

DAIRY PLANNER

HARBIL/2004/22481

Title Code HARBIL00698

Vol. 23 | No.10 | October - 2026

DRIVING DAIRY FORWARD

INNOVATION | SUSTAINABILITY
GROWTH



MARKET INSIGHTS

Trends, Prices &
Opportunities



TECHNOLOGY

Smarter Farms
Better Yields



TOMORROW'S DAIRY

A Healthier Planet
A Stronger Industry



HEALTHY
ANIMALS



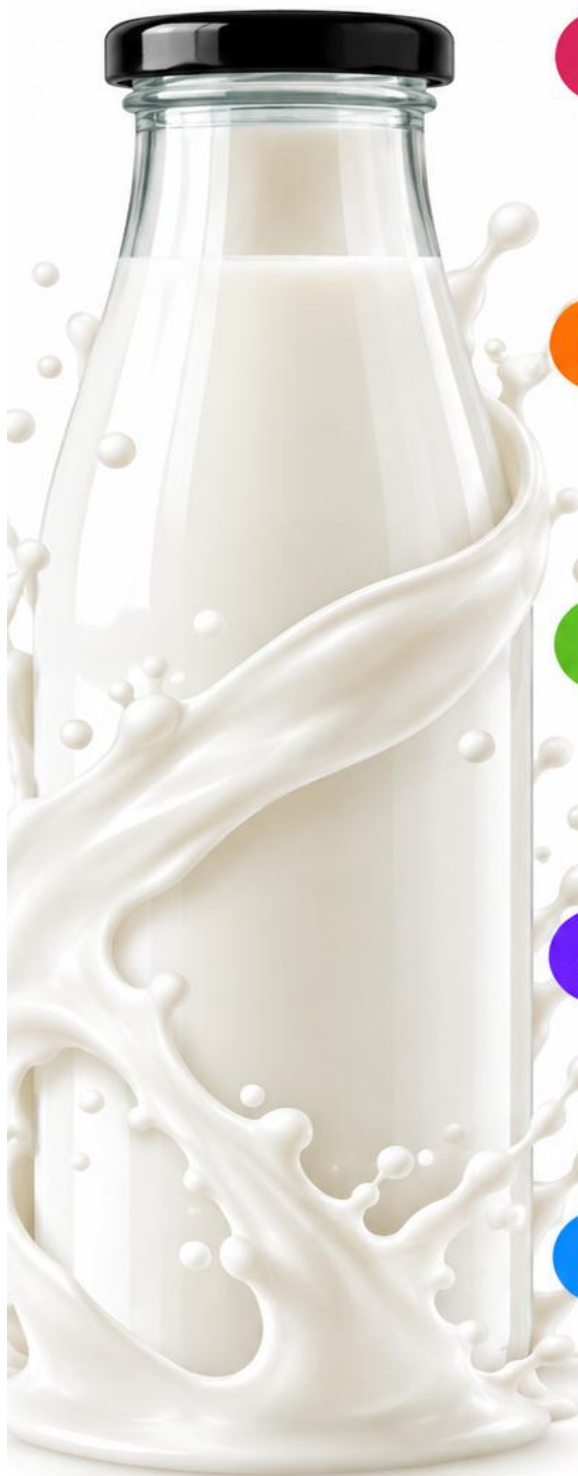
PROFITABLE
FARMS



SUSTAINABLE
FUTURE

HEALTH

Benefits Of A2 Milk



1



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.

2



Healthy Bones



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

3



Weight Loss



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

4



Reduce Stress



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

5



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.

