial Intelligence (AI) into animal breeding and genetic engineering is transforming the landscape of agriculture, veterinary science, and biotechnology.

Enhancing Productivity and Health

Machine learning algorithms can predict desirable traits such as disease resistance, growth rates, and reproductive success. This precision can increase productivity and reduce the reliance on harmful chemicals or antibiotics, improving animal welfare and sustainability

Accelerating Genetic Improvements

CRISPR and other gene-editing technologies, combined with AI-driven data analysis, allow for precise modifications at the DNA level.

Reducing Animal Suffering

AI-driven breeding programs can reduce animal suffering. For example, breeding cows less susceptible to mastitis or pigs

resistant to certain infections can decrease the need for veterinary interventions and antibiotic use.

Intellectual Property Frameworks Relevant to AI-Based Breeding

Several forms of intellectual property are relevant to AI applications in animal breeding, each with its own limitations.

Patents

Patents may protect technical innovations related to AI, such as novel data-processing methods, genomic analysis techniques, or breeding optimization systems. However, patenting AI-related inventions in animal breeding can be difficult. Many legal systems exclude abstract algorithms from patent protection unless they demonstrate a clear technical effect. Furthermore, genetic traits found in animals are often considered products of nature and are therefore not patentable, even if AI was used to identify them.

Copyright

Copyright protection applies to AI software code, databases, and documentation used in animal breeding systems. While this protects the expression of ideas, it does not cover biological data itself, such as DNA sequences or breeding results. As a result, copyright offers limited protection for the biological outcomes of AI-driven breeding

Trade Secrets

Trade secrets are one of the most effective IP tools in AI-based animal breeding. Companies often rely on secrecy to protect training datasets, algorithms, model parameters, and breeding strategies. Unlike patents, trade secrets do not require public disclosure, but they depend heavily on confidentiality agreements and data security measures.

Specialized Breeding Rights

Unlike plant breeding, which benefits from specific legal regimes such as plant breeders' rights, animal breeding lacks a comparable, well-defined system of protection. This creates uncertainty for breeders who invest heavily in AI-assisted genetic improvement without clear legal safeguards for their innovations.

Data Ownership and Control

Data is the foundation of AI in animal breeding, yet ownership of this data is often unclear. Genetic information, performance records, and health data may be generated on farms but analyzed by breeding companies or AI service providers. In most cases, ownership and usage rights are determined through contracts rather than IP law. This reliance on private agreements can disadvantage small-scale breeders and farmers who may have limited bargaining power.

AI-Generated Outcomes and Legal Challenges

A key legal question is whether AI-generated breeding decisions or genetic insights can be considered intellectual creations. Current legal systems generally recognize only humans or legal entities as inventors or authors, treating AI as a tool rather than a creator. Consequently, AI-generated outcomes typically belong to the entity that owns or operates the AI system, provided this is clearly defined in contractual arrangements.

Ethical and Policy Considerations

The use of AI and IP protection in animal breeding raises broader ethical concerns. Strong IP control may lead to market concentration, limiting access to advanced breeding technologies. Over-optimization driven by AI may also reduce genetic diversity, increasing vulnerability to disease. Policymakers must balance incentives for innovation with fairness, transparency, animal welfare, and long-term sustainability.

Conclusion

Artificial intelligence has the potential to transform animal breeding by enhancing productivity, sustainability, and animal health. However, existing intellectual property systems struggle to accommodate AI-driven biological innovation. Patents, copyright, and trade secrets each offer partial solutions, but none fully address the unique challenges posed by AI in animal breeding. Moving forward, clearer legal frameworks, improved data governance, and ethical oversight will be essential to ensure that AI-based breeding technologies benefit both industry and society as a whole.

Reference

- *Kistanova E, Yotov S, Zaimova D. Intelligent Animal Husbandry: Present and Future. Animals (Basel). 2024 May 31;14(11):1645. doi: 10.3390/ani14111645. PMID: 38891691; PMCID: PMC11171394.*
- *Carslake C., Vázquez-Diosdado J.A., Kaler J. Machine learning algorithms to classify and quantify multiple behaviours in dairy calves using a sensor: Moving beyond classification in precision livestock. Sensors. 2020;21:88. doi: 10.3390/s21010088. [DOI] [PMC free article] [PubMed] [Google Scholar]*
- *Shine P., Murphy M.D. Over 20 Years of Machine Learning Applications on Dairy Farms: A Comprehensive Mapping Study. Sensors. 2022;22:52. doi: 10.3390/s22010052. [DOI] [PMC free article] [PubMed] [Google Scholar]*

Brucellosis is Dangerous in Farm and Milk Industry

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Introduction

Brucellosis is considered as one of the important zoonotic infections affecting both humans and animals. Brucellosis a serious public health issue in our country.brucellosis is very dangerous in milk industry because it transmit through milk.

Brucellosis is an often overlooked zoonotic disease, primarily due to its nonspecific symptoms and lack of awareness among healthcare professionals. The health of milk and dairy products is very important because of their high nutritional value in the human nutrition.

It is the bacterial disease caused by various brucella species, which mainly infect the cattle , swine, sheep, goat , dogs.

Most frequently species responsible for this disease are Brucella abortus,B.canis,B.melitensis,B.suis.

Infected animals and dairy products, such as butter, fresh cheese,lassi, buttermilk and ice cream, are playing imperative roles in the transmission of disease in human. Therefore, the consumption of milk and unpasteurized dairy products are very important regarding their serious and potential risk for the transmission of Brucella to humans.

The most important reasons regarding the difference in the prevalence of Brucella species in dairy products consumed in different parts of the world can be attributed to the diversity of the geographical area, the type of survey, the sensitivity of the tests, the type and number of samples taken, the host factors, the vaccination of Brucella in animals and the methods used for the production of dairy products.

Consuming raw milk and milk-based products lke cheese , paneer icecream etc that have not been produced under strict control conditions can cause brucellosis, a highly contagious zoonotic disease.

Consuming unpasteurized milk and milk products has been identified as the leading cause of human brucellosis, with as incidence rates varying from 33.9% to 100%.

Who is at risk?

Brucellosis is found globally and is a reportable disease in most countries. In the general population, most cases are caused by the consumption of raw milk or its derivatives such as fresh cheese.

The disease is also considered an occupational hazard for people who work in the livestock sector.

People who work with animals and are in contact with blood, placenta, foetuses and uterine secretions have an increased risk of contracting the disease. This method of transmission primarily affects farmers, butchers, hunters, veterinarians and laboratory personnel.

Worldwide, Brucella melitensis is the most prevalent species causing human brucellosis.

What are the symptoms of brucellosis?

Symptoms of brucellosis take two to four weeks or longer after you're exposed to the bacteria. Symptoms can come and go for months or years, including:

- Fever.
- Sweating (sometimes with a moldy smell).
- Joint pain,pain in knees or lower back.
- weight loss.
- Headache.

- Abdominal (stomach) pain.
- Loss of appetite.
- Depression.Large, painful lymph nodes.

How is brucellosis transmitted?

- Drinking unpasteurized (raw) milk or eating unpasteurized cheese, ice cream . Infected animals produce contaminated milk. However, pasteurization kills the bacteria so you can safely drink milk if they have brucellosis.
- Touching the infected tissue or body fluids of an animal. Brucella can get into your body through injury.
- Skin or through your eyes, nose or mouth.
- You can inhale particles of Brucella in from the air, usually from the exposed tissues or blood of an infected animal. This is a risk if you work with Brucella in a lab, work on a farm, in a slaughterhouse or in a meat packing plant.
- Eating undercooked meat.
- While person-to-person transmission have been rare cases of Brucella transmission.

How it is diagnosed?

As symptoms of brucellosis can look like other diseases, so dignosis is must-

- **Culture-** Confirmation of disease via culture is considered the gold standard but is not always possible. Clinical samples from sites of the disease's focus, such as bone marrow, spleen, synovial fluid, and abscesses, can be tested for the presence of Brucella. Whole blood is typically the biological material of choice for isolating Brucella.
- **Antibodies** against Brucella were assessed using a series of serological tests to confirm the presence of infection with this bacterium .
- **Rose Bengal precipitation test (RBPT)-** this test was developed for veterinary screening, it is now routinely used to diagnose human brucellosis. The Rose Bengal test is a rapid (5-10 minute), simple to conduct, and highly sensitive diagnostic tool for acute brucellosis, it has a high rate of false-negative results in chronic and severe cases.
- **Serum agglutination test (SAT)-** this test was first introduced in 1897, it still relies upon today for the serodiagnosis of brucellosis. In endemic areas, SAT is the most widely employed serological test.
- Incomplete, blocking, or non-agglutinating IgG can be detected with the help of the Coombs test.
- **Enzyme-linked immunosorbent assay (ELISA)** is the test of choice for focused, difficult, and chronic patients. it may detect immunoglobulins (IgG, IgM, and IgA) during 4 to 6 hours. ELISA is a highly effective tool for both the detection of Brucella antibodies and the discrimination between the acute and chronic stages of the disease in large populations. It has been proven by the research community that ELISA assays are quick, accurate, sensitive, and specific.
- The laboratory diagnosis of human brucellosis has benefited from advancements in **molecular-based technology.** Pure Brucella culture DNA and DNA from clinical specimens can both be amplified and detected using PCR tests. Extracting Brucella DNA from whole blood, serum, and tissue samples .
- A single-pair **PCR technique** was devised to amplify the target genomic sequence of Brucella species for the diagnosis of human brucellosis. PCR is a more sensitive approach than culture methods, for the initial diagnosis of infection.
- Detection of Brucella antibodies in livestock milk.
- The **milk ring test (MRT)** was first introduced by Fleischhauer in Germany in 1937; it is the best test for screening the milk of suspected cases of animal brucellosis. MRT is characterized by simplicity, ease, accuracy, and inexpensive method, also MRT is not consumed time. Therefore, MRT is considered the method of choice for the surveillance of dairy herds. This test mainly detects the Brucella antibodies IgM and IgA in fresh milk.
- Detection Techniques of Brucella Milk and Dairy Products- The **isolation method** is the most accurate way to diagnose brucellosis. This method is highly specific and allows for biotyping of Brucella species isolates. Without particular supplements such as blood, serum, or tissue extracts. Moreover, without intense movement of the liquid medium, Brucella species typically develop poorly. Brucella species cultures can grow properly on solid media and colonies can be easily identified. Brucella species grow well on Brucella medium base, tryptone soya agar, glycerol dextrose agar, and sucrose dextrose agar containing 5% bovine or horse serum . It is best to use a nonselective Castaneda's medium to isolate Brucella species from milk, blood, or any other bodily fluid. Due to the large number of contaminants present, a selective medium is advised for the primary isolation of Brucella

Prevention and control of human brucellosis

- Milk and dairy products play an important role in the transmission of Brucella to humans, and the risks are increased because an infectious dose of just 10-100 organisms is sufficient to cause systemic infection.
- Brucellosis is zoonotic Therefore, the only way to effectively prevent sickness in humans is to remove the animal reservoir.
- Medical, public health and veterinary authorities must often

work together to eradicate brucellosis and ensure its prevention and control.

- The concept of "One Health" (OH) is a catch- all phrase referring to the commonalities between people, animals, plants, and the environment. Integrative health practices are encouraged by increasing cross-disciplinary communication and coordination.
- What **medications** are used to treat brucellosis?
- Antibiotics prescribe to treat brucellosis include: Streptomycin, Rifampin,Doxycycline,Trimethoprim/sulfamethoxazole, Ciprofloxacin.
- The **process of pasteurization-** Boiling, Ultra heat treatment (UHT) are imp for dairy industry -various kinds of cheese, especially soft cheeses made from raw milk, as they may harbor high numbers of Brucella species if they have not been adequately heated. The acidification methods used to make sour milk, sour cream, yogurt, and butter; all drastically lower the Brucella concentration. the rennet enzyme, if it is made from the stomachs of Brucella-infected ruminants, can potentially be a source of infection . Rennet enzyme is a complex set of enzymes, such as chymosin, pepsin, and lipase, naturally present in the fourth stomach or abomasum of an unweaned calf, kid, or lamb. Chymosin essentially turns milk into a soft cheese in the stomach.
- **Meat and meat products-** contaminated meat and meat products may be a vector for spreading the disease, especially if they are sourced from animals slaughtered during the acute phase of the disease and are eaten raw meat. Not only the hunters and butchers but also other family members may have contact with the meat. All meat products must be fully cooked prior to consumption because meat borne brucellosis cannot be prevented by using most common meat preservation methods such as salting, drying, smoking, refrigeration, or freezing .
- **Personal hygiene-** Veterinarians, laboratory employees, meat inspectors, abattoir workers, farm laborers, farmers, inseminators, stockmen, and anyone involved in the processing of animal products are at a high risk of occupational exposure to Brucella infection. Procedures involving aborting animals, aborted materials, or those in the process of parturition, as well as clinical examination, inspection, shearing, dipping, insemination, treatment, vaccination, and the disinfection and cleaning of contaminated premises pose a particularly high risk of spreading brucellosis. Everyone working in potentially hazardous environments should dress appropriately and use Personal Protective Equipment (PPE). consists of an overall or coat, a rubber or plastic apron, rubber gloves, boots, a face shield and a respirator (a mask) . Immediately after coming into contact with the animal, fetus, placenta, or animal secretions, wash hands thoroughly with liquid soap and water.
- Apply antiseptic (tincture of iodine, for example) and plaster or self-adhering bandage to any wounds or scrapes that you find.
- Work garments should be used only for the work and after each use, they should be boiled, steamed, fumigated with formaldehyde, or soaked in a disinfectant solution of suitable concentration, such as phenolic soap, iodophor, hypochlorite, or chloramine.
- Shoe disinfection is essential to prevent the spread of disease from outside the home or tent to the living space.Sanitize yourself.
- Eye protection is essential because of the high risk of infection from conjunctival contamination, and any infectious material that enters the eye must be removed under clean or aseptic conditions away from the work area.
- Respiratory contamination is also a high risk in heavily infected environments. Protect yourself from breathing in dust or aerosols created by dried excreta or tissues discharged after abortion, parturition, or slaughter by donning a mask.
- Serological testing at regular intervals is a great way to keep an eye on the health of your workforce. Before commencing work, new hires are encouraged to submit a blood sample as a baseline.
- Pregnant women and children under the age of 18 should not be allowed to work in hazardous environments.
- **Occupational hygiene -** is the study of how to prevent, detect, evaluate, and remediate risks to workers' health and safety on the job, while also considering the potential effects on the larger community. This field of study improves working conditions and practices by raising awareness of potential dangers among employers and workers.
- Teams whose duties need them to come into contact with diseased animals or animal byproducts. Farmers, stockmen, shepherds, dairymen, goatherds, abattoir workers, butchers, and those who do artificial insemination are among these professionals
- Groups whose work involves the processing of hides, viscera, wool, and skins, as well as individuals involved in the servicing of buildings or machinery used for these purposes.they prevent themselves by infection.
- **Laboratory biosafety-** Brucellae are classified as a high-risk pathogen by the World Health Organization (WHO), placing them in risk group 3.

- Brucellae are rarely present in sufficient numbers to provide a substantial risk to people handling blood samples and biopsy material for either serological or bacteriological diagnosis. When Brucellae have been cultured, however, they multiply to serious levels, necessitating special safety measures. It is also necessary to use biosafety level 3 equipment, methods, and practices.
- **Farm hygiene-** When work with suspected animal, farmhands and animal caretakers should take precautions by wearing protective gear or using personal protective equipment (PPE).
- Use an approved disinfectant, such as iodophor, hypochlorite, or phenolic disinfectant, to clean any location where an abortion or infected parturition took place.
- After handling potentially hazardous materials, agricultural equipment should be disinfected by submerging it in a solution of diluted caustic soda, iodophor, or phenolic soap.
- Liquid manure, which can remain infectious for long periods of time, especially at low temperatures requires special attention, including daily removal, burning, or disinfecting before disposal.
- Disinfectants should be used in a shallow trough for vehicles entering or exiting.
- After cleaning and disinfecting a building that has previously housed animals infected with Brucella, the building should not be restocked for at least four weeks.
- Buildings that have not been decontaminated should not have maintenance employees (such as builders, plumbers, or electricians) present.
- Preventing rodent and insect entry to buildings should be a top priority for building maintenance.
- Fly screens, light traps, and insecticides should be used to reduce the number of flying insects and keep rodent populations under control.
- Making available the best possible living conditions in terms of things like clean water, clean air, and clean storage sheds.
- **Hygienic among slaughterhouse-** The term "slaughterhouse" or "abattoir" refers to a facility that has been licensed by the appropriate government agency to perform sanitary animal slaughtering and inspection, including pre and postmortem examinations, as well as processing, preservation, and storage of meat products for human consumption. Slaughterhouse operations provide the fundamental environment and operating conditions needed to produce safe meat and meat products. Good manufacturing practices (GMPs), good hygiene practices (GHPs), and standard operating procedures (SOPs) are all examples . Slaughterhouse personnel must adhere to the rules of the expert authority for how to deal with brucellosis to ensure that the postmortem inspection is conducted under proper conditions.
- Brucellosis-infected animals must be butchered in a separate area of the main slaughterhouse called the "emergency slaughterhouse," where the workforce has received specialized training and has access to specialized equipment , should dress in personal protective equipment (PPE).
- In the workplace, no one should be allowed to eat, drink, or smoke. Required facilities for the disinfection of protective materials and personal washing should be available.
- **Control of reemergence brucellosis-** The World Health Organization/Food and Agriculture Organization/World Organization for Animal Health joint consultation on emerging zoonotic diseases, held in Geneva in 2004, defined an emerging zoonotic as "a pathogen that is newly recognized or newly evolved, or that has occurred previously but shows an increase in incidence or expansion in geographical or vector range.
- Brucellosis have emerged as a result of different causes, including global travel and commerce; climate change and weather; changing ecosystems; human demographics and behavior; poverty and social inequality; breakdown in public health measures; the industrialization of food production; globalization; microbial adaptation, in addition, to change in technology and industry; and economic development and land use .
- Vaccination-live attenuated vaccine like B.abortus S19, B.melitensis strain Rev1,and M5 and B.suis strain S2.all are in 4-8 months of age in female calves.
- Vector vaccines-there are varius bacterial and viral vectorlike Lactococcus lactis,Escherichia coli,Salmonella strains.
- Subuit vaccine-freund's adjuvant,alum adjuvant and aluminium hydroxide.
- **Prevalence of Human Brucellosis due to the Intake of Milk and Other Dairy Products-** Brucellosis is a severe illness acquired by humans through consuming contaminated milk and dairy products . It has been consistently found that consuming raw, unpasteurized milk and fresh cheese is a major contributor to the illness . Previous research has also confirmed that raw or undercooked milk is the leading cause of human brucellosis. All affected individuals had a history of consuming unpasteurized milk, resulting in an average incidence rate of 87.3%.

Budget Dairy: Producing More with Less in a High-Cost Era

By

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Introduction: The Cost Crisis Is Structural, Not Temporary

Let's start with an uncomfortable fact: the global dairy sector is no longer operating in a "high-cost phase." It is operating in a **permanently high-cost** structure. Anyone waiting for feed prices, energy costs, labor wages, veterinary inputs, or capital interest rates to "return to normal" is wasting time—and money.

The dairy industry in 2026 is caught between **rising production costs and price-sensitive consumers.** Farmers are being squeezed from both ends. Input inflation is persistent, while farm-gate milk prices remain volatile and politically constrained in many regions. Subsidies, where they exist, are shrinking or becoming conditional on sustainability metrics rather than profitability.

This reality demands a mindset shift. Survival and growth now depend on **budget discipline, biological efficiency, operational precision, and ruthless elimination of waste.** The era of "produce more animals and hope margins improve" is over. Volume without efficiency is a fast track to bankruptcy.

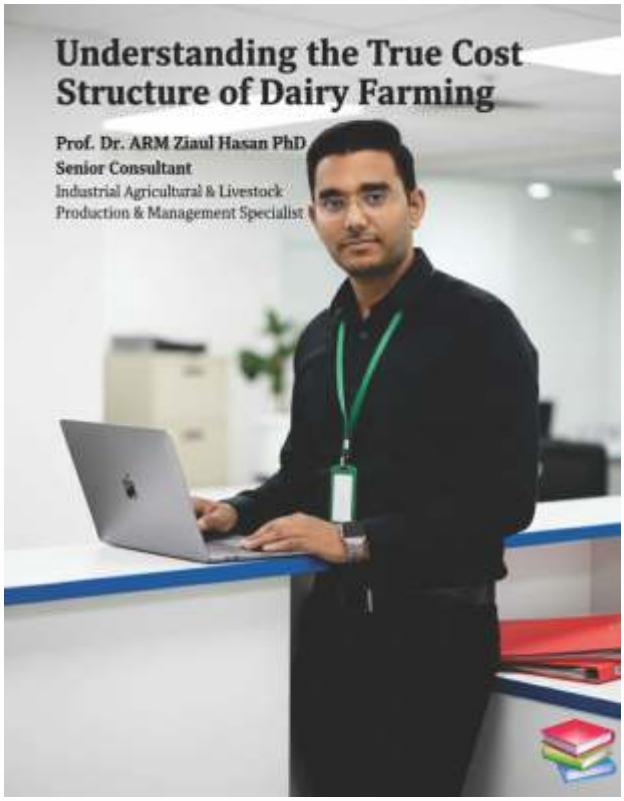
This article focuses on **budget dairy production—** not cheap dairy, not low-quality dairy, but **cost-intelligent dairy systems** that extract maximum output from every unit of feed, labor hour, square meter, and dollar invested. Producing more with less is not a slogan. It is a management doctrine.

1. Understanding the True Cost Structure of Dairy Farming

Most dairy farmers misdiagnose their cost problem. They obsess over feed price per kilogram while ignoring cost per liter of milk produced. That difference matters.

Major Cost Components in Modern Dairy Systems

- Feed and fodder: **55–70%**
- Labor: **10–15%**



- Animal health & reproduction: **5–8%**
- Energy, water, utilities: **5–10%**
- Depreciation, interest, capital servicing: **5–12%**

Feed dominates, but feed inefficiency— not feed price— is the real enemy. Two farms buying the same feed at the same price can have 20–30% difference in milk cost purely due to management.

Budget dairy production starts with one non-negotiable rule:

Every cost must be justified by measurable output.

If a cost does not increase milk yield, improve milk quality, reduce losses, or protect long-term productivity, it is not an investment—it is waste.

2. Feed Efficiency: The Core Lever of Budget Dairy Feed Is Not Expensive—Bad Feeding Is

Cutting feed costs blindly is one of the fastest ways to destroy a dairy farm. Underfeeding, imbalanced rations, and inconsistent feeding schedules reduce milk yield, harm fertility, and shorten productive lifespan.

The goal is not cheaper feed. The goal is **maximum milk per kilogram of dry matter intake (DMI).**

Key Principles of Budget Feed Management

a. Precision Ration Formulation

Rations must be formulated based on:

- Stage of lactation
- Milk yield target
- Body condition score
- Local feed availability
- Generic "one ration fits all" programs increase hidden losses

Even a **0.1 improvement in feed efficiency** translates into massive savings at herd scale.

b. Forage Quality Over Quantity

Low-quality forage is expensive, even if it's free. Poor digestibility increases DMI without increasing milk yield.

Budget-focused systems invest in:

- Proper silage fermentation
- Harvest timing
- Dry matter monitoring
- Mycotoxin management

c. Reducing Feed Waste

Feed lost at bunk level, storage, or mixing is pure financial leakage. Common waste sources:

- Overfilling feed bunks
- Poor mixer calibration
- Spoiled silage faces
- Inadequate feed push-ups

A well-managed farm keeps feed waste **below 3%**. Many farms unknowingly lose **8–12%**.

3. Herd Productivity: Fewer Cows, More Milk

One of the biggest myths in dairy farming is that profitability comes from **more cows**. In reality, profit comes from **better cows.**

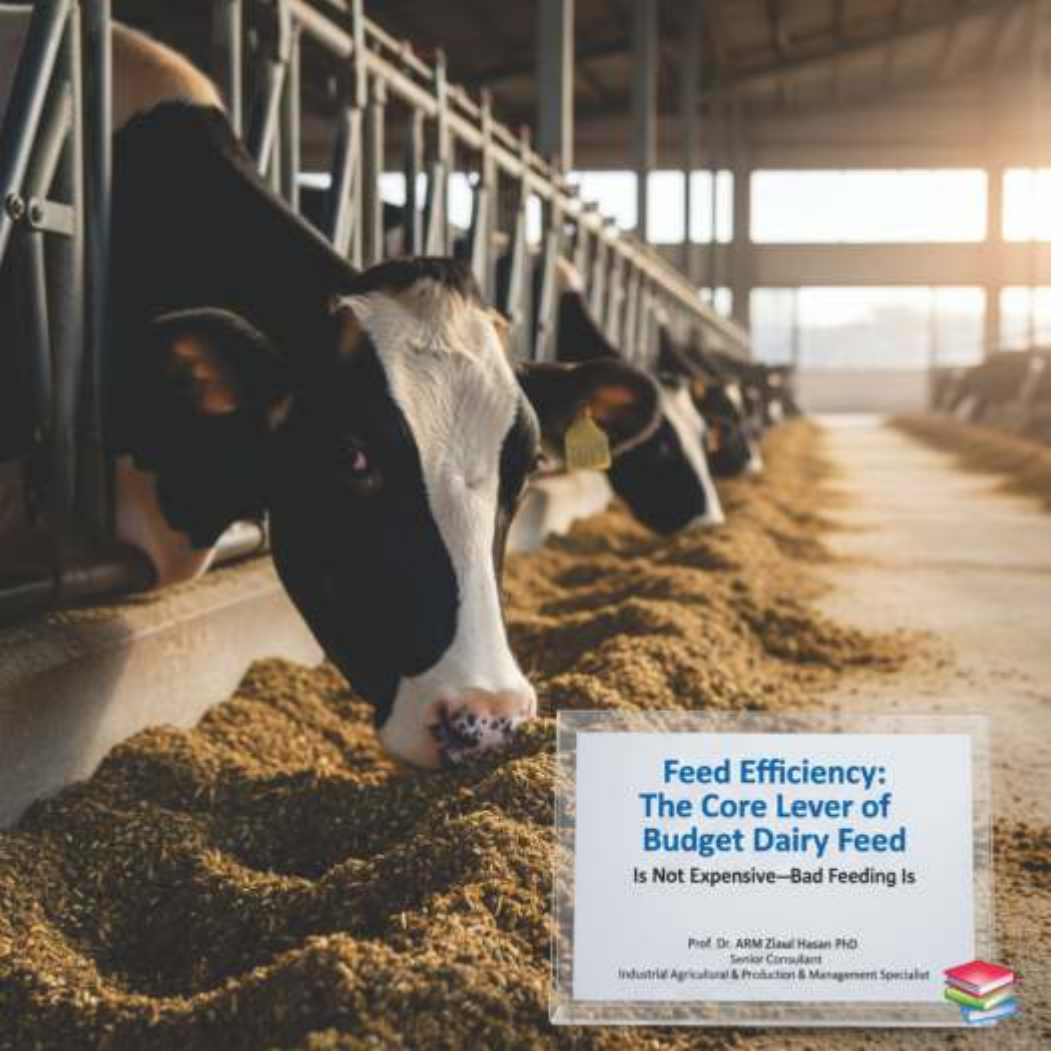
Milk per Cow Matters More Than Herd Size

A 100-cow herd averaging 30 liters/day is more profitable—and easier to manage—than a 150-cow herd averaging 18 liters/day. Budget dairy systems focus on:

- Lactation persistency
- Cow longevity
- Reproductive efficiency

Key Productivity Indicators

- Milk per cow per day
- Lifetime milk yield per cow
- Calving interval



- Days open
- Replacement rate

High replacement rates are a **silent cost killer**. Every replacement heifer represents:

- 22–26 months of non-productive cost
- Feed, labor, housing, and health expenses without milk income

4. Reproduction: The Most Underestimated Cost Center

Poor reproduction is not a biological issue—it is a **management failure.**

Every extra day open costs money through:

- Reduced lifetime milk
- Increased insemination costs
- Higher culling risk

Budget Reproductive Management Priorities

- Heat detection accuracy
- Timely insemination
- Nutritional support for fertility
- Early pregnancy diagnosis

Spending modestly on reproductive monitoring tools often delivers **higher ROI than expensive feed additives.**

5. Animal Health: Prevention Is Always Cheaper Than Treatment

Reactive veterinary care is expensive and inefficient. Budget dairy systems are **preventive by design**.

Cost-Effective Health Strategies

- Strict biosecurity
- Consistent vaccination schedules
- Lameness prevention
- Mastitis control programs
- Clean housing and bedding management

Mastitis alone can reduce net farm income by **10–15%** through milk loss, discarded milk, treatment costs, and premature culling. Good hygiene is not an expense. It is a profit center.

6. Labor Efficiency: Output per Worker, Not Headcount

Labor shortages and rising wages are global realities. Hiring more people does not fix poor systems.

Principles of Budget Labor Management

- Clear SOPs for every task
- Cross-trained workers
- Performance-based accountability
- Simple automation where it reduces repetitive work

A well-managed dairy operation measures:

- Milk liters per labor hour
- Cows per worker
- Task completion time

If labor productivity is not measured, it cannot be improved.

7. Energy, Water, and Infrastructure Costs

Utilities are often ignored because they appear "fixed." They are not.

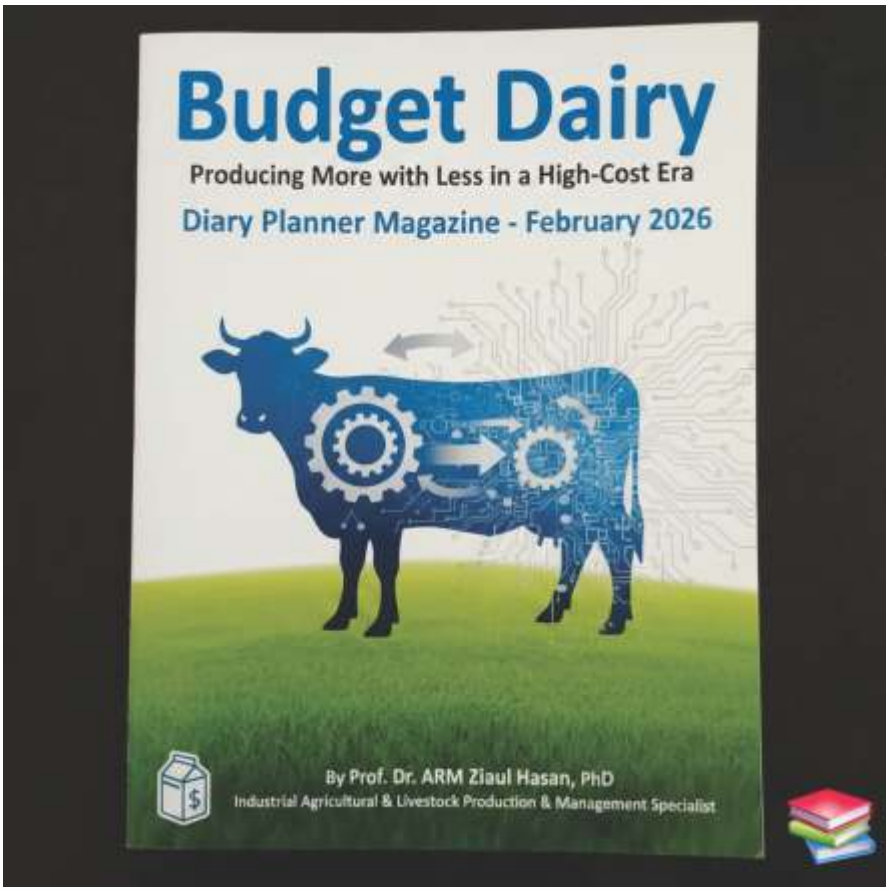
Budget Control Measures

- Energy-efficient milking equipment
- Smart cooling and ventilation
- Water reuse systems
- Regular maintenance to avoid breakdown losses

Small efficiency gains across utilities compound into substantial annual savings.

8. Technology: Spend Strategically or Don't Spend at All

Technology does not make farms profitable. **Good management**



does. Technology only amplifies discipline—or chaos.

High-ROI Technologies

- Milk yield recording
- Reproduction monitoring
- Feed intake tracking
- Environmental sensors

Avoid technology that:

- Requires heavy subscriptions
- Adds complexity without insight
- Is not used daily for decision-making

If data is collected but not acted upon, the system is useless.

9. Risk Management in a High-Cost Dairy Economy

High costs increase vulnerability. Budget systems must include risk buffers.

Key Risk Controls

- Feed supply diversification
- Insurance coverage
- Cash flow planning
- Market diversification (fresh milk, value-added products)

Ignoring risk does not reduce it—it magnifies losses when shocks occur.

10. Case Examples: Budget Discipline in Action

Case 1: Medium-Scale Farm

A 200-cow operation reduced feed cost per liter by 14% by:

- Improving forage digestibility
- Reducing feed waste
  Adjusting rations by lactation stage

Milk yield increased, total feed cost decreased.

Case 2: Smallholder Cluster

A cooperative of small farms improved profitability by:

- Shared veterinary services
- Group feed procurement
- Standardized SOPs

Efficiency, not scale, was the advantage.

Conclusion: Budget Dairy Is Not About Cutting—It's About Controlling

Let's be clear: budget dairy farming is not about starving cows, underpaying workers, or avoiding investment. It is about s**pending with intent.**

In a high-cost era, profitability belongs to producers who:

- Measure everything
- Waste nothing
- Invest only where returns are clear
- Treat efficiency as a daily discipline

The future of dairy does not belong to the biggest producers. It belongs to the **best-managed ones.**

References

- *FAO. Dairy Development's Impact on Poverty Reduction.*
- *FAO. Livestock's Long Shadow – Environmental Issues and Options.*
- *NRC. Nutrient Requirements of Dairy Cattle, 7th Revised Edition.*
- *OECD–FAO. Agricultural Outlook.*
- *IFCN Dairy Research Network. Global Dairy Cost Comparisons.*
- *IDF (International Dairy Federation). The Global Standard for Quality Raw Milk.*
- *USDA ERS. Milk Cost of Production Estimates.*
- *Van Soest, P.J. Nutritional Ecology of the Ruminant.*
- *IFIF. Feed Safety and Efficiency Guidelines.*
- *Ziaul Hasan,Prof Dr A.R.M. Industrial Dairy Production & Management Systems (Professional practice and consultancy).*

Budgeting in Dairy Farming: Strengthening Economic Viability of Milk Production

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Introduction

Dairy farming plays a pivotal role in India's rural economy by providing regular income, nutritional security, and employment. Despite its potential, many dairy farms suffer from low profitability due to high feed costs, animal health expenses, and inefficient financial planning. Budgeting in dairy farming serves as a vital tool to evaluate costs, optimize resource utilization, and improve economic efficiency of milk production systems.

Meaning of Dairy Farm Budgeting

A dairy farm budget is a comprehensive financial plan that estimates income and expenditure associated with milk production over a specific period. It helps in assessing economic feasibility, monitoring farm performance, and guiding managerial decisions.

Components of a Dairy Farm Budget

Fixed Costs

- Cattle shed and housing
- Dairy equipment and machinery
- Depreciation
- Interest on fixed capital

Variable Costs

- Green and dry fodder
- Concentrate feed
- Veterinary care and medicines
- Labour
- Breeding and artificial insemination

Electricity and water

Income Sources

- Milk sales
- Sale of calves
- Manure and biogas slurry
- Sale of culled animals

Significance of Budgeting in Dairy Farming

- Improves Profitability: Identifies cost-intensive inputs
- Efficient Feed Management: Helps balance ration cost and milk yield
- Health Cost Control: Promotes preventive healthcare planning
- Loan and Subsidy Planning: Useful for NABARD and government schemes
- Expansion Decisions: Assists in herd size and breed selection

Constraints in Dairy Budgeting

- Fluctuating milk prices
- Seasonal fodder scarcity
- High concentrate feed costs
- Inadequate record maintenance

Training farmers in farm economics and record keeping can greatly improve budgeting accuracy.