Happy cow Plus milk

4 Benefits

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

2 Goals

1. More Milk
2. More Profit !!!



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



From the Pen of Chief Editor



The Changing Dairy Sector and New Opportunities

The Indian dairy sector is passing through an important phase of transformation. Dairy farming plays a vital role in the rural economy and remains a major source of regular income for millions of farming families. Rising population, changing lifestyles, and growing demand for nutritious and high-quality food products are creating new opportunities for the dairy industry. However, these opportunities are accompanied by growing challenges. Rising costs of animal feed and fodder, climate change, livestock diseases, shortage of farm labour, and increasing consumer expectations regarding milk quality are placing new pressures on dairy farmers. In such a scenario, adopting scientific practices, modern technology, and efficient farm management has become more important than ever. Balanced animal nutrition, better breed management, timely vaccination, effective reproductive management, hygienic milk production, and regular animal health check-ups can significantly improve productivity and farmers' income. At the same time, scientific cultivation of green fodder, efficient water management, and the conversion of cattle dung into organic manure and renewable energy can make dairy farming more sustainable and environmentally friendly. Digital technology is also transforming the future of dairy farming. Livestock monitoring, digital record-keeping, precision feeding, milk quality testing, and data-driven management are helping farmers make more accurate and timely decisions. The objective of Dairy Planner is to provide farmers, livestock owners, veterinarians, nutrition experts, and dairy entrepreneurs with reliable information, the latest technical knowledge, and practical solutions. We believe that the future of Indian dairy farming lies not merely in producing more milk, but in achieving better quality, greater profitability, healthier livestock, and sustainable production systems. This approach will help make Indian dairy farming more self-reliant, competitive, and prepared for the future.

Vishal

OUR TEAM

Vishal Rai Gupta
Editor-In-Chief
vishal@pixie.co.in

Siddhi Gupta
Co-Editor
siddhi@pixie.co.in
editor.pcsi@gmail.com

Website: www.pixie.co.in

Designed by Aditya Kumar

EDITORIAL BOARD MEMBER

Dr. J. Tamizhkumaran
M.V.Sc., PGDEP, Ph.D.
(Ph. D in Veterinary & Animal
Husbandry Extension Education)
Dr. Anjali Aggarwal
Principal Scientist
Dr. Sanjay K. Latkar
Alembic Pharmaceuticals Ltd
Dr. Amitav Bhattacharyya:
Professor
DUVASU (Uttar Pradesh)

Dr. Manisha Singodia
(MVSC Veterinary Science, Jaipur)
Dr. Annanda Das
(Ph. D Scholar, WBIAFS, Kolkata)
Dr. M. Arul Prakash Ph.D
(Assistant Professor, TANUVAS)
Dr. B.L. Saini
(Ph. D IVRI, Izatnagar)
Dr. Uma Kant Verma
Assistant Professor
BUAT, Banda-210001 (U. P.)

Dr. Bilawal Singh
(MVSC, Assistant Professor
Ludhiana)
Dr. M.S. Mahesh
Asst. Prof. (Animal Nutrition)
Banaras Hindu University
Dr. Swarup Debroy
Assistant Professor
College of Veterinary and
Animal Sciences
BUAT, Banda-210001 (U. P.)

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

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

Editorial & Advertisements may not be reproduced without the written consent of the publishers. Whilst every care is taken to ensure the accuracy of the contents of **Dairy Planner**. The publishers do not accept any responsibility or liability for the material herein.

Publication of news, views and information is in the interest of positive Dairy industrial development in India. It does not imply publisher's endorsement. Unpublished material of industrial interest, not submitted elsewhere, is invited.

The Submitted material will not be returned.

Publisher, Printer : **Mr. Vishal Gupta** on Behalf of **Pixie Expomedia Pvt. Ltd.** Karnal.

Printed at : Jaiswal Printing Press, Railway Road, Karnal - 132001, Haryana.

Published at : Omang Complex, Namastey Chowk, Karnal - 132001, Haryana.

Editor-In-Chief : Mr. Vishal Rai Gupta

All Legal matters are subject to Karnal.

Office:
Pixie Publication
Omang Complex, Namastey Chowk, Karnal - 132 001



ADVERTISEMENT



3

Editorial	4
Content	5
News	30
Editorial Calender	31
Subscription Form	31

ARTICLE

Page
6

Antimicrobial Resistance and One Health

*Varsha Jain¹,
Veterinary Assistant, Surgeon at Livestock
Development Department of Chhattisgarh

Page
9

Healthy Herd, Healthy Farm: Principles of Disease Prevention in Dairy Animals

Bhavana Singh Malhotra,
Internship Students, Khalsa College of
Veterinary and Animal Sciences,
Amritsar

Page
13

Smart Farming in the Livestock Sector : A Practical Guide for Indian Farmers

Dr. Megha Verma M.V.Sc. (Livestock Production
and Management), ICAR-Indian Veterinary
Research Institute, Izatnagar, Bareilly,
Uttar Pradesh – 243122

Page
16

A understanding the difference between Milk Allergy and Lactose Intolerance

Vandana Chaudhary
Assistant Professor, College of Dairy Science and Technology,
LUVAS, Hisar

Page
18

Dorb In Cattle Feed : Why Balance Matters In The Dairy Ration

Ankit Bansal
Director
Business Development, Rudrapur Solvents Private Limited

Page
20

Indigenous Cattle Breeds of India: Heritage, Potential and Sustainable Future

Swarup Debroy, Assistant Professor,
Veterinary Anatomy & Histology, CoVAS, Banda
University of Agriculture and Technology, Banda.

Page
24

EL NINO and its Potential Impact on Livestock

KAPILAN, P., Final year B.V.Sc. & A.H. student,
Arawali Veterinary College,
Sikar, Rajasthan

Page
27

Future-Ready Dairy Farms: Precision Tools and Climate-Smart Housing

Dr. Megha Verma M.V.Sc. (Livestock Production
and Management), ICAR-Indian Veterinary
Research Institute, Izatnagar, Bareilly,
Uttar Pradesh – 243122





Antimicrobial Resistance and One Health

Antimicrobial Resistance and One Health: An Integrated Approach to a Global Health Threat



***Varsha Jain¹**, Kamalesh Ejardar², Rani Soni³, Vivek Naik¹, Roopa Jaiswal⁴

¹Veterinary Assistant Surgeon at Livestock

Development Department of Chhattisgarh

²Demonstrator in Pharmacology Department at

Late Baliram Kashyap Memorial Government

Medical College, Jagdalpur, Chhattisgarh

³Scientist-B in Microbiology Department at Late

Baliram Kashyap Memorial Government Medical

College, Jagdalpur, Chhattisgarh

⁴UG student at College of Veterinary Science & A.H.,

DSVCKV, Anjora, Durg, Chhattisgarh

Abstract

Antimicrobial resistance (AMR) has emerged as one of the greatest threats to global health in the 21st century. The increasing inability of antimicrobial agents to effectively treat infections compromises human and animal health, food security, and economic development. AMR is not confined to hospitals or human medicine; it is a complex problem involving humans, animals, plants, and the environment. The One Health approach recognizes the interconnectedness of these sectors and promotes multidisciplinary collaboration to address AMR comprehensively. This article reviews the causes, transmission pathways, public health implications, and control strategies of AMR within the framework of One Health. Strengthening antimicrobial stewardship, surveillance, infection prevention, environmental management, and intersectoral cooperation is essential to mitigate the growing threat of antimicrobial resistance.

Keywords: Antimicrobial Resistance, One Health, Antibiotic Stewardship, Public Health, Veterinary Medicine, Environment

Introduction

Antimicrobials, particularly antibiotics, have revolutionized modern medicine by effectively treating bacterial infections and reducing mortality. However,

their widespread and often inappropriate use has accelerated the emergence of antimicrobial resistance (AMR), a phenomenon in which microorganisms develop the ability to survive exposure to antimicrobial agents that previously inhibited or killed them (WHO, 2015). The World Health Organization (WHO) identifies AMR as one of the top ten global public health threats. Resistant infections lead to prolonged illness, increased mortality, longer hospital stays, and substantial economic losses. It is estimated that if current trends continue, AMR could cause up to 10 million deaths annually worldwide by 2050 (O'Neill, 2016). Because resistant microorganisms circulate among humans, animals, food systems, and environmental reservoirs, AMR exemplifies the need for a One Health approach, which integrates human, animal, and environmental health disciplines to achieve optimal health outcomes.

The One Health Concept

The One Health concept is based on the recognition that the health of humans, animals, and ecosystems is closely interconnected. The roots of One Health can be traced to the work of Rudolf Virchow, who introduced the concept of zoonoses, and Calvin Schwabe, who promoted the idea of "One Medicine" linking human and veterinary medicine. Today, One Health has evolved into a collaborative, multisectoral, and transdisciplinary approach involving physicians, veterinarians, microbiologists, environmental scientists, policymakers, and public health professionals. This framework is particularly important for addressing AMR because resistant organisms and resistance genes move freely across human, animal, and environmental interfaces.

Antimicrobial Resistance: A Global Challenge

AMR develops naturally through microbial evolution but is accelerated by excessive and inappropriate antimicrobial use. Factors contributing to AMR include:

1. Over-prescription and misuse of antibiotics in human medicine.
2. Use of antibiotics for growth promotion and disease prevention in livestock.
3. Inadequate infection prevention and control measures.
4. Poor sanitation and hygiene.
5. Environmental contamination with antimicrobial residues.
6. Lack of effective surveillance and regulatory enforcement.