Conclusion

Budgeting is a powerful managerial tool that transforms dairy farming from a traditional activity into a commercially viable enterprise. Scientific budgeting enhances income stability, reduces financial risks, and supports sustainable dairy development. Adoption of proper budgeting practices is essential to strengthen India's dairy sector in the face of rising production costs and market challenges.

Nutritional and Bioactive Properties of Donkey Milk

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Introduction

Donkey (Equusasinus), also called burro or domestic ass belongs to the horse family, Equidae, and descended from the African wild ass (Equus africanus), known to be used as a beast of burden since 4000 BC. It is a rustic, undemanding, and easily adaptable animal (Simos et al.,2021).

The global donkey population is approximately 44 million, with an annual growth rate of about 1%. The most significant increase has been observed in Sub Saharan Africa, while the number of donkeys in Eastern Europe has decreased (Wang et al., 2023) whereas the population in India currently stands at 1.20 lakhs (Livestock Census 2019) with decline of 61.23% compared to Livestock census 2012. The reasons attributed for decrease in donkey populations are ignorance of the animal for transport purpose, illegal trade and illegal slaughter for meat and cosmetic purposes.

Donkey milk, often referred to as "white gold," has gained significant attention due to its numerous health benefits. Regarding donkey milk production, due to the low milk yield of donkeys, which can produce only1–2 L of milk per day and have a lactation period of about six months, the global donkey milk production is relatively limited (Zang et al.,2023). However, with the growing popularity of health and wellness concepts worldwide, donkey milk, due to its unique nutritional value, such as a high proportion of whey protein (64.3% of total protein, significantly higher than cow milk) and its rich content of immunoglobulins, various vitamins, and minerals, aligns well with the trend of healthy consumption, and market demand is gradually expanding (Lu et al., 2020).

Despite the relatively low milk yield of donkeys compared with other dairy animals, the breeding return benefit is exceptionally high. The development of fresh donkey milk represents a mutually beneficial opportunity for all stakeholders in the donkey milk industry (Feng et al., 2017).

As a natural and organic food product, donkey milk not only offers rich nutritional content but also contains various bioactive compoundsincluding growth factors, immunoglobulins, and antimicrobial peptideswhich demonstrate anti-inflammatory, antioxidant, antibacterial, and anti-allergenic properties(Martini et al., 2018). Although donkey milk has been consumed for centuries in certain regions, it has recently gained significant attention due to its potential health applications (Derdak et al., 2020).

Since ancient times, donkey milk has been known for its therapeutic properties and has been used to heal wounds and treat various diseases such as bronchitis, asthma, joint pain, gastritis (Martini et al., 2018).

Donkey milk is designated as 'pharma food', 'functional food', 'nutraceutical', 'elixir of youth' and is considered both as pediatric and

geriatric food.

Nutrient content of donkey milk

Below states the nutritional characteristics/ composition of donkey milk indicating close resemblance with human milk, except for the fat content, which is considerably lower in the former.

Proteins: Donkey milk contains a relatively high protein content, ranging from 1.4 to 1.8 g/100 mL, primarily consisting of whey proteins and caseins. A distinctive characteristic of donkey milk protein is the high proportion of whey protein, which accounts for approximately 55–65% of the total protein content. The principal whey proteins in donkey milk include α-lactalbumin, β-lactoglobulin, and lactoferrin (Zang et al.,2023a).

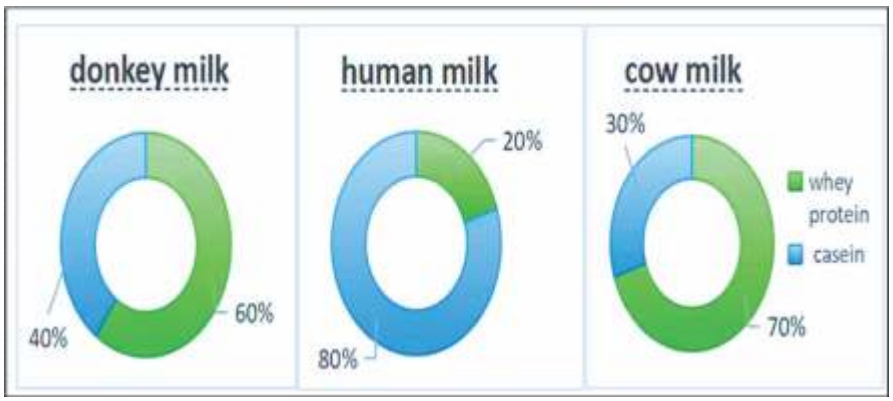


Figure 1. ***Percentage whey protein and casein content in donkey, human and cow milk***

Lipids: Donkey milk is characterized by its relatively low-fat content, averaging about 1.29%, which is only about 40% of the fat content in regular cow's milk (Martemucci et al., 2012). The primary component of its lipid profile is triglycerides (TAGs), which make up over 95% of the total fat content.

Carbohydrates: Carbohydrates in donkey milk are predominantly present as lactose. The average lactose content per 100 mL of donkey milk is approximately 6.34 g. Lactose, a disaccharide, requires enzymatic hydrolysis into glucose and galactose in the human gastrointestinal tract before absorption and utilization (Balos et al., 2023).

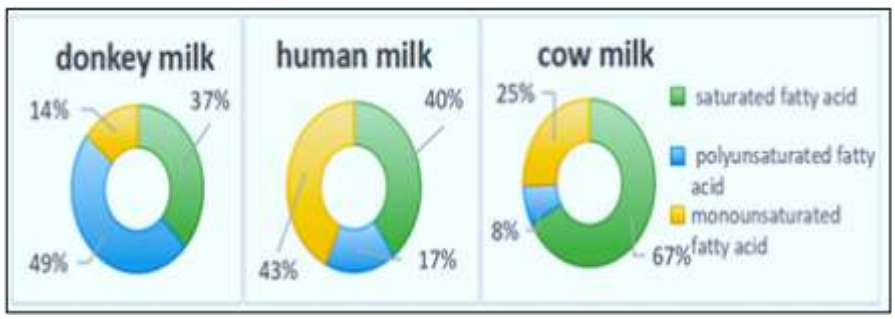


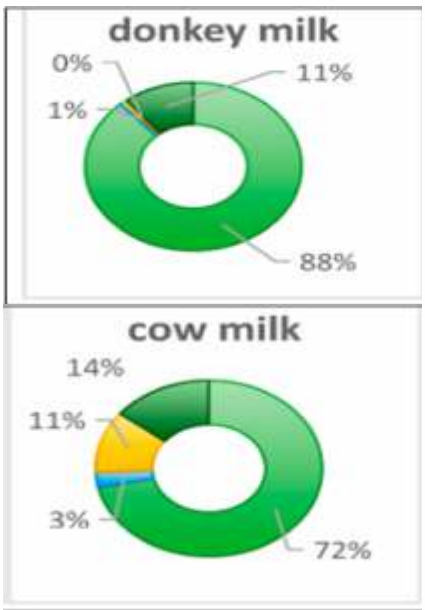
Figure 2 ***Percentage of fatty acid content in donkey, human, and cow milk.***

Figure 3. Ratio of donkey, cow, and human milk from lactose to total carbohydrates (per100 g).

Table 1:Summary table of the protein, fat, and carbohydrate content of donkey,cow, and human milk.

Milk Compositions	Donkey Milk	Cow Milk	HumanMilk
Protein(%)	1.25–2.18	3.10–3.80	0.90–1.70
Fat(%)	0.10–1.40	3.50–3.90	3.50–4.00
1Lactose(%)	6.03–7.28	4.40–4.90	6.30–7.00
Casein(%)	0.64–1.03	2.46–2.80	0.32–0.42
Lactoalbumin(%)	0.49–0.93	0.55–0.70	0.68–0.83

Vitamins: Donkey milk represents an excellent source of various vitamins, with notably high vitamin C content, approximately 4.75 times that of bovine milk. Donkey milk also contains appreciable amounts of vitamin A, which is crucial for maintaining normal epithelial cell function. Furthermore, donkey milk contains a spectrum of B vitamins including B1, B2, B6, and B12. Although the vitamin D content is not exceptionally high (Vincenzetti et al., 2021a).



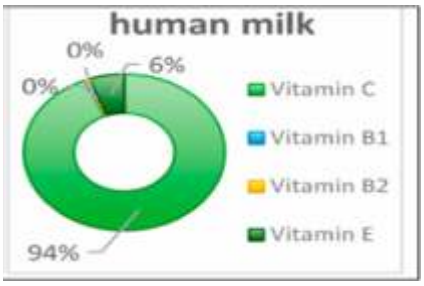


Figure 4: ***Percentage of vitamin content***

Minerals: Donkey milk contains essential minerals including calcium, phosphorus, potassium, sodium, iron, and zinc. The calcium content of donkey milk (80–120 mg/100 g) is significantly lower than that of bovine milk (120–130 mg/100 g), but substantially higher than humanmilk (32–35mg/100g). Donkey milk contains appreciable iron, with concentrations 2–3 times higher (0.3–0.5 mg/100 g) than bovine milk. Additionally, donkey milk contains zinc, with significantly higher concentrations (0.5–0.7mg/100g) than human milk (Fantuz et al., 2020).

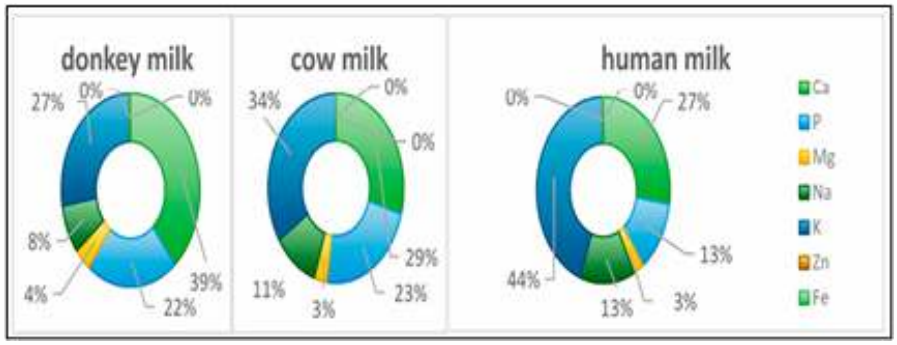


Figure 5: ***Proportion of mineral content.***

Physio-chemical Properties: Donkey milk is slightly alkaline (mean pH:7.2) and lowacidity (mean % lactic acid 0.052), which is similar to that of human milk (mean pH: 7.2,mean % lactic acid 0.06); on the other hand, bovine milk is slightly acidic (mean pH; 6.7and mean % lactic acid: 0.16). The low acidity in donkey milk is due to lower content ofcaseins and phosphates. Donkey milk is also characterized with small fat globule size(2 µ), compared to human and bovine milk (4 µ) (Saric et al., 2022).

Conclusion

With a compound annual growth rate of over 9%, the donkey milk market is expanding significantly worldwide. Consumer demand for healthier dairy products is the driving force behind this rising trend. Donkey milk, with its unique nutritional components and potential health benefits, is gradually becoming a new hot spot in the dairy market. Although the market for donkey milk is presently dominated by the cosmetics and personal care sectors, analysts predict that over the next five years, the food specialty sector will see the most rise in donkey milk consumption.

References

- *Balos, M.Z., Pelic, D.L., Jaksic, S. and Lazic, S. (2023). Donkey milk: An overview of its chemical composition and main nutritional or human health benefit properties. Journal of Equine Veterinary Science, 121(51): 1042-1043.*
- *Derdak, R., Sakoui, S., Pop, O.L., Muresan, C.I., Vodnar, D.C., Addoum, B., Vulturar, R., Chis, A., Suharoschi, R. andSoukri, A. (2020). Insights on Health and Food Applications of Equusasinus (Donkey) Milk Bioactive Proteins and Peptides — An Overview. Foods, 9(9):1302-1303.*
- *Fantuz, F., Ferraro, S., Todini, L., Cimarelli, L., Fatica, A., Marcantoni, F. andSalimei, E. (2020). Distribution of calcium, phosphorus, sulfur, magnesium, potassium, and sodium in major fractions of donkey milk. Journal of Dairy Science, 103(17): 8741–8749.*
- *Feng, Y., Chen, Y. and Qu, H. (2017). Status and development of Shandong donkey industry.Heilongjiang Animal Science and Veterinary Medicine, 24(5): 74-76.*
- *Lu, Y., Fan, Y., Shaikh, A.S., Wang, Z., Wang, D. and Tan, H. (2020). Dezhou donkey (Equusasinus) milk as a potential treatment strategy for type 2 diabetes. Journal of Ethnopharmacology, 246(17): 1121-1122.*
- *Martemucci, G. and D'Alessandro, A.G. (2012). Fat content, energy value and fatty acid profile of donkey milk during lactation and implications for human nutrition. Lipids in Health and Disease, 11(7): 113-114.*
- *Salimei, E. and Park, Y.W. (2017). Mare milk. In Handbook of Milk of Non-Bovine Mammals pp 369–408.*
- *Simos, Y., Metsios, A., Verginadis, I., D'Alessandro, A.G., Loiudice, P., Jirillo, E. andKarkabounas, S. (2021). Antioxidant and anti-platelet properties of milk from goat, donkey and cow: An in vitro, ex vivo and in vivo study. International Dairy Journal,21(5): 901–906.*
- *Vincenzetti, S., Polidori, P., Mariani, P., Cammertoni, N., Fantuz, F. and Vita, A.(2021a). Donkey milk as a supplement in infant nutrition: A review. Nutrients, 13(9): 3008-3009.*
- *Wang, Y., Hua, X., Shi, X. and Wang, C. (2023). Origin, evolution, and research development of donkeys. Genes, 40(13): 194-195.*
- *Zhang, X., Jiang, G., Ji, C., Fan, Z., Ge, S., Li, H. and Zhao, F. (2023a). Comparative whey proteome profiling of donkey milk with human and cow milk. Frontiers in Nutrition, 9(1): 911-912.*

Geographical Indication in Animal-Husbandry Products: Value, Voices and Viable Pathways

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Abstract

Geographical Indications (GIs) are an intellectual-property tool that link a product's reputation, characteristics or quality to its place of origin. Though widely used for agricultural and handicraft products, GIs for animal-husbandry outputs — wool and pashmina, yak dairy products, regionally distinct cheeses, honey and traditional meat preparations — are a fast-emerging area with unique opportunities and challenges. This article explains what GIs are, why animal-husbandry products are well suited (and sometimes poorly suited) to GI protection, and how GIs have already been applied in India (for pashmina wool, yak churpi, and regional meat/fish/dairy products). It examines the practical benefits for rural producers (price premiums, market access, cultural recognition), the barriers (traceability, collective action, standardization), and policy and business models that can unlock the value while protecting small producers. Case examples from Ladakh, Arunachal Pradesh and Kashmir show how a GI can protect local knowledge, add value, and simultaneously require investment in governance, testing and marketing. The article ends with a pragmatic roadmap for producers, extension services and policymakers to make GIs a working tool for sustainable livelihoods in the animal-husbandry sector.

What is a Geographical Indication — and why it matters for animal products?

A Geographical Indication (GI) is a sign used on products that have a specific geographical origin and possess qualities, a reputation or other characteristics that are essentially attributable to that origin (for example, “Roquefort” for cheese, “Darjeeling” for tea). The TRIPS Agreement and global IP bodies such as WIPO describe GIs as a way to protect the link between place and product, both legally and commercially (Cristallo, 2025).

Why apply that to animal-husbandry products? Many animal goods — high-altitude pashmina, yak cheeses, regionally crafted dairy items, artisanal honey, and culturally unique meat dishes — are shaped by local breeds, micro-climates, feeding regimes, and traditional processing. Those place-specific features are precisely what GIs are designed to protect and promote. When the product's identity depends on the local environment and skills, a GI can preserve authenticity, prevent mislabelling, and help local communities capture a fair share of the product's value (Spilioti et al.,2023).

Categories of animal-husbandry products that fit GI protection

Not every animal product is an obvious candidate for a GI. But several categories show strong potential:

- **Textile fibres from specific breeds** (e.g., Pashmina from Changthangi goats). Breed genetics + high-altitude ecology = distinct fibre traits.
- **Traditional dairy specialities** (hard cheeses, fermented milk products made from yak, cow or buffalo breeds with location-specific microflora). Example: yak churpi from Arunachal Pradesh.

- **Artisanal meat products:** regional processing styles and culinary traditions (e.g., Kashmiri Wazwan items such as Tabak Maaz or Goshtaba) that depend on local breeds and processing know-how.
- **Honey and apiarian products** where floral ecology is unique (many Indian GIs are for honey and local apiary products).
- **Seafood / lake products** that are geographically bound (e.g., specialty fish products from Chilika Lake).

These categories combine a biological basis (breed, feed, flora, microbes) with a human, cultural basis (processing, recipes, local skills) — the classic GI sweet spot.

India's emerging list: selected GI examples from the animal sector

India's GI registry covers handicrafts, agricultural products and foodstuffs; in recent years several animal-husbandry items received GI status or were proposed for registration. Important, illustrative examples:

- **Pashmina Wool of Ladakh** — recognized as a GI linked to the Changthangi goat's undercoat, its high-altitude origin and traditional processing. The GI helps differentiate Ladakh pashmina from other shawl wools sold under the "pashmina" name.
- **Kashmiri meat preparations (Tabak Maaz, Goshtaba and other Wazwan items)** — several Kashmiri meat products have been applied for registration; these are typical examples where culinary practice, local breeds and processing combine to create a protected identity. s
- **Arunachal Pradesh Yak Churpi** — a hard, long-shelf traditional product made from yak milk; GI protection recognizes its link to high-altitude yak breeds and local methods. This is one of India's earliest GI tags explicitly for a yak dairy product.
- **Chilika Lake fish/dairy curiosities** — coastal and lake products tied to Chilika's unique ecology have been studied and proposed for GI recognition, underscoring how inland water bodies can yield geographically distinct animal products.

These examples show two common features: (a) a biological/geographic uniqueness (climate, breed, flora, microflora), and (b) a cultural/processing uniqueness (handcraft, traditional recipes, fermentation processes). Both are essential to mount a successful GI claim.

What GIs actually deliver — the benefits (and the caveats)

Benefits

1. **Price and Market Differentiation.** GI certification signals authenticity to consumers and often supports premium pricing and preference in niche markets. Studies show GIs can improve export performance for agricultural products; the same logic applies for specialty animal products when supply is limited and identity is credible.
2. **Protection against Misuse.** Legally protecting a product name helps stop outside producers from using the region's name and undercutting producers' reputation. For high-value goods like pashmina, this is commercially important.
3. **Cultural Recognition and Heritage.** GIs officially recognize traditional knowledge and recipes — this can strengthen local identity and pride while attracting tourism and value-chain interest.
4. **Incentive for Quality & Traceability.** A GI typically requires product specifications (a GI "book") and control mechanisms; these push producers toward standardised, traceable processes that buyers value.

Caveats and limits

- **Not an automatic cash machine.** A GI without marketing, enforcement and institutional capacity rarely delivers price premiums. Many studies caution that GI's economic impact depends on governance and market development (Flinzberger et al., 2024)
- **Collective governance is hard.** GI requires a group of producers to accept standards and contribute to enforcement — this needs trust, rules and sometimes professional management.
- **Traceability & testing costs.** Ensuring that only authorized producers use the GI can mean testing animal origin, feed regimes, or microbial fingerprints — costly for small communities.
- **Risk of elite capture.** Without equitable structures, value can concentrate with traders or brand owners instead of producers.

So GIs are a tool — helpful but not sufficient by themselves.

How GI registration for animal products works (practical view)

A successful GI claim typically contains these elements:

1. **Definition of the product and its essential characteristics.** For animal products this could include breed (e.g., Changthangi goat), altitude range, feed or pasture ecology, or a fermentation microflora profile.
2. **Delimitation of the geographical area.** Exact districts or micro-regions are defined. A GI is meaningfully precise: it names where the product comes from.
3. **History and evidence linking product quality to place.** Documents, oral histories, technical reports and lab analyses that link product traits to environment and traditional methods.
4. **A specification document (GI book)** describing permitted raw materials (breeds), processing steps, quality parameters, labelling rules and control procedures.
5. **A registered "GI user group"** (often a producers' association or cooperative) that will administer the GI and enforce standards.
6. **Enforcement & monitoring mechanisms,** which may involve

sample testing, traceability audits and legal action where misuse is detected. These are the elements that make a GI more than a certificate — they make it credible in the market.

India's GI registry (IP India) holds application forms, specification templates and the public list of registered GIs; applicants must document the above to win registration (li et al., 2023)

Case spotlight: Ladakh Pashmina — science, place and value

Pashmina fibre from the Changthangi (or "Ladakhi") goat is a textbook GI case. The goat's undercoat is a biological response to extreme cold; fine underhair (pashm) has low denier and high thermal insulation. Human craftsmanship — combing, hand-spinning, high-skill weaving — completes the value chain. The Ladakh GI frames this entire chain: breed + microclimate + artisanal know-how. By protecting the term and defining quality standards, the GI helps prevent mislabelling and gives consumers confidence that a "Ladakh Pashmina" meets specific fibre and origin criteria. However, the product still requires active marketing, traceability for raw wool and support to shepherd communities to capture benefits (Bérard et al., 2006).

Case spotlight: Arunachal Yak Churpi — a mountain dairy GI

Yak churpi — a hard cheese traditionally produced by pastoralists in high Himalaya — illustrates how microflora, milk composition and altitude combine to make a distinctive product. Yak milk is higher in fat and unique in certain protein traits; traditional fermentations and drying techniques give churpi its long shelf life and characteristic texture. GI recognition provides legal protection and the prospect of better prices — but it also requires producers to organize, adopt quality controls (e.g., hygienic milking and drying), and connect to buyers who value authenticity. ICAR and state agencies have highlighted the cultural and livelihood significance of yak products and supported GI applications.

The special challenges for animal GIs — biology, scale and ethics

There are a few challenges that are especially salient for animal-product GIs:

- **Breed mobility and interbreeding.** Animals move, breeds mix and cross-breeding is common — this complicates strict origin claims unless genetic or management criteria are used. A sensible GI book will therefore combine geographic origin with production practices (e.g., animals must graze on named pastures, milk only from specified breeds). t
- **Animal welfare and sustainability.** A GI should not encourage over-exploitation of native breeds or pastures. Ethical standards and sustainability criteria can be embedded in specifications.
- **Testing and traceability complexity.** Wool, milk, or meat products may need provenance testing (is this yak milk? which valley?) — doable but costly. Building local labs or partnering with national labs helps.
- **Seasonality and small volumes.** Many animal specialties are seasonal or produced in tiny quantities; a GI must align market expectations with realistic supply.

Practical steps for producer groups — from idea to market

If a village cooperative or pastoralist association wants a GI for a product (say, a local cheese, a specific honey, or a wooled textile), a practical roadmap is:

1. **Document the story.** Collect oral histories, traditional recipes, and technical notes showing link to place.
2. **Map the geography.** Delimit the production area precisely.
3. **Define the product specification.** Identify breed(s), feed, processing steps, quality metrics, and labelling.
4. **Form a producer collective.** A legally recognized association, cooperative or society must manage the GI.
5. **Get technical help.** Partner with state veterinary/dairy/handicraft institutes and a legal or NGO partner experienced in GI drafting.
6. **File the GI application with IP India** and prepare to publish the specification and defend it if contested.
7. **Plan marketing & enforcement.** Use storytelling, traceability tags (QR codes), and periodic sample testing to ensure the GI means something to consumers.

Policy & institutional recommendations (for governments and agencies)

To fully realize GI benefits for animal products, policy must go beyond registration:

1. **Dedicated extension for GI candidate products.** Veterinary, dairy and craft extension teams should help producers draft specifications and implement quality systems.
2. **Subsidize traceability & testing.** Seed funding for lab tests, breed certification and labeling technology lowers barriers for small producers.
3. **Capacity building for producer groups.** Management training, cooperative governance and legal literacy. GI is a collective right; collective institutions must be strong.
4. **Market access support.** Public procurement, trade fairs, e-commerce facilitation and international promotion help GI brands reach paying consumers.
5. **Embed sustainability & welfare.** GI specifications should incorporate ecological and animal-welfare safeguards to prevent harmful intensification or overgrazing.
6. **Monitor socio-economic outcomes.** Governments should track whether GI actually benefits primary producers and not just

middlemen; use impact evaluation to refine programmes.

Making GIs work for small producers — business models that succeed

Three business models are commonly effective for rural animal GIs:

1. **Cooperative brand model.** Producers join a cooperative that owns the GI, pools product, certifies quality, and runs marketing (similar to small dairy cooperatives). This model works well where volumes allow pooling and cold-chain/processing can add value.
2. **Niche boutique model.** Small volumes targeted to gourmet, ethnic food or craft buyers who pay high premiums (e.g., exclusive pashmina lines or artisanal yak cheese). This needs strong branding and direct-to-consumer routes.
3. **Hybrid producer-buyer partnerships.** Local groups partner with ethical buyers or social enterprises that invest in traceability and pay a premium under contracts. This reduces marketing burden on producers and can scale with oversight (Wu et al.,2024).

All models require transparent benefit sharing, simple governance rules and external technical support in early years.

Consumer psychology: why buyers pay for GI animal products

Consumers purchase GI products for various reasons: perceived authenticity, health and safety, cultural cachet, or willingness to support rural producers. In many urban and export markets, an origin story (mountain pasture, ancient recipe, rare breed) sells — but only when supported by credible certification, independent verification and appealing storytelling. Thus, marketing must marry provenance claims with visible proof (labels, QR codes, producer stories) (Rangnekar,2004)

Risks to watch and how to mitigate them

- **Counterfeiters & misuse.** Vigilant monitoring and rapid legal action are required; enforcement partnerships with customs and local police help.
- **Over-dependence on a single buyer.** Encourage diverse sales channels and direct marketing to reduce bargaining power of any single trader.
- **Environmental stress on production locales.** Include rotational grazing, pasture regeneration and carrying capacity limits in GI rules.
- **Social exclusion.** Ensure women, smallholders and marginal groups are represented in GI governance to avoid elite capture.

Conclusion — GI as a tool, not a panacea

Geographical Indications can be a powerful instrument to valorize animal-husbandry products that are truly place-specific — pashmina from high-altitude goats, yak cheese matured on Himalayan terraces, honey from unique floral mosaics, and cultural meat preparations rooted in regional culinary art. But GI is not an instant uplift; it is a governance and market project. With the right combination of producer organization, technical standards, testing capacity, marketing and public support, GIs can protect heritage, raise incomes and conserve breeds and ecosystems. India's recent GI registrations for animal products show promise; the next challenge is converting certificates into living, equitable value chains that reward those who steward place-based animal knowledge.

References

- *Bérard, L., & Marchenay, P. (2006). Local products and geographical indications: taking account of local knowledge and biodiversity. International Social Science Journal, 58(187), 109-116.*
- *Rangnekar, D. (2004). The socio-economics of geographical indications. UNCTAD-ICTSD Project on IPRs and Sustainable Development, Issue Paper, 8, 13-15.*
- *Li, C., Gao, J., Ge, L., Hu, W., & Ban, Q. (2023). Do geographical indication products promote the growth of the agricultural economy? An empirical study based on meta-analysis. Sustainability, 15(19), 14428.*
- *Cristallo, D. (2025). Geographical Indications and biodiversity: An overview of regulatory challenges and critical perspectives. New medit: Mediterranean journal of economics, agriculture and environment= Revue méditerranéenne d'economie, agriculture et environment, 24(3), 47-58.*
- *Flinzberger, L., Plieninger, T., Bugalho, M. N., & Zinngrebe, Y. (2024). Is the 'Protected Designation of Origin'an indicator for sustainable landscape management? Insights from pasture-based animal husbandry in five EU countries. Journal of Land Use Science, 19(1), 59-77.*
- *Spilioti, M., Karanikolas, P., Kominakis, A., Stachtiaris, S., & Tsiboukas, K. (2023). Geographical indication products and the provision of public goods-a Greek case study. International Journal of Sustainable Agricultural Management and Informatics, 9(2), 136-158.*
- *Wu, S., & Sun, C. (2024). Linking agricultural water-food-environment nexus with geographical indication products using geographic information. Desalination and Water Treatment, 320, 100901.*

Milk Fever, Ketosis and Fatty Liver: Hidden Metabolic Disorders in High-Yielding Cows

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Introduction

In modern dairy farming, genetic improvement and enhanced nutritional practices have led to remarkable increases in milk production. However, this rise in productivity has also made high-yielding cows increasingly vulnerable to metabolic disorders, particularly during the transition period. Among these, milk fever, ketosis and fatty liver syndrome represent a closely interlinked group of disorders that often remain unnoticed until they significantly impair health and production. These conditions primarily occur around calving, when the cow undergoes profound physiological and metabolic adjustments to support the onset of lactation.

The transition period, spanning approximately three weeks before calving to three weeks after calving, is widely recognised as the most critical phase in the productive life of a dairy cow. During this time, dry matter intake typically declines while nutrient requirements increase sharply to meet the demands of fetal growth and subsequent milk synthesis. This imbalance places cows at risk of negative energy balance and mineral deficiencies, predisposing them to metabolic disturbances that compromise immunity, fertility and milk yield.

Milk fever

Milk Fever or periparturient hypocalcemia is one of the most common metabolic disorders observed at or shortly after calving. It results from a sudden decline in blood calcium levels when large quantities of calcium are diverted into colostrum and milk. Calcium is essential for neuromuscular function and inadequate circulating levels lead to muscle weakness, reduced rumen motility and impaired cardiovascular function. Clinically affected cows may exhibit lethargy, cold extremities, tremors, recumbency and in severe cases, coma and death. Even subclinical hypocalcemia, which often goes unnoticed, can have significant consequences by reducing feed intake and increasing susceptibility to secondary disorders such as ketosis, displaced abomasum and mastitis.

The occurrence of milk fever is strongly associated with improper mineral balance during the dry period, particularly excessive dietary calcium intake that suppresses the cow's natural calcium mobilisation mechanisms. Nutritional strategies such as feeding low-calcium diets or manipulating dietary cation–anion difference (DCAD) in close-up dry cows have been shown to enhance calcium homeostasis at calving.

Prompt calcium supplementation and careful monitoring during the periparturient period remain essential components of prevention and management.

Ketosis

Ketosis is another major metabolic disorder affecting high-yielding cows, typically within the first few weeks of lactation. It arises when energy intake fails to meet the enormous glucose demand required for milk production. To compensate, the cow mobilises body fat reserves, leading to elevated levels of non-esterified fatty acids (NEFAs) in the bloodstream. These fatty acids are partially converted into ketone bodies such as β-hydroxybutyrate, acetone and acetoacetate. Excessive accumulation of ketone bodies results in ketosis, which may occur in either subclinical or clinical form.

Subclinical ketosis is particularly problematic because it lacks obvious clinical signs yet significantly reduces milk yield, feed intake and reproductive performance. Clinical ketosis, on the other hand, may present with anorexia, rapid body condition loss, decreased rumen motility and a characteristic fruityodour in the breath or milk. Ketosis also predisposes cows to a range of postpartum complications, including metritis, mastitis and displaced abomasum, thereby increasing treatment costs and culling rates.

Fatty Liver Syndrome

Closely associated with ketosis is fatty liver syndrome, a condition characterised by excessive fat accumulation within hepatocytes during early lactation. In high-yielding cows experiencing severe negative energy balance, large quantities of mobilised fat overwhelm the liver's limited capacity to oxidise or export lipids. Unlike other species, cattle have a relatively poor ability to secrete very low-density lipoproteins, resulting in triglyceride deposition within hepatocytes. As liver function becomes compromised, glucose production, immune competence and detoxification processes are impaired.

Fatty liver syndrome often develops silently, without distinct clinical signs, yet it plays a pivotal role in perpetuating metabolic dysfunction. Affected cows may exhibit reduced appetite, poor milk yield, delayed uterine involution and increased susceptibility to infectious diseases. Severe cases can lead to prolonged recovery, reproductive failure and early culling. Diagnosis in the field is challenging, as definitive confirmation traditionally requires liver biopsy, although blood metabolites and emerging biomarkers are increasingly used as indirect indicators.

Interrelationship of Metabolic Disorders

These metabolic disorders rarely occur in isolation. Milk fever can reduce feed intake and rumen activity, thereby exacerbating negative energy balance and triggering ketosis. Ketosis and fatty liver frequently coexist, reinforcing each other in a vicious cycle that prolongs metabolic stress during early lactation. This interconnected nature highlights the importance of addressing underlying management and nutritional factors rather than treating individual conditions in isolation.

Economic Impact on Dairy Production

The economic impact of milk fever, ketosis, and fatty liver syndrome is substantial. Reduced milk yield, increased veterinary costs, impaired fertility and premature culling collectively impose heavy financial losses on dairy enterprises. Subclinical forms of these disorders are particularly costly, as their effects often go unrecognised until herd performance declines.

Preventive Strategies and Herd-Level Management

Prevention remains the most effective approach to managing metabolic disorders in high-yielding cows. Proper nutritional management during the dry and transition periods is most important, with emphasis on balanced energy intake, appropriate mineral supplementation and avoidance of over-conditioning. Monitoring body condition score, ensuring consistent feed availability, minimising stress and maintaining comfortable housing conditions all contribute to improved metabolic health. Routine screening for ketone bodies during early lactation can aid in early detection and timely intervention, reducing long-term losses.

Conclusion

Milk fever, ketosis and fatty liver syndrome represent hidden yet highly impactful metabolic challenges in modern dairy production. By recognising their interrelated nature and focusing on preventive management during the transition period, farmers and veterinarians can significantly improve cow health, productivity, and longevity. A proactive, science-based approach to metabolic health is essential for sustaining profitable and welfare-oriented dairy farming in the era of high milk production.

Patentability of Veterinary Biotechnology Interventions: How Innovation Is Transforming Animal Health

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Introduction

Veterinary biotechnology is rapidly reshaping the livestock, poultry, aquaculture, and companion animal sectors in India and worldwide. From gene-edited disease-resistant animals to rapid diagnostics and recombinant vaccines, innovations are arriving faster than ever before. But a question that concerns researchers, startups, and industry alike is: **Can veterinary biotechnologies be patented?** The answer is **yes but with conditions.**

Patent laws, including India's Patents Act (1970) and global frameworks like TRIPS, allow patenting of biotechnology inventions if they meet the standard requirements of **novelty, inventive step, and industrial applicability** (WIPO, 2022). However, biological materials are treated carefully due to ethical, safety, and biodiversity concerns.

Here's a clear and practical look at what kinds of veterinary biotechnology interventions are patentable, what is restricted, and why this matters for the future of animal health.

Diagnostic Kits and Molecular Tests: Fully Patentable

Veterinary diagnostics — PCR kits, ELISA assays, biosensors, point-of-care devices, CRISPR-based detection, and AI-supported disease prediction platforms — are among the most patent-friendly domains.

As long as the diagnostic method is novel and not a natural biological discovery, it qualifies for patent protection (Singh & Chaurasia, 2019). Examples include:

- Real-time PCR kits for canine parvovirus
- LAMP assays for brucellosis
- Biosensors for mastitis detection in cattle
- Microfluidic chips for rapid poultry pathogen screening

These innovations improve early detection and reduce animal mortality, making them highly commercially viable.

Recombinant Vaccines and Novel Antigens

Vaccines designed using recombinant DNA technology, virus-like particles, subunit antigens, or mRNA platforms are also patentable (OECD, 2021).

What can be patented:

- Recombinant vaccine formulations
- Antigenic proteins expressed in bacterial or yeast systems
- Novel adjuvants that enhance immune response
- Delivery systems (nanoparticles, liposomes)

What cannot:

- Naturally occurring biological sequences unless significantly modified
- Traditional biological materials existing in nature

Recombinant vaccines against Brucella, Theileria, foot-and-mouth disease, and avian influenza are classic examples of patentable innovations.