Under antimicrobial selection pressure, bacteria acquire resistance genes through mutations or horizontal gene transfer mechanisms such as plasmids,

transposons, and integrons. These resistance determinants can spread rapidly among bacterial populations across different ecosystems.

AMR in Human Health

In human medicine, inappropriate prescribing practices, self-medication, and incomplete treatment courses contribute significantly to resistance development. Common resistant pathogens include:

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Extended-spectrum β -lactamase (ESBL)-producing *Escherichia coli*

- Carbapenem-resistant Enterobacteriaceae (CRE)
- Multidrug-resistant *Mycobacterium tuberculosis*

These infections are associated with increased morbidity, mortality and healthcare costs. The emergence of resistance to last-resort antibiotics such as colistin and carbapenems poses a major challenge to modern healthcare.

AMR in Animal Health

Antimicrobials are widely used in livestock, poultry, aquaculture, and companion animals for therapeutic, prophylactic, and growth-promotion purposes. In many regions, the quantity of antimicrobials used in food-producing animals exceeds that used in humans. The extensive use of antibiotics in animal production creates selective pressure favoring resistant bacteria. These organisms can spread to humans through:

- Direct animal contact
 - Consumption of contaminated food products
 - Environmental pathways involving water and soil
- Examples include resistant strains of *Salmonella*, *Campylobacter*, *Enterococcus*, and *E. coli* originating from food animals.

Environmental Dimensions of AMR

The environment serves as a major reservoir and transmission route for antimicrobial resistance. Antibiotics, resistant bacteria, and resistance genes enter environmental ecosystems through:

- Hospital wastewater
- Pharmaceutical industry effluents
- Agricultural runoff
- Animal manure
- Aquaculture systems

Many antimicrobials are excreted unchanged and

persist in soil and aquatic environments, creating selective pressure that promotes the survival and dissemination of resistant microorganisms. Environmental contamination facilitates the exchange of resistance genes among environmental, animal, and human-associated bacteria, further complicating AMR control efforts.

Transmission Pathways within the One Health Framework

The spread of antimicrobial resistance occurs through interconnected pathways:

Human-Animal Interface

- Occupational exposure among farmers, veterinarians, and animal handlers.
- Transmission of resistant pathogens through food chains.

Animal-Environment Interface

- Release of resistant bacteria through animal waste.
- Contamination of soil and water sources.

Environment-Human Interface

- Exposure through drinking water, recreational water, and contaminated produce.
- Dissemination of resistance genes through environmental microbial communities.

These interconnected pathways highlight the necessity of coordinated interventions across all sectors.

Global Initiatives to Combat AMR

Recognizing the global nature of AMR, international organizations including the World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the World Organisation for Animal Health (WOAH, formerly OIE) have developed coordinated strategies.

Major initiatives include:

WHO Global Action Plan on AMR (2015)

The plan aims to:

1. Improve awareness and understanding of AMR.
2. Strengthen surveillance and research.
3. Reduce infection incidence.
4. Optimize antimicrobial use.
5. Promote sustainable investment in new medicines and diagnostics.

Global Antimicrobial Resistance Surveillance System (GLASS)

GLASS facilitates standardized collection and analysis of AMR data worldwide, supporting evidence-based policy decisions.

World Antimicrobial Awareness Week

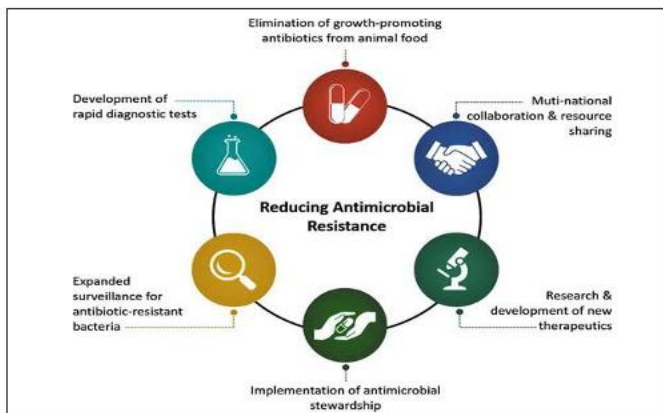
This annual campaign promotes responsible antimicrobial use among healthcare professionals, veterinarians, policymakers, and the public.