Probiotics, Feed Additives, and Microbial Formulations

Livestock and poultry probiotics — beneficial bacterial strains isolated, characterized, and formulated for gut health — can be patented if the strain is unique or modified (FAO, 2020).

Patentable:

- Novel microbial isolates
- Genetically improved rumen bacteria
- Encapsulation technologies
- Prebiotic–probiotic combinations

These biotechnologies reduce the need for antibiotics and improve productivity in dairy, poultry, and pig farming.

Gene Editing and Transgenic Animals: A Grey but Growing Area

Technologies such as CRISPR-Cas9, TALENs, and ZFNs have enabled gene editing for disease resistance, improved production, and stress tolerance in animals.

Globally, gene-editing tools are patentable, but gene-edited animals themselves may face restrictions, depending on the country (Van Eenennaam, 2019).

Examples of gene-edited traits:

- PRRS-resistant pigs
- Hornless (polled) dairy cattle
- Heat-tolerant poultry lines

India restricts patenting of "animals in whole or any part thereof," but allows patenting of methods, tools, and gene-editing technologies used in generating these animals (Indian Patents Act, 1970; Section 3).

Stem Cell Therapies and Regenerative Veterinary Medicine

Stem-cell-based treatments for canine osteoarthritis, equine tendon injuries, and wound healing are patentable if they involve novel processing or delivery methods (Brennan et al., 2020).

Patentable:

- Culture media
- Therapeutic formulations
- Cryopreservation methods
- Delivery systems (scaffolds, gels)

Not patentable:

- Naturally occurring stem cells without modification

Assisted Reproduction and Embryo Technologies

Innovations in reproductive biotechnology are strongly patent-eligible, including:

- In vitro embryo production
- Sexed semen processing
- Embryo cryopreservation techniques
- Hormonal protocols for superovulation

These patents have accelerated genetic gains in cattle and buffalo.

Why Patents Matter for Veterinary Biotechnology

Incentivize innovation

Patents encourage researchers and startups to invest in R&D (WIPO, 2022).

Ensure commercial protection

Companies can secure exclusive rights, helping them scale manufacturing.

Boost One Health preparedness

Novel diagnostics and vaccines support disease control in animals and humans.

Promote rural development

Biotech innovations improve livestock productivity and farmers' incomes.

As India's livestock sector grows, protecting veterinary biotech innovations becomes essential for achieving global competitiveness.

Conclusion

Veterinary biotechnology is entering a golden era. With increasing support for innovation, clearer regulatory frameworks, and expanding global markets, patenting is becoming a critical tool for transforming research into real-world applications.

While ethical and biosafety safeguards remain essential, the future of patentable veterinary biotech interventions from diagnostics to gene editing looks incredibly promising.

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References (APA Style)

- *Brennan, M. L., Higgins, H. M., & Williams, D. (2020). Veterinary regenerative medicine and stem cell therapy: Current applications and future potential. Veterinary Record, 186(7), 210–218.*
- *FAO. (2020). Probiotics in animal nutrition: Production, impact, and regulation. Food and Agriculture Organization of the United Nations.*
- *Indian Patents Act. (1970). The Patents Act, 1970 and Rules 2003. Government of India.*
- *OECD. (2021). Emerging trends in biotechnology and bioscience innovation. Organisation for Economic Cooperation and Development.*
- *Singh, R., & Chaurasia, R. (2019). Patentability of biotechnology inventions in India: Current challenges and future prospects. Journal of Intellectual Property Rights, 24, 95–102.*
- *Van Eenennaam, A. L. (2019). Gene editing in livestock: Research and regulation. Annual Review of Animal Biosciences, 7, 335–360.*
- *WIPO. (2022). Patentability of biotechnology inventions: Guidelines and global perspectives. World Intellectual Property Organization.*

Understanding Animal Welfare and Intellectual Property Rights in India: A Popular Overview

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Abstract

In India, the regulation of animal breeding and veterinary innovation is primarily guided by animal welfare principles rather than the grant of exclusive intellectual property rights over new animal breeds. This popular article discusses the legal framework governing animal breeding and veterinary practice, emphasizing the Prevention of Cruelty to Animals Act, 1960, and its allied rules in promoting ethical breeding, humane research, and responsible commercial practices. Although India lacks a patent-like system for protecting animal breeds, initiatives such as breed registration by the ICAR–National Bureau of Animal Genetic Resources contribute to the conservation of indigenous breeds and recognition of traditional livestock keepers. The article also highlights how veterinarians and breeders use patents, trademarks, copyrights, and trade secrets to protect innovations in veterinary medicine, diagnostics, clinical practices, and educational materials. Overall, the article underscores that while animal breeds are not patentable, India's welfare-oriented regulatory approach, combined with existing IPR tools, supports ethical innovation and sustainable development in the animal breeding and veterinary sectors.

Introduction

In India, the legal framework related to animal breeding and veterinary practice prioritizes animal welfare over exclusive intellectual property rights for new animal breeds. The emphasis is on ethical treatment, prevention of cruelty, and protection of animal health. Despite the absence of breed-level IP protection, breeders and veterinarians actively engage with various intellectual property tools to safeguard their innovations and professional contributions.

Animal Welfare Laws Governing Breeding Practices

Animal welfare laws form the backbone of breeding regulations in India. The Prevention of Cruelty to Animals (PCA) Act, 1960, is the primary legislation aimed at preventing unnecessary pain and suffering to animals. Several rules framed under this Act regulate breeding establishments, research institutions, and commercial animal handling. The Breeding of and Experiments on Animals (Control and Supervision) Rules, 1998, prescribe ethical standards for breeding and research while mandating registration with the Animal Welfare Board of India.

Regulation of Commercial Dog Breeding

Specific rules govern the commercial breeding of dogs in India. The Prevention of Cruelty to Animals (Dog Breeding and Marketing) Rules, 2017, require dog breeders to register with the State Animal Welfare Board. These

rules prescribe standards for housing, nutrition, veterinary care, and breeding practices, while prohibiting harmful practices such as tail docking and excessive inbreeding. Such regulations aim to improve breeding standards while safeguarding animal health and welfare.

Breed Registration and Conservation of Indigenous Germplasm

Although India does not provide intellectual property protection for animal breeds, indigenous livestock breeds are registered by the ICAR–National Bureau of Animal Genetic Resources (NBAGR). This registration helps conserve genetic diversity and recognizes the contributions of local livestock keepers. It also aligns with benefit-sharing principles under the Biological Diversity Act, 2002, offering potential support to breeders in future policy developments.

Role of Veterinarians and Intellectual Property Rights

Veterinarians play a crucial role in implementing animal welfare laws by certifying animal fitness for transport, identifying cruelty cases, monitoring breeding animals, and recommending humane euthanasia when necessary. Beyond regulatory responsibilities, veterinarians contribute significantly through research, clinical innovations, and academic publications.

Their intellectual contributions are protected under general intellectual property laws. Patents may be granted for new veterinary drugs, diagnostic tools, equipment, or treatment technologies that meet legal requirements. Trademarks protect the identity of veterinary clinics and services, while copyrights safeguard research papers, manuals, academic publications, and training materials.

Trade Secrets in Veterinary and Breeding Practices

Trade secrets also play an important role for breeders and veterinarians. Confidential breeding strategies, proprietary feed formulations, specialized treatment protocols, and unique management practices can provide competitive advantages if maintained as confidential information.

Conclusion

Innovation within the animal breeding and veterinary in conclusion, while Indian law does not permit patents for new animal breeds, the broader intellectual property framework supports sectors. A welfare-driven regulatory approach, combined with effective use of patents, trademarks, copyrights, and trade secrets, enables breeders and veterinarians to protect their innovations, enhance professional credibility, and contribute to the ethical growth of animal science in India.

Role of IPR to Promote Innovation in Animal Husbandry

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Introduction

Research and development experiments, trials, and long late nights that produce new vaccines, diagnostic tests, breeding tools, or precision-farming devices costs money and time. IPR (patents, breeders' rights, trademarks, trade secrets) gives inventors and companies a limited period to recoup those investments by excluding competitors or licensing technology. That promise of return is a major reason private capital flows into animal-health companies, biotech firms and agri-tech start-ups. WIPO and policy reviews make this economic link clear.IP helps attract investment and turn lab discoveries into usable products.

Empirical evidence of IPR driven innovation in animal husbandry

1. Genome editing and disease resistance-Tools such as CRISPR/Cas have moved quickly from proof of concept into animal breeding for example, edits that reduce susceptibility to viral diseases in pigs or improve milk traits in cattle. High-quality reviews and experimental papers document both the technical breakthroughs and the pathway from lab to farm. Those pathways are often paved by patents and proprietary platforms that allow firms to invest at scale.
2. Advanced vaccines and therapeutics-The rapid rise of mRNA and other platform-based vaccine technologies (now widely discussed for human medicine) also offers tools for livestock disease control. Protecting platform innovations through IP rights has helped firms and research consortia develop, test, and commercialize veterinary vaccines and diagnostics.
3. Precision livestock farming (PLF)-Sensors, cameras, and machine-learning algorithms that monitor animal health and behavior are productized by startups and larger firms. Patents and trade secrets protect hardware designs and algorithms, encouraging commercialization and broader deployment on farms. Reviews of precision farming show clear productivity and welfare gains when these technologies are used.

A simplified overview of the standard process

1. Academic labs or startups develop an idea (a gene edit, vaccine candidate, sensor algorithm).
2. Inventors file for IP protection

(patents, plant/animal variety protections where applicable).

3. IP enables licensing deals, spin-out companies, or partnerships with larger firms that have manufacturing and regulatory capacity.
4. With revenue potential clearer, investors back scaling, field trials proceed, and the product reaches farmers. Several reviews trace that lifecycle in agricultural biotech and show how IP enabled market entry.

Benefits among the animal agriculture ecosystem

1. Faster access to better tools- Vaccines, diagnostics and resistant breeds can reduce mortality and increase productivity by improving farmer incomes and food supply stability.
2. Improved animal welfare- Disease-resistant lines and early-warning health sensors reduce suffering and antibiotic use.
3. Economic scaling- IP enables firms to invest in manufacturing, distribution, and farmer training necessary for new tech to reach millions of smallholders or large-scale farms. Evidence across genomics and PLF literatures supports these gains.

Challenges and tradeoff considerations

Several important issues appear repeatedly in the literature and policy analyses:

1. Access and equity- Strong IP can raise prices or concentrate control in a few firms, making certain technologies unaffordable for smallholders or for countries with limited purchasing power. WIPO and academic reviews highlight this tension and the need for licensing models that preserve access.
2. Biological complexity- A patented solution may be less effective long-term, requiring continued R&D and careful stewardship (e.g., to avoid resistance evolution). Research modeling shows that combining technologies often works best.
3. Regulation and public acceptance-Gene edited animals and some biotech derived products face regulatory hurdles and consumer skepticism in many markets. PNAS and other policy papers discuss how regulatory clarity and stakeholder engagement matter.

Practical models for balancing innovation

Researchers and policymakers point to a few workable approaches:

1. Tiered licensing- Companies license technologies on different terms for low income countries or smallholders.
2. Public–private partnerships- Public research institutions retain rights or co-ownership to ensure public interest deployment.
3. Open platforms for basic tools- Foundational methods (e.g., non-proprietary gene-editing protocols, shared datasets) can be kept openly available to spur broad innovation, while downstream commercial applications remain protected. WIPO guidance and institutional case studies show these models in action.

Conclusion

IPR supplies the economic incentives that translate scientific discovery into farm-ready tools in animal husbandry. The science from CRISPR edits to smart sensor systems and new vaccine platforms shows tangible benefits for productivity, welfare and disease control. But because biological systems, markets, and social needs are complex, IP must be paired with smart licensing, proportionate regulation, and public-interest safeguards to ensure innovations reach those who need them most.

References

1. *Mahony, T. J., Briody, T. E., & Ommeh, S. C. (2024). Can the revolution in mRNA-based vaccine technologies solve the intractable health issues of current ruminant production systems? PubMed Central.*
2. *Jewell, C. (2015, August 21). Who benefits from IP rights in agricultural innovation? WIPO Magazine. World Intellectual Property Organization.*
3. *Clancy, M. S., & Moschini, G. (2017). Intellectual property rights and the ascent of proprietary innovation in agriculture. Annual Review of Resource Economics.*
4. *Petersen, G. E. L., & Buntjer, J. B. (2022). Modeling suggests gene editing combined with vaccination could eliminate a persistent disease in livestock. Proceedings of the National Academy of Sciences.*

Role of Traditional Knowledge in Sustainable Animal Husbandry

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Keywords
Traditional knowledge, Indigenous Technical Knowledge, sustainable animal husbandry, ethnoveterinary practices, rural livelihood.

Abstract

Traditional knowledge, often referred to as Indigenous Technical Knowledge (ITK), has played a crucial role in animal husbandry systems for centuries. It includes locally developed practices related to animal feeding, health care, breeding, housing, and management, based on long-term observation and experience. Several studies have highlighted that traditional animal husbandry practices are environmentally sustainable, economically viable, and socially acceptable (FAO, 2010). In recent years, growing concerns about climate change, antimicrobial resistance, and high input costs have renewed interest in traditional knowledge. Integrating traditional wisdom with modern scientific approaches can significantly enhance sustainable animal husbandry systems.

Introduction

Animal husbandry is a vital component of agricultural systems, particularly in developing countries like India. According to the Food and Agriculture Organization (FAO, 2019), livestock contributes significantly to food security, nutrition, and rural livelihoods. Long before the development of modern veterinary science, farmers relied on traditional knowledge to manage livestock health, nutrition, and productivity.

Traditional knowledge is developed through generations of close interaction between humans, animals, and the environment. Warren (1991) defined indigenous knowledge as a local knowledge system unique to a given culture or society, developed through experience and adapted to local conditions. Despite rapid modernization, traditional animal husbandry practices continue to be relevant because they are based on sustainability, low external inputs, and ecological balance.

Traditional Knowledge in Animal Feeding

Traditional feeding practices emphasize the use of locally available feed resources such as crop residues, grasses, tree leaves, and agro-industrial by-products. Devendra (2011) reported that indigenous feeding systems reduce feed costs and improve nutrient recycling in smallholder livestock systems. Farmers

traditionally use fodder trees like neem, subabul, and banyan to supplement animal diets during fodder scarcity.

According to Singh et al. (2014), such feeding practices not only improve animal nutrition but also enhance resilience against climate variability.

Indigenous Animal Health Care Practices

Ethnoveterinary medicine is an important component of traditional animal husbandry. McCorkle (1986) emphasized the scientific importance of ethnoveterinary practices in livestock health management. Farmers use medicinal plants such as turmeric, neem, garlic, aloe vera, and asafoetida to treat wounds, digestive disorders, parasitic infections, and skin diseases.

Mathias and McCorkle (2004) highlighted that traditional remedies are cost-effective and easily accessible to rural farmers. FAO (2012) reported that herbal treatments help reduce excessive use of antibiotics.

Breeding and Conservation of Indigenous Breeds

Traditional knowledge plays a key role in the conservation of indigenous livestock breeds. According to ICAR (2018), indigenous breeds are better adapted to local climatic conditions and require fewer inputs compared to exotic breeds. Köhler-Rollefson (2007) emphasized that traditional breeding practices contribute significantly to the conservation of animal genetic resources.

Housing and Animal Welfare Practices

Traditional animal housing systems are designed using locally available materials such as mud, bamboo, thatch, and cow dung. These structures provide thermal comfort and proper ventilation. Gaughan et al. (2010) reported that climate-adapted housing improves animal welfare and productivity.

Socio-Economic Importance

Traditional animal husbandry practices provide income, employment, and nutritional security to millions of rural households. The World Bank (2014) reported that livestock-based traditional systems play a crucial role in poverty alleviation. Women play a major role in preserving traditional knowledge related to animal care (Kumar et al., 2016).

Conclusion

Traditional knowledge plays a vital role in promoting sustainable animal husbandry by offering low-cost, eco-friendly, and locally adaptable solutions. Integrating traditional knowledge with modern veterinary science can enhance animal health, conserve biodiversity, reduce environmental impact, and strengthen rural livelihoods. Documentation, scientific validation, and policy support are essential for long-term sustainability.

References

- *Devendra, C. (2011). Integrated tree crops–ruminants systems in South Asia. FAO.*
- *FAO. (2010). Indigenous knowledge for sustainable agriculture. Rome.*
- *FAO. (2011). Guide to good animal welfare practices. Rome.*
- *FAO. (2012). Ethnoveterinary medicine in livestock health care. Rome.*
- *FAO. (2019). Livestock and livelihoods. Rome.*
- *Gaughan, J. B., et al. (2010). Thermal stress and livestock housing. Journal of Animal Science.*
- *ICAR. (2018). Indigenous livestock breeds of India. New Delhi.*
- *Köhler-Rollefson, I. (2007). Endogenous livestock development.*
- *Kumar, S., et al. (2016). Role of women in traditional livestock management. Indian Journal of Animal Sciences.*
- *Mathias, E., & McCorkle, C. (2004). Traditional livestock healers.*
- *McCorkle, C. M. (1986). Introduction to ethnoveterinary research. Journal of Ethnobiology.*
- *Warren, D. M. (1991). Indigenous knowledge in agricultural development. World Bank.*
- *World Bank. (2014). Livestock development and poverty reduction.*

Tongue and Salivary Glands in Domestic Animals Structure, Function and Clinical Importance

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Keywords
Tongue, Salivary glands, Domestic animals, Veterinary anatomy, Digestion, Oral cavity

Abstract

The tongue and salivary glands are essential accessory organs of the digestive system in domestic animals. The tongue plays a vital role in prehension, mastication, taste perception, and swallowing, while salivary glands contribute to lubrication of food, digestion, buffering of rumen contents, and maintenance of oral health. Structural and functional variations in these organs reflect dietary adaptations among herbivores, carnivores, and omnivores. Disorders of the tongue and salivary glands commonly affect feed intake and animal productivity. This article reviews the anatomy, histological features, functions, and clinical significance of the tongue and salivary glands in domestic animals, with emphasis on their applied veterinary importance.

Introduction

The oral cavity is the initial site of digestion in domestic animals and contains several specialized structures that aid in food intake and processing. Among these, the tongue and salivary glands play a central role in mechanical and chemical digestion (Dyce et al., 2018). The tongue is a muscular organ occupying the floor of the mouth, while salivary glands are exocrine glands that secrete saliva into the oral cavity (König & Liebich, 2020). In veterinary anatomy, understanding the tongue and salivary glands is important not only from a structural perspective but also from a functional and clinical viewpoint. Diseases affecting these organs often result in dysphagia, reduced feed intake, salivation abnormalities, and decreased productivity in farm animals (Getty, 1975). Hence, detailed knowledge of their anatomy and functions is essential for veterinary students and clinicians.

Anatomy of the Tongue

The tongue is a highly mobile, muscular organ composed mainly of striated muscle fibers arranged in longitudinal, transverse, and vertical directions, allowing precise movements (Dyce et al., 2018). It is covered by mucous membrane and attached caudally to the hyoid apparatus.

Anatomically, the tongue is divided into the apex, body, and root. This division is consistent across domestic animals, though size and shape vary with species (König & Liebich, 2020).

Papillae of the Tongue

The dorsal surface of the tongue bears specialized projections known as papillae. These papillae are classified into mechanical and gustatory types (Dyce et al., 2018).

Mechanical papillae such as filiform, conical, and lenticular assist in manipulation of food and are especially well developed in ruminants, reflecting their fibrous diet (Getty, 1975).

Gustatory papillae including fungiform, vallate, and foliate contain taste buds and are involved in gustatory sensation (König & Liebich, 2020).

Species Differences in Tongue

Cattle possess a rough tongue with prominent lenticular papillae, aiding in grasping coarse fodder (Dyce et al., 2018). The horse tongue is smoother and highly sensitive, assisting in selective feeding. Dogs and cats have a flexible tongue adapted for lapping liquids and grooming (Getty, 1975).

Functions of the Tongue

The tongue performs several vital functions including prehension of food, mastication and bolus formation, taste perception, swallowing, and vocalization in some species (Dyce et al., 2018). Loss of tongue function significantly impairs feeding and overall health of animals (König & Liebich, 2020).

Salivary Glands in Domestic Animals

Salivary glands are exocrine glands that secrete saliva into the oral cavity through ducts. Saliva is composed of water, electrolytes, mucus, enzymes, and antimicrobial substances (Dyce et al., 2018).

Based on secretion type, salivary glands are classified as serous, mucous, or mixed (König & Liebich, 2020).

Major Salivary Glands

The parotid gland is the largest salivary gland and is mainly serous in nature. It produces large quantities of watery saliva, especially in ruminants (Dyce et al., 2018).

The mandibular gland is mixed in nature and contributes both serous and mucous secretions (König & Liebich, 2020).

The sublingual gland is predominantly mucous and helps in lubrication of feed (Getty, 1975).

Minor Salivary Glands

Minor salivary glands include labial, buccal, palatine, and lingual glands. Though small, they play an important role in maintaining moisture of the oral mucosa (Dyce et al., 2018).

Functions of Saliva

Saliva lubricates food, initiates digestion, buffers rumen contents, maintains oral hygiene, and facilitates swallowing (König & Liebich, 2020). In ruminants, saliva plays a crucial role in maintaining rumen pH and preventing acidosis (Getty, 1975).

Clinical Significance

Diseases of the tongue include glossitis, tongue injuries, foreign body penetration, and neoplasia, which may cause dysphagia and anorexia (Dyce et al., 2018). Salivary gland disorders include sialadenitis, salivary fistula, and obstruction of salivary ducts (König & Liebich, 2020).

Excessive salivation or reduced salivation adversely affects feed intake and digestion, particularly in ruminants (Getty, 1975).

Conclusion

The tongue and salivary glands are indispensable components of the digestive system in domestic animals. Their anatomical structure reflects functional adaptation to different feeding habits. Proper functioning of these organs ensures efficient prehension, mastication, digestion, and maintenance of oral health. Disorders affecting the tongue and salivary glands can significantly compromise animal welfare and productivity. Therefore, a thorough understanding of their anatomy, functions, and clinical relevance is essential for effective veterinary diagnosis and treatment (Dyce et al., 2018; König & Liebich, 2020).

References

- *Dyce, K. M., Sack, W. O., & Wensing, C. J. G. (2018). Textbook of Veterinary Anatomy (5th ed.). Elsevier.*
- *König, H. E., & Liebich, H. G. (2020). Veterinary Anatomy of Domestic Mammals (7th ed.). Thieme.*
- *Getty, R. (1975). Sisson and Grossman's The Anatomy of the Domestic Animals. W.B. Saunders Company.*

Digitalizing India's Dairy Sector

Building a Smarter, Transparent, and Farmer-Centric Ecosystem

India is the world's largest producer of milk, accounting for **25% of global output.** As the sector continues to expand, digital tools are playing an increasingly crucial role in improving productivity, transparency, and farmer welfare. The National Dairy Development Board (NDDB) has been at the forefront of this transformation, developing digital platforms that connect farmers, cooperatives, and stakeholders across the dairy value chain. These initiatives aim to modernize operations, reduce inefficiencies, and enhance traceability, ultimately strengthening the world's largest dairy ecosystem.

National Digital Livestock Mission (NDLM)

The National Digital Livestock Mission (NDLM), implemented by NDDB in collaboration with the Department of Animal Husbandry and Dairying (DAHD), represents a major step toward a unified digital livestock ecosystem called ***"Bharat Pashudhan."***

To enhance data-driven livestock management, the Bharat Pashudhan database records field activities such as breeding, artificial insemination, health services, vaccination, and treatment, with over 84 crore transactions logged. Field personnel, including veterinarians and extension workers, assist farmers in accessing this system.

The NDLM uses digital tools such as unique animal identification, data integration, and mobile applications to empower farmers and improve productivity. It aims to ensure every animal in India has a digital identity, linking it to health records and productivity data. NDDB provides both technical and financial support to implement this mission across states.

In line with the international practices a unique **12-digit bar coded Tag ID** in the form of ear tag is being issued to all livestock animals. This unique code has been named as ***"Pashu Aadhar"***, and it acts as a primary key for registering all types of transactions done on the animals such as Vaccination, Breeding, Treatment, etc. All these transactions can be viewed at a single place against the Tag ID and shall be visible to the farmer as well as to the field veterinarians and workers for respective animals/area. Till November 2025, over **35.68 Crore** *Pashu Aadhaar* has been generated.

Under the National Digital Livestock Mission, the 1962 App provides authenticated information on best practices and government schemes. Besides, the **toll-free number 1962** is available to the farmers to get the veterinary services through Mobile Veterinary Units at their doorstep.

Automatic Milk Collection System

At the heart of India's cooperative dairy model is the daily milk collection from millions of farmers. To make this process transparent, efficient, and farmer-friendly, the National Dairy Development Board (NDDB) has developed the Automatic Milk Collection System (AMCS), a robust, integrated software platform for managing every aspect of operations at Dairy Cooperative Societies (DCS).

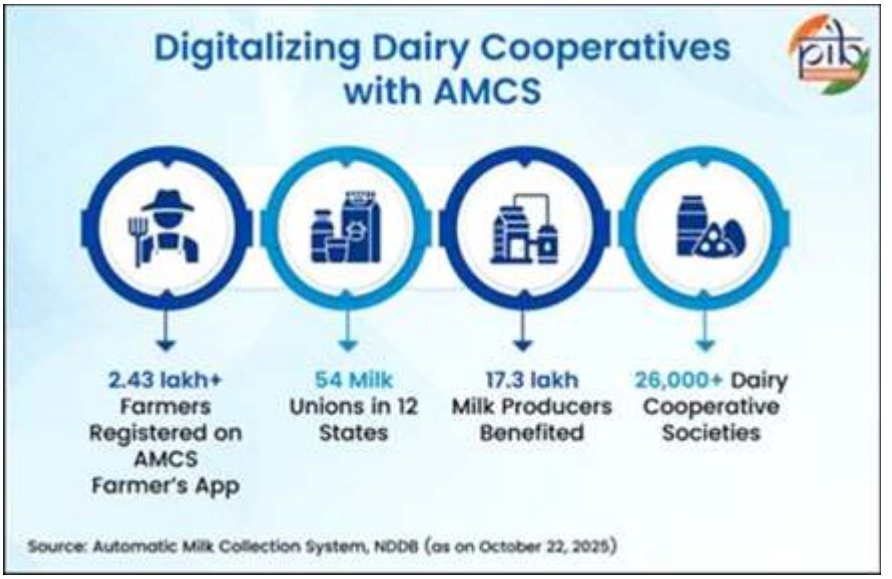
AMCS automates milk collection by digitally recording each transaction, including quantity, quality, and fat content, and instantly transferring payments to farmers' bank accounts. Using open-source technology, the system ensures traceability, eliminates manual errors, and promotes transparency at every level. Farmers receive **real-time SMS updates** on their daily sales and payments, while cooperatives gain access to data-driven insights for better procurement and production planning.

The system is integrated at Union, Federation, and National levels, connecting with financial institutions and providing mobile-based key informatics for all stakeholders. Currently

operational in 12 states/UTs, AMCS covers over **26,000 Dairy Cooperative** Societies and benefits over **17.3 lakh milk** producers across **54 milk unions** (as on October 22, 2025), reflecting NDDB's commitment to building a digitally empowered and inclusive dairy ecosystem.

The integrated AMCS solution has the following major Applications / components.

1. **DCS Application:** Common, multilingual AMCS Application at DCS Level which works on Windows / Linux and Android Platform.
2. **Portal Application:** Common Centralized AMCS Portals at Union, Federation and National Level.
3. **Android Apps:** Common, multilingual Mobile Applications one each for Society Secretary, Dairy Supervisor and Farmer.



This Android-based application serves as a Digital Passbook for farmers and a real-time information and alert platform for Dairy Secretaries and Supervisors. So far, over 2.43 lakh farmers, 1,374 supervisors, and 13,644 secretaries have registered (as on October 22, 2025) on the AMCS mobile app.

The NDDB Dairy ERP (NDERP) is a comprehensive, web-based enterprise resource planning system developed and customized specifically for the dairy and edible oil industries. Built on an open-source platform (Frappe ERPNext), it eliminates the need for any software installation and can be accessed seamlessly through a computer or mobile device. It is also available on Android and iOS **(mNDERP)** for distributors, offering a complete and cost-effective solution without proprietary or recurring licensing fees.

The iNDERP portal (https://inderp.nddb.coop) is an online platform for distributors integrated with NDERP. It enables them to manage orders, delivery challans, invoices, and payments efficiently. Distributors can track deliveries, view outstanding balances, and download invoices directly from the portal, ensuring smooth coordination with milk unions and federations.

The mNDERP mobile app, available on Android and iOS, offers the same functionalities as iNDERP for distributors on the go. It allows them to place orders, check deliveries, access invoices, and monitor payments easily through their smartphones, promoting transparency and convenience in dairy business operations.

NDERP includes all major functional modules such as Finance and Accounts, Purchase, Inventory, Sales and Marketing, Manufacturing, HR and Payroll, each integrated with advanced workflows and maker-checker features to ensure greater transparency and control. The system also features dashboards and analytical tools that support data-driven decision-making across management levels.

Crucially, NDERP is integrated with the **Automatic Milk Collection System** (AMCS) to create an end-to-end digital solution, from cow to consumer, covering milk collection, processing, and distribution. To enhance efficiency, the platform incorporates a mass-balancing technique in the production module, helping dairies minimize processing losses.

Semen Station Management System (SSMS)

The Semen Station Management System (SSMS) is a comprehensive digital platform designed to streamline the production of Frozen Semen Doses (FSD) and ensure adherence to the Minimum Standard Protocols (MSP) and Standard Operating Procedures (SOPs) set by the Government of India. The system covers all core operations of semen stations, including bull lifecycle management, semen production, quality control, biosecurity, farm and fodder management, and sales tracking. It integrates with laboratory equipment and RFID bull tags for accurate, efficient, and traceable operations, ensuring every stage, from production to distribution, is digitally monitored.

SSMS is connected to the Information Network for Semen Production and Resource Management (INSPRM), a national portal that enables real-time data sharing between semen stations and field-level systems like INAPH (Information Network for Animal Productivity and Health). This integration allows complete traceability of semen doses supplied across the country and supports coordinated monitoring through a central database. Developed under the National Dairy Plan I (NDP I), a World Bank-funded initiative implemented by NDDB, the system has modernized semen stations nationwide, strengthening India's artificial insemination network and contributing to enhanced dairy productivity. Currently, 38 graded semen stations across India are using SSMS to ensure quality, transparency, and standardization in semen production.

INAPH

Information Network for Animal Productivity & Health (INAPH) is an application that facilitates capturing of real time reliable data on Breeding, Nutrition and Health Services delivered at Farmer's Doorstep. It helps to assess and monitor progress of the projects.

Internet-based Dairy Information System

Efficient data management is central to evidence-based planning and informed decision-making in the dairy sector. The Internet-based Dairy Information System (i-DIS) developed by the National Dairy Development Board (NDDB) provides a unified digital platform for dairy cooperatives, milk unions, federations, and other allied units to systematically collect, share, and analyse data. The system enables participants to track performance indicators such as milk procurement and sales, product manufacturing and distribution, and the supply of technical inputs, while allowing each organisation to benchmark its performance against others.

Currently, around **198 milk unions, 29 marketing dairies, 54 cattle-feed plants, and 15 federations** across the country are part of i-DIS, contributing to the creation of a reliable and comprehensive National Cooperative Dairy Industry Database. This data-driven ecosystem supports strategic decision-making and policy formulation within the dairy sector. NDDB also conducts regular refresher workshops for Management Information System (MIS) officials from participating unions to strengthen their ability to use i-DIS effectively and ensure its optimal utilisation for

planning and operations.

Efficient milk collection and distribution are vital for the success of India's dairy supply chain. To make this process more cost-effective and systematic, the National Dairy Development Board (NDDB) has introduced milk route optimisation using GIS (Geographical Information System) technology. This digital approach replaces manual planning by mapping milk procurement and distribution routes on digitised maps, allowing easy visualisation of multiple route options and supporting data-driven decision-making.

Using GIS-based route planning helps reduce transportation distance, fuel costs, and time, improving overall efficiency in milk procurement and delivery. NDDB launched a milk route optimisation exercise in August 2022 under the Vidarbha Marathwada Dairy Development Project, where routes for four milk chilling centres were redesigned, leading to notable savings in transportation costs. Similar exercises in Varanasi Milk Union, West Assam Milk Union, Jharkhand Milk Federation, and Indore Milk Union have also produced encouraging results, showcasing the potential for significant cost reduction in dairy logistics.

To help cooperatives adopt this technology widely, NDDB has developed a web-based dynamic route planning software that enables fleet and route optimisation in a structured, scientific, and user-friendly manner. Available free of cost to dairy cooperatives, this tool allows real-time route planning and supports better operational control. By integrating technology with cooperative efficiency, NDDB's route optimisation initiative is setting a benchmark for sustainable and cost-effective milk transport in India's dairy sector.

Conclusion

India's dairy sector, which contributes a quarter of the world's milk output, is undergoing a remarkable digital transformation led by the National Dairy Development Board (NDDB). Through integrated platforms such as NDLM, AMCS, NDERP, SSMS, i-DIS, and route optimisation tools, the sector is moving toward greater efficiency, transparency, and inclusiveness. These systems are not just enhancing operational productivity but also ensuring that millions of small and marginal dairy farmers are directly linked to a modern, tech-driven ecosystem.

By combining cooperative strength with digital innovation, India is setting new standards in sustainable dairy development, one where every litre of milk and every animal is part of a connected, traceable, and efficient value chain. The ongoing efforts reflect NDDB's vision of creating a digitally empowered dairy sector that serves both producers and consumers, driving India closer to its goal of being the global leader in safe, sustainable, and technology-driven milk production.

References

- ***PIB***

1. *https://www.pib.gov.in/PressReleasePage.aspx?PRID=2114715*
2. *https://www.pib.gov.in/PressReleseDetail.aspx?PRID=2115188*

- ***NDDB Annual Report 2023-24*** - *https://www.nddb.coop/sites/default/files/pdfs/NDDB_AR_2023_24_Eng.pdf*
- ***Bharat Pashudhan Dashboard*** - *https://bharatpashudhan.ndlm.co.in/*
- ***Automatic Milk Collection System –***

1. *https://amcs.nddb.coop/*
2. *https://amcs.nddb.coop/Home/UnionDetails*
3. *https://amcs.nddb.coop/Home/About*

- ***NDDB Dairy ERP*** –

1. *https://nderp.nddb.coop/subpage?i-NDERP*
2. *https://nderp.nddb.coop/subpage?m-NDERP*
3. *https://nderp.nddb.coop/subpage?NDERP*

- ***Semen Station Management System*** - *https://insprm.nddb.coop/AboutUs.aspx*
- ***INAPH*** - *https://www.nddb.coop/resources/inaph*
- ***Internet-based Dairy Information System*** - *https://www.nddb.coop/resources/idis*
- ***Milk Route Optimisation*** - *https://geospatialworld.net/article/milk-procurement-route-optimisation-using-gis/*

India to Present Diverse Agri-Food Ecosystem Through 161 Exhibitors at Gulfood 2026

APEDA's BHARATI Pavilion to Feature Eight High-Potential Startups
India is the Partner Country at Gulfood 2026 for the First Time

The Agricultural and Processed Food Products Export Development Authority (APEDA), under the Ministry of Commerce and Industry, Government of India, is participating in Gulfood 2026 with a strong, expanded and high-impact presence, reinforcing India's growing stature in the global agri-food trade. India is the Partner Country at Gulfood 2026, underscoring its strategic importance as a reliable sourcing destination and a key contributor to global food security and resilient supply chains.

India's participation at Gulfood 2026 marks a significant scale-up compared to previous editions. The Indian Pavilion has doubled in size compared to last year, reflecting the expanding footprint of Indian agri-food exports, increasing global demand for Indian products and enhanced participation from exporters, institutions and startups.