One Health Strategies for Controlling AMR

1. Antimicrobial Stewardship: Prudent and evidence-based antimicrobial use should be promoted in both human and veterinary medicine. Antibiotics should only be used when necessary and under professional guidance.

2. Strengthening Surveillance: Integrated surveillance systems should monitor:

- Antimicrobial consumption



- Resistance patterns
- Environmental contamination across human, animal, and environmental sectors.

3. Infection Prevention and Biosecurity: Improved hygiene, vaccination, sanitation, and biosecurity measures can reduce infection rates and decrease the need for antimicrobial use.

4. Environmental Management: Proper treatment of wastewater and responsible disposal of pharmaceutical waste can reduce environmental contamination.

5. Research and Innovation: Investment is needed in:

- Novel antimicrobials
- Vaccines
- Rapid diagnostic tests
- Alternative therapies such as bacteriophages and probiotics

6. Role of Diagnostics: Early and accurate diagnosis is essential for appropriate antimicrobial use. Rapid diagnostic tests, culture and antimicrobial susceptibility testing (AST), and molecular diagnostic techniques help to identify pathogens and resistance patterns, thereby reducing unnecessary antibiotic use and supporting antimicrobial stewardship.

7. Public Education and Awareness: Educating healthcare providers, farmers, and the public about responsible antimicrobial use is critical for long-term AMR control.

8. future challenges:

- Antibiotics are still used too often in people, animals, and agriculture.
- Limited surveillance makes it hard to identify and control resistance trends.
- Antibiotic residues in the environment may contribute to the spread of resistance.
- The development of new antimicrobial drugs remains slow.



- Climate change and increased movement of people can support the spread of resistant microbes.
- Better cooperation among health, veterinary, and environmental sectors is still needed.

Conclusion

Antimicrobial resistance is a multifaceted global challenge that transcends traditional disciplinary boundaries. The interconnected nature of human, animal, and environmental health makes the One Health approach essential for addressing AMR effectively. Coordinated action involving antimicrobial stewardship, surveillance, infection prevention, environmental protection, and international collaboration is necessary to preserve the effectiveness of existing antimicrobials and safeguard global health. Success in combating AMR will depend on sustained commitment from governments, healthcare professionals, veterinarians, researchers, industry stakeholders, and communities worldwide.

References

1. World Health Organization (WHO). *Global Action Plan on Antimicrobial Resistance*. Geneva: WHO; 2015.
2. Velazquez-Meza ME, Galarde-López M, Carrillo-Quiróz B, Alpuche-Aranda CM. Antimicrobial resistance: One Health approach. *Veterinary World*. 2022;15(3):743–749.
3. Collignon PJ, McEwen SA. One Health—Its importance in helping to better control antimicrobial resistance. *Tropical Medicine and Infectious Disease*. 2019;4(1):22.
4. O'Neill J. *Tackling Drug-Resistant Infections Globally: Final Report and Recommendations*. Review on Antimicrobial Resistance; 2016.
5. Laxminarayan R, Duse A, Wattal C, et al. Antibiotic resistance—The need for global solutions. *Lancet Infectious Diseases*. 2013;13(12):1057–1098.
6. Van Boeckel TP, Brower C, Gilbert M, et al. Global trends in antimicrobial use in food animals. *Proceedings of the National Academy of Sciences*. 2015;112(18):5649–5654.
7. Queenan K, Häsler B, Rushton J. A One Health approach to antimicrobial resistance surveillance. *International Journal of Antimicrobial Agents*. 2016;48(4):422–427.
8. WHO. *Antimicrobial Resistance: Global Report on Surveillance*. Geneva: World Health Organization; 2014.
9. FAO. *Drivers, Dynamics and Epidemiology of Antimicrobial Resistance in Animal Production*. Rome: Food and Agriculture Organization; 2016.
10. Kimani T, Kiambi S, Eckford S, et al. Expanding beyond zoonoses: The benefits of a national One Health coordination mechanism to address antimicrobial resistance. *Revue Scientifique et Technique*. 2019;38(1):155–171.



Healthy Herd, Healthy Farm: Principles of Disease Prevention in Dairy Animals



**Bhavana Singh Malhotra¹,
Gagandeep² and
Simran Jeet Singh³**

^{1,2} Internship Students, Khalsa
College of Veterinary and
Animal Sciences, Amritsar ³
Assistant Professor, Veterinary
Medicine, Khalsa College of
Veterinary and Animal
Sciences, Amritsar

Dairy