India's participation spans a total exhibition area of 1,434 square metres, featuring 161 exhibitors across a wide range of categories, including processed foods, fresh and frozen products, pulses, grains and cereals, beverages, value-added food products and agri-export startups. The Indian Pavilion brings together exporters, Farmer Producer Organisations (FPOs), cooperatives, startups, State Government agencies and national institutions, presenting a comprehensive view of India's agri-food ecosystem and export readiness.

Exhibitors from 25 States and regions are participating, reflecting India's vast agricultural and regional diversity. These include Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, West Bengal (including Kolkata and Siliguri), Madhya Pradesh, Maharashtra (including Mumbai), Meghalaya, Punjab, Rajasthan, Sikkim, Tamil Nadu, Telangana, Uttar Pradesh and Uttarakhand. The participation highlights region-specific agri-products, GI-tagged items, organic produce and value-added food products, demonstrating India's expanding engagement in international agri-trade.

India's presence at Gulfood 2026 is further strengthened by participation from key national institutions and government bodies, including NAFED, National Cooperative Exports Limited, National Horticulture Board, Uttarakhand Horticulture Board, Spices Board India, Tea Board of India, National Turmeric Board, Indian Rice Exporters Federation (IREF), All India Rice Exporters Association, IOPEPC, The Rice Exporters Association Chhattisgarh (TREACG), COMFED – Bihar State Milk Cooperative Federation Ltd., Punjab State Cooperative Supply & Marketing Federation Ltd., Directorate of Horticulture, Government of Bihar, Sikkim Organic Farming Development Agency, and The Central Arecanut and Cocoa Marketing and Processing Cooperative Limited (CAMPCO), among others.

A key highlight of India's participation is the BHARATI Pavilion, APEDA's flagship initiative to promote export-ready agri-food and agri-tech startups. Located in the Startup Zone at the Dubai World Trade Centre, the BHARATI Pavilion features eight high-potential Indian startups, selected through a national-level

process from over 100 applicants. These startups are showcasing innovative products, technology-driven solutions and export-enabling offerings aligned with APEDA's Farm to Foreign vision.

The Indian Pavilion also features a dedicated Culinary Area, where a renowned chef will conduct live demonstrations of Indian cuisines. This experiential zone highlights India's rich culinary heritage, diverse regional flavours and the versatility of Indian ingredients, enhancing buyer engagement and global appreciation of Indian food products.

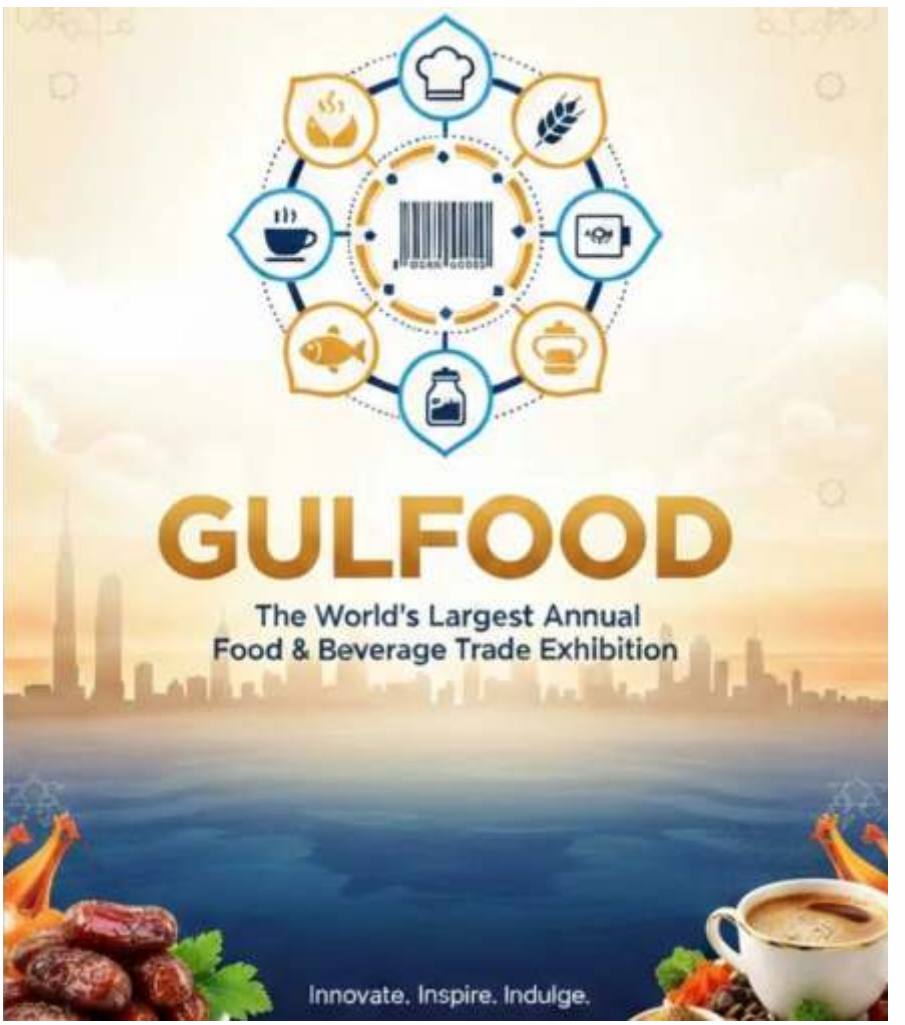
The product showcase includes a comprehensive Pulses, Grains and Cereals section, displaying a wide range of Indian varieties and reinforcing India's position as one of the world's leading producers and exporters of staple food commodities. The displays emphasise quality, sustainability, traceability and compliance with international standards to meet global market requirements.

Gulfood 2026 is being organised across two major venues, with India having a strong and visible presence at both locations. Dubai Expo City hosts the World Food Hall, Pulses, Grains and Cereals Hall and Gulfood Green, focusing on sustainability, innovation and future food systems. The Dubai World Trade Centre (DWTC) hosts the Beverage Hall and the Startup Hall, including the BHARATI Pavilion.

India's participation at Gulfood 2026 is aligned with the opportunities emerging from the India–UAE Comprehensive Economic Partnership Agreement (CEPA), which has strengthened bilateral trade ties and enhanced market access for Indian agri and food products in the Gulf region.

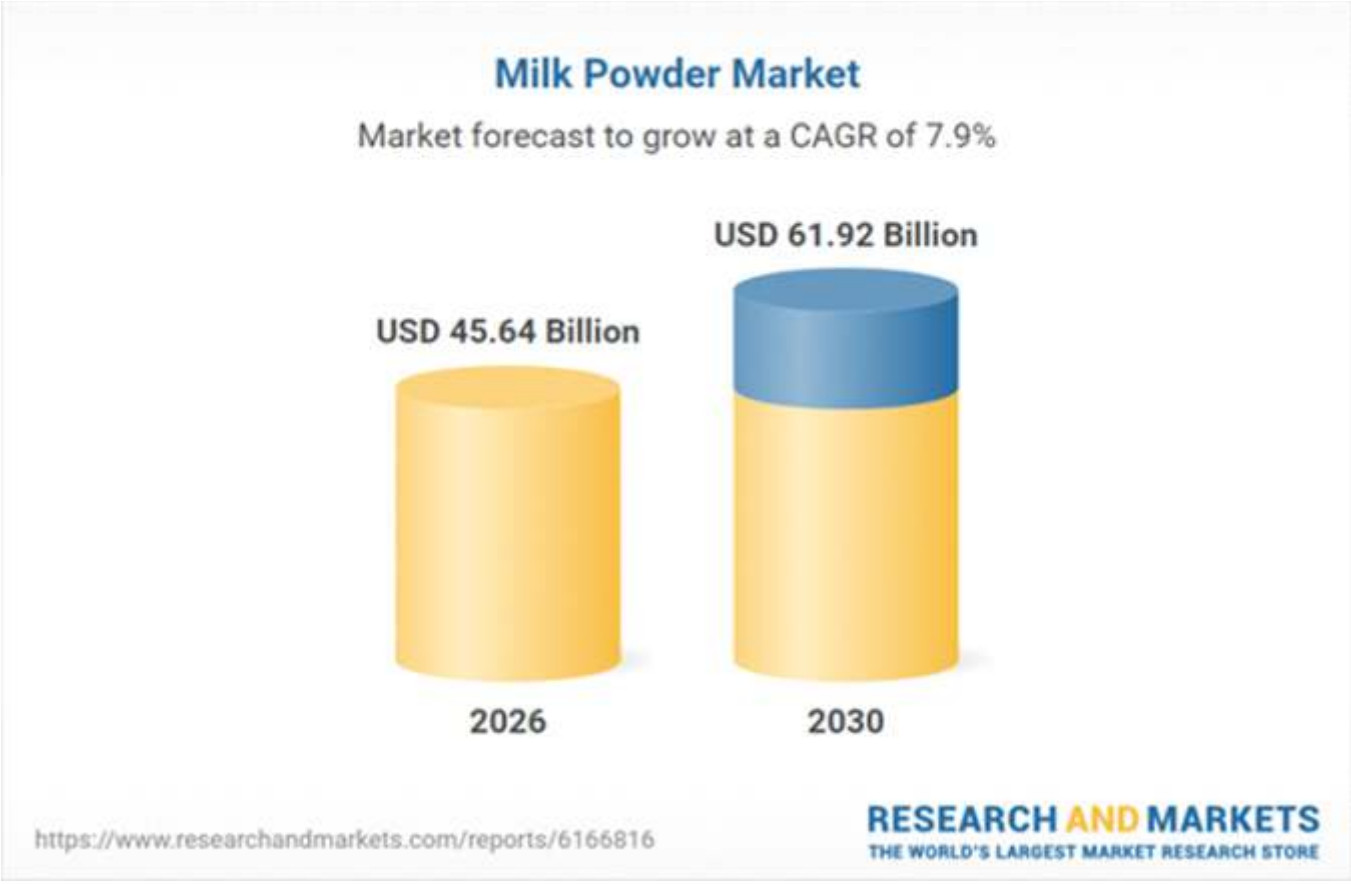
In addition to the exhibition presence, APEDA is undertaking extensive exclusive branding and high-impact promotional activities across prominent locations in Dubai as part of India's Partner Country status at Gulfood 2026. These include branding at metro stations, bus wraps, gas stations, panel branding and other high-visibility outdoor formats, significantly enhancing India's visibility and brand recall.

Through this comprehensive and expanded participation, APEDA aims to strengthen buyer–seller linkages, promote Indian brands globally, support startups and exporters, showcase India's agri-food diversity, and further consolidate India's role as a reliable, innovation-driven and sustainable player in the global agri-food value chain.



Milk Powder Market Report 2026: Industry Forecast to Reach $6.19 Billion by 2030, Driven Rising Demand for Shelf-Stable Dairy Products in Regions with Limited Cold-Chain Infrastructure

Dublin, Jan. 26, 2026 (GLOBE NEWSWIRE) -- The "Milk Powder Market Report 2026" has been added to ***ResearchAndMarkets.com's*** *offering. The market research report provides in-depth analyses of market trends, opportunities, and competitive landscapes, equipping industry stakeholders with the insights required to navigate the evolving market environment.*



The global milk powder market has demonstrated robust growth and is poised for continued expansion, with its market size projected to increase from $42.16 billion in 2025 to $61.92 billion by 2030, reflecting a compound annual growth rate (CAGR) of 7.9%. This growth trajectory can be attributed to the rising demand for shelf-stable dairy products in regions with limited cold-chain infrastructure, increased use of specialized milk powders in infant formula, and the expanding global trade of milk powder due to its ease of transport and long shelf life. Additionally, the growing adoption of non-fat dry milk in bakery and confectionery industries and expanding food processing sectors utilizing milk powder as a key ingredient are fueling the market's progress.

As consumer preference shifts towards organic and lactose-free milk powders, the industry is

anticipating a surge in demand for high-protein whey and functional dairy powders. The burgeoning infant nutrition markets in emerging economies are significantly boosting premium milk powder sales. Moreover, the increasing integration of milk powders in meal replacements and sports nutrition products, along with innovations in drying technologies enhancing product quality and energy efficiency, are notable growth drivers. Key trends shaping the market include the rising demand for infant formula, the proliferation of lactose-free and specialty dietary milk powders, and a growing preference for organic milk powders, particularly in emerging markets.

The dairy industry plays a crucial role in driving the milk powder market forward, responding to the global demand for convenient, shelf-stable dairy products. The availability of milk powder as a transportable alternative to liquid milk supports industry growth by enhancing global product availability and facilitating extended distribution. This expansion is encapsulated by recent industry developments, such as the National Agricultural Statistics Service's report indicating a rise in cheese production, underscoring the sector's momentum.

Leading market players like Nestle are focusing on innovation, launching products like the Nido Milk & Soya instant powder mix, enriched with essential nutrients through advanced microencapsulation technology. Furthermore, Muller Milk & Ingredients' acquisition of Yew Tree Dairy highlights strategic expansions to bolster milk powder production and export capabilities.

Despite facing challenges from evolving trade relations and tariffs impacting production and export costs, the milk powder market is witnessing strategic adaptations. Higher tariffs are driving some countries to invest in local production capabilities, facilitating regional player competitiveness and fostering the development of more value-added formulations.

The Asia-Pacific region, the largest market for milk powder, remains a focal point of expansion amidst dynamic international trade conditions. Major companies in this sector include Nestle S.A., Abbott Laboratories, and Fonterra Co-operative Group Limited, among others.

Markets Covered:

- By Type: Whole Milk Powder, Skimmed Milk Powder, Dairy Whitener, Buttermilk Powder, Fat Filled Milk Powder, Other Types
- By Function: Emulsification, Foaming, Flavouring, Thickening
- By Application: Infant Formula, Confectionery, Sports and Nutrition Foods, Bakery Products, Dry Mixes, Fermented Milk Products, Meat Products, Other Applications

Companies Mentioned: Nestle, Abbott Laboratories, Lactalis Group, Danone, Dairy Farmers of America, and more.

Geographical Coverage: Australia, Brazil, China, France, Germany, India, and other key regions

covering Asia-Pacific, Europe, Americas, Middle East, and Africa.

The companies featured in this Milk Powder market report include:

- Nestle S.A.
- Abbott Laboratories
- Lactalis Group
- Danone S.A.
- Dairy Farmers of America Inc.
- Inner Mongolia Yili Industrial Group Co. Ltd.
- Land O'Lakes Inc.
- Arla Foods Amba
- Fonterra Co-operative Group Limited
- China Mengniu Dairy Company Limited
- Saputo Inc.
- Royal FrieslandCampina N.V.
- Schreiber Foods Inc.
- Glanbia Public Limited Company
- Almarai Company
- Morinaga Milk Industry Co. Ltd.
- Bel Group
- Feihe International Inc.
- Vietnam Dairy Products Joint Stock Company (Vinamilk)
- Mother Dairy Fruit & Vegetable Pvt. Ltd.
- Hatsun Agro Product Limited
- Parag Milk Foods Limited
- Agri-Mark Inc.
- California Dairies Inc.

Key Attributes

Report Attribute	Details
No. of Pages	250
Forecast Period	2026-2030
Estimated Market Value (USD) in 2026	$45.64 Billion
Forecasted Market Value (USD) by 2030	$61.92 Billion
Compound Annual Growth Rate	7.9%
Regions Covered	Global

More resilience, less energy loss: Dr. Eckel introduces Anta®Sync

Exceptionally high polyphenols support metabolic stability while reducing oxidative stress and inflammation

Niederzissen, Germany, – Dr. Eckel Animal Nutrition, German manufacturer of high-quality feed additives, has just launched its new phytogenic innovation Anta®Sync. The formulation is distinguished by its high content of secondary plant substances, with double-soluble polyphenols that enable optimal absorption in both fat and water environment in the animals. Thus it supports improved bioavailability, metabolic efficiency and resilience in high-performance livestock under pressure.

Modern livestock production faces a growing contradiction: while genetics, nutrition and management continue to advance, animals are increasingly challenged by metabolic pressure, environmental stress and immune load. Much of the resulting performance loss does not stem from visible disease, but from oxidative stress and systemic inflammation acting silently at cellular level.

With Anta®Sync, Dr. Eckel Animal Nutrition introduces a new phytogenic feed additive designed to address exactly these hidden drivers of inefficiency. Anta®Sync supports animals in maintaining metabolic balance, immune resilience and productive performance, even under challenging conditions.

Oxidative stress and chronic inflammation are triggered by routine events such as heat stress, feed transitions, pathogen exposure or high metabolic demand. These processes consume energy, weaken immune responses and ultimately reduce performance, product quality and longevity. Anta®Sync tackles this problem at its source.

"Improving profitability and resource efficiency means addressing hidden energy losses," says Dr Viktor Eckel, Managing Director at Dr. Eckel Animal Nutrition. "Oxidative stress and inflammation bind energy and make production systems more vulnerable. Anta®Sync helps limit these burdens and supports more robust animals – a key lever for sustainable livestock production."

The phytogenic formulation of Anta®Sync combines carefully selected, polyphenol-rich plant ingredients with antioxidant and anti-inflammatory properties. Through functional synergy, Anta®Sync helps reduce the metabolic cost of stress responses and supports more efficient energy utilisation. The formulation is distinguished by its high content of secondary plant substances, with double-soluble polyphenols that enable optimal absorption in both fat and water environment in the animals. Thus it supports improved bioavailability and a more consistent effect under practical conditions, helping animals direct energy towards growth, milk production and reproduction instead of defence mechanisms.

"What sets Anta®Sync apart in practice is its high polyphenol content," explains Temitope A. Aloba, Technical Sales Manager at Dr. Eckel Animal Nutrition. "This allows us to actively reduce oxidative stress while supporting metabolic stability at the same time. In the field, this translates into more consistent performance, stable milk quality and animals that cope noticeably better with stress situations such as disease pressure or heat stress."

Anta®Sync is suitable for use in cattle, poultry and pigs and has been developed for high-performance production systems. Its multi-targeted mode of action clearly distinguishes it from conventional feed additives that address only a single function.

Practical farm experience underlines the concept. Following a bluetongue outbreak that caused a marked drop in milk yield and quality, a dairy herd supplemented with Anta®Sync recovered rapidly. Herd-average milk production increased, somatic cell counts stabilised and performance remained consistent, even during subsequent heat stress phases.

Anta®Sync is supplied as a brown powder and can be easily integrated into existing feeding concepts.

For more information and scientific background, Dr. Eckel Animal Nutrition will host a technical webinar on Anta®Sync on 11 February, providing deeper insights into its mode of action, application and practical benefits.

Register here: https://app.livestorm.co/p/51f8ab3e-5ab4-4c3b-8f49-90882487e38e/live?s=dcb6dbd3-290f-478e-9233-45756e2a481f

[Boilerplate] About Dr. Eckel

Dr. Eckel Animal Nutrition is all about innovative feed additives made in Germany. The value-orientated family business was founded by Dr Antje Eckel in Niederzissen / Germany in 1994, where it is still firmly established. With Dr Viktor Eckel, the next generation has now joined the management team.

The company has gained international success with Dr. Eckel ranking among the world's leading companies in the sector with a specific focus on animal welfare, developing products that make animal nutrition more resource-efficient, climate-friendly and healthy. This is how Dr. Eckel contributes to sustainable global nutrition.

Dr. Eckel Animal Nutrition represents excellence, innovation and responsibility towards people, animals and the environment. The products combine innovation and quality, which is what sets Dr. Eckel apart. Customers value the solutions for profitable animal nutrition. These promote animal welfare and enable customers to achieve sustainable, long-term success. To this end, the multinational team of experts conducts research and works with specialists from around 20 different countries. This is but one of the reasons why Dr. Eckel was identified as a hidden champion by the Forschungszentrum Mittelstand (FZM), a research institute for the German Mittelstand at the University of Trier.

Every year, Dr. Eckel invests more than 10 per cent of its revenue in innovation projects for customers, partners and employees. These consist of new products, consolidating digital infrastructure and sustainability projects such as replacing the current company fleet with electric vehicles, among others. This commitment is paying off, as evidenced by various awards, including Leading Employer, TOP 100 innovator, 'Top Arbeitgeber im Mittelstand' (Top 'Mittelstand' Employer) by FOCUS magazine and the 'Innovative through Research' seal of approval.

Projections

This press release may include projections based on current assumptions and forecasts made by the management of Dr. Eckel Animal Nutrition GmbH & Co. KG. Various risks—both known and unknown—uncertainties and other factors may cause the actual results, financial situation, development or performance of Dr. Eckel Animal Nutrition GmbH & Co. KG to differ significantly from the estimates provided here. Such factors include those described by Dr. Eckel Animal Nutrition GmbH & Co. KG in published reports. Dr. Eckel Animal Nutrition GmbH & Co. KG shall accept no liability whatsoever for updating such projections and adjusting them to future events or developments.

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India's Dairy Sector at a Crossroads: Rising Costs, Trust Deficits and the Case for Nutritional Responsibility

India's dairy sector is undergoing a quiet but profound transformation. What began as a reaction to tightening milk supply and rising procurement costs is now evolving into a broader industry-wide reflection on trust, nutrition and the responsibilities dairy brands carry in a rapidly shifting consumer landscape.

This is not merely a matter of rupees and litres. It is a re-evaluation of dairy's place in modern Indian life.

Rising Costs Trigger Strategic Rethink

Over the past year, milk procurement prices have risen steadily across major states, driven by a combination of climate-related fodder shortages, lower milk yields, and escalating costs of animal care. These pressures have left both producers and processors squeezed, with limited room for manoeuvre.

But beyond the financials lies a deeper insight. As revealed during recent interactions with stakeholders in Gujarat, Maharashtra, Uttar Pradesh and Karnataka, the sector is beginning to redefine success not only in terms of profitability but also in terms of public trust, nutrition access and consumer wellbeing.

There is growing realisation that dairy cannot be treated as just a commodity. It is a daily dietary anchor for millions, and any disruption to its availability or quality has wide social consequences.

Value-Added Products as Pillars of Stability

One of the most visible trends is the shift towards **value-added dairy products.** Items like paneer, ghee, curd, flavoured milk and probiotic drinks are gaining ground, not only because of higher margins but also due to their role in ensuring **nutritional continuity, shelf stability and consumer confidence** during uncertain supply conditions.

These products allow processors to better manage raw milk variability while offering **fortified nutrition, hygiene assurance and clear labelling** that increasingly matters to urban and semi-urban consumers.

However, this shift calls for far more than product diversification. It requires **investment in cold chains, processing innovation, digital quality tracking** and a cultural shift towards **nutritional stewardship.**

Industry Perspective: Trust as the Cornerstone

During a regional dialogue held recently, **Prashant**, a senior dairy advisor and industry observer, provided a clear-eyed view of the sector's inflection point.

"India's dairy industry is standing on a moral edge. This is not just about balancing costs, but about deciding what kind of promise we are willing to make to Indian families. When milk becomes expensive, it should never become untrustworthy or unavailable."

He emphasised that resilience and recovery in dairy would come not from cost-cutting, but from rebuilding **trust** through **transparency, consistency** and **unwavering quality standards.**

"Consumers no longer trust brands by default. Trust must be earned, test by test, day by day."

Navigating the Farmer–Consumer Balance

India's dairy economy sits at a crucial intersection. On one side are millions of **smallholder dairy farmers** whose livelihoods depend on regular and fair payments. On the other are **consumers across income groups** for whom dairy is a dietary necessity.

As milk procurement prices rise to protect farmer incomes, the challenge is to avoid pricing vulnerable consumers out of the market. For many processors, this balancing act is becoming increasingly difficult, leading to **SKU rationalisation, controlled price pass-throughs** and an accelerated move towards **premiumised but affordable value-added formats.**

Some cooperatives are also testing models that share value more equitably across the chain, including **direct farmer payments, milk quality bonuses and community-based chilling centres** that reduce spoilage and improve traceability.

Tackling Quality and Adulteration: No Longer Optional

Consumer concerns around **milk adulteration, hormone use,** and **cold chain failures** continue to challenge the credibility of the sector. But the current moment has catalysed a significant shift.

Larger dairies and cooperatives are investing in:

- **End-to-end digital traceability**

- **Batch-wise quality data reporting**
- **Food safety certifications**
- **RFID-based cattle health tracking**
- **Retail labelling that details nutritional content and origin**

These steps are not just good governance — they are critical for regaining consumer trust and aligning with evolving regulatory standards.

Insights from the Field: A National Mission in the Making

During our recent travels across India's key milk-producing belts, we witnessed innovations that reflect the grit and adaptability of local stakeholders.

In **Tamil Nadu**, community-led milk processing units were successfully supplying flavoured milk to school nutrition programmes. In **Punjab**, private players were trialling high-protein paneer fortified with calcium and vitamin D. In **Maharashtra,** we saw rural cold chain pilots improving shelf life and reducing dependency on seasonal procurement peaks.

Each of these cases represents not just business innovation, but a reorientation towards **dairy as a public good.**

Conclusion: From Commodity to Commitment

India's dairy sector, the largest in the world by volume, is standing at a crossroads. The decisions taken now — regarding product portfolios, quality standards, farmer engagement and consumer communication — will determine whether the industry evolves into a **nutrition-first, trust-led model,** or remains vulnerable to cyclical shocks.

This is the time to treat dairy as a **social and nutritional contract,** not just a commercial venture. The processors, cooperatives and policymakers who rise to this challenge — and invest in **integrity, innovation and inclusion** — will shape not just the future of Indian dairy, but the health and livelihoods of millions.

As Prashant said:

"If we treat milk as more than a transaction — if we treat it as a promise — then we will build a dairy future that is good for the farmer, fair for the consumer and strong for the country."

Pran Dairy launches 'khanti khamari sammanona 2026' campaign

Leading local liquid milk brand PRAN Dairy has launched a nationwide initiative to recognise dairy farmers who have made outstanding contributions to the country's dairy sector.

The campaign, titled "PRAN Dairy Khanti Khamari Sammanona 2026", was formally unveiled on Tuesday at the Bangladesh-China Friendship Conference Centre in the capital.

The initiative aims to acknowledge the dedication, hard work and contribution of grassroots dairy farmers who play a vital role in the development of the dairy industry. It also seeks to highlight their inspirational stories to encourage broader participation in sustainable dairy farming.

At the launch event, the honour crest of PRAN Dairy Khanti Khamari Sammanona 2026 was unveiled by PRAN Group Managing Director Iliaz Mirdha.

It was announced that registration will begin from 1 February across 124 rural milk collection centres of PRAN Dairy located in Pabna, Rangpur, Sirajganj, Bogura, Satkhira, Khulna, Jashore, Magura, Kurigram and Natore. Around 16,000 enlisted dairy farmers of PRAN Dairy will be able to register by submitting the required information through the registration process.

In the second phase, submitted information will be verified and evaluated by a special jury board comprising representatives from relevant sectors. From this process, ten "Khanti Khamari" (authentic dairy farmers) will be shortlisted. In the final phase, based on jury scores and public voting, three top dairy farmers will be selected.

The three winners will receive honour crests and cash awards worth Tk1 lakh each, while the remaining seven finalists will receive special recognition.

Speaking at the event, Iliaz Mirdha said, "Our primary objective through this campaign is to honour

and inspire the authentic dairy farmers who have made exceptional contributions to the dairy sector. At the same time, we want to showcase their stories so that others are encouraged to engage in dairy farming. Another key objective is to reaffirm PRAN Dairy's commitment to delivering safe and quality milk to consumers."

PRAN Dairy Chief Operating Officer Maksudur Rahman said PRAN Dairy has been standing beside dairy farmers across the country for more than two decades. He said farmers have benefited from fair pricing, training, veterinary services and other forms of support, leading to positive changes in their livelihoods.

Senior General Manager (Marketing) of PRAN Md Ali Hasan, Head of Marketing of PRAN Dairy Syed Mustayeen Qader, Brand Manager Fazle Elahi Nayeem, and other senior officials of the organisation were also present at the event.

The Indian dairy industry is calling for GST rationalization and further policy support as the 2026 Union Budget approaches. Industry leaders emphasize the need for reduced cost pressures and incentives for value-added products.

The dairy industry in India is at the forefront of discussions as the Union Budget 2026 approaches. As a vital component of India's food security and a significant part of the rural economy, the sector not only supports millions of farmers but also integrates into the broader fast-moving consumer goods (FMCG) value chain.

Industry leaders have acknowledged the government's efforts in providing GST relief but argue for further rationalization. Essential inputs such as packaging materials, refrigeration equipment, animal feed, and veterinary services continue to experience cost pressures. Dr. K Rathnam, CEO of Milky Mist Dairy Food Limited, highlighted the budget as a chance to accelerate growth within the sector by rationalizing GST on key inputs, which would alleviate rising costs and improve efficiency across the value chain.

Dr. Rathnam also pointed out the necessity for incentives to promote value-added dairy products and advancements in automation, quality testing, and sustainability initiatives. These measures, he argued, are vital for organized players to scale in line with global standards.

The broader FMCG sector, which includes dairy, remains focused on consumption-driven growth. While GST reforms have eased compliance, high tax rates on large mass-consumption categories continue to be a concern. Sudhir Sitapati, CEO of Godrej Consumer Products Limited, indicated that moving certain high-volume categories to a lower tax slab could stimulate demand.

Infrastructure and logistics also pose challenges for the dairy sector. Inadequate cold chain infrastructure limits the market penetration of dairy products, particularly in rural areas. Experts suggest the establishment of a dedicated Rural FMCG Infrastructure Fund, which could improve last-mile connectivity and reduce wastage through enhanced cold storage facilities.

India's retail and consumer sector is expanding rapidly, projected to grow from USD 1.06 trillion in 2024 to USD 1.93 trillion by 2030, according to Deloitte. This growth provides opportunities for dairy and food FMCG players to scale both locally and globally.

Union Budget 2026: Dairy sector expects further GST rationalisation,

infrastructure upgradation and more

Dairy sector in India: The Indian dairy sector has witnessed significant growth over the past decade, especially with India ranking first in global milk production and contributing nearly a quarter of the world's supply, according to a press information bureau report.

Its total milk production grew 3.58% year-on-year (YoY) to an estimated 247.87 million tonnes during 2024-25, compared to 239.30 million tonnes it logged in 2023-24.

Furthermore, dairy is the largest agricultural product in India, contributing 5% to the national economy and directly employing more than 8 crore farmers.

"The dairy sector is a cornerstone of India's food security and rural economy, directly supporting millions of farmers and allied livelihoods," said Dr. K. Rathnam, Whole Time Director & CEO, Milky Mist Dairy Food Ltd., adding that the Union Budget 2026 presents a timely opportunity to "accelerate the next phase of growth for this vital sector."

He stated that overall, the industry expects a balanced and forward-looking Budget that would strengthen farmer incomes, upgrade infrastructure, and enable organised dairy players to scale sustainably.

Rathnam added that it would "create long-term value for the sector and reinforce India's position as one of the world's leading dairy economies."

Key expectations for Budget 2026

- Rathnam stated that the sector will welcome the government's continued support on the GST front, and added that there is a scope for further rationalisation of key inputs such as packaging materials, refrigeration equipment, animal feed, and veterinary services. He added that GST rationalisation on this front would go a long way in easing rising cost pressures and improving overall efficiency across the value chain.
- He said that the industry expects a strong policy push towards strengthening cold-chain infrastructure, adding that it is critical.
- Rathnam highlighted that enhanced capital subsidies, interest subvention schemes and easier access to long-term credit will help bridge the existing infrastructure gaps, reduce wastage and improve milk quality, especially in hinterland regions.
- He highlighted that incentives for both dairy companies and farmers would be equally important, stating that initiatives focused on productivity enhancements, fodder development, animal health, affordable cattle insurance and cold-chain logistics could significantly improve farmer incomes while ensuring consistency in supply.
- "From an industry standpoint, incentives for value-added dairy products, automation, advanced quality-testing laboratories and sustainability initiatives will encourage private players to invest in modern, scalable capacity aligned with global standards," Dr. K. Rathnam said.
- According to an EY report, it expects promotions of dairy, fisheries, and livestock sectors for income diversification.

Dairy sector allocations in Budget 2025

In the Union Budget 2025-26, the government allocated ₹7,544 crore to the Ministry of Fisheries, Animal Husbandry, and Dairying, which constituted about 0.15% of the total government expenditure, according to the Indian Dairy Association.

More specifically, the Department of Animal Husbandry and Dairying received an allocation of ₹4,840.40 crore, in comparison to ₹4,521.24 crore in Budget 2024.

The government allocated ₹1,790 crore towards the National Programme for Dairy Development (NPDD). Furthermore, it allocated ₹460 crore towards the infrastructure development fund.

Editorial Calendar 2026

Publishing Month:
January
Article Deadline :
18th, Dec. 2025
Advertising Deadline :
20th, Dec. 2025
Focus :
Opportunities and Challenges

Publishing Month:
February
Article Deadline :
18th, Jan. 2026
Advertising Deadline :
20th, Jan. 2026
Focus :
Budget

Publishing Month:
March
Article Deadline :
18th, Feb. 2026
Advertising Deadline :
20th, Feb. 2026
Focus :
Summer Stress Management

Publishing Month:
April
Article Deadline :
18th, March 2026
Advertising Deadline :
20th, March 2026
Focus :
Cold Chain

Publishing Month:
May
Article Deadline :
18th, April 2026
Advertising Deadline :
20th, April 2026
Focus :
Nutrition

Publishing Month:
June
Article Deadline :
18th, May 2026
Advertising Deadline :
20th, May 2026
Focus :
Milk - Production & Preservation

Publishing Month:
July
Article Deadline :
18th, June 2026
Advertising Deadline :
20th, June 2026
Focus :
Monsoon Management

Publishing Month:
August
Article Deadline :
18th, July 2026
Advertising Deadline :
20th, July 2026
Focus :
Sustainability

Publishing Month:
September
Article Deadline :
18th, August 2026
Advertising Deadline :
20th, August 2026
Focus :
Processing & Packaging

Publishing Month:
October
Article Deadline :
18th, September 2026
Advertising Deadline :
20th, September 2026
Focus :
Disease Prevention

Publishing Month:
November
Article Deadline :
18th, October 2026
Advertising Deadline :
20th, October 2026
Focus :
Biosecurity

Publishing Month:
December
Article Deadline :
18th, November 2026
Advertising Deadline :
20th, November 2026
Focus :
Winter Stress

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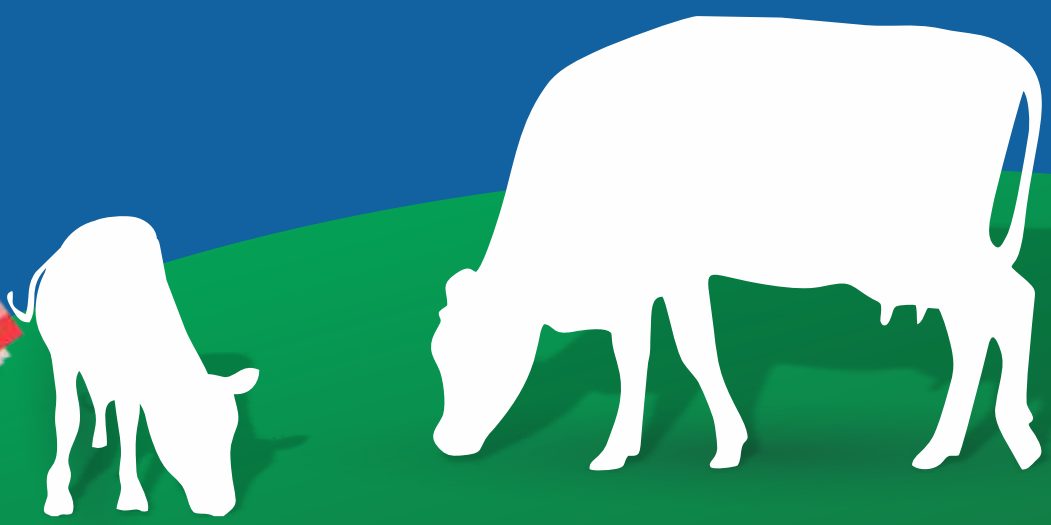

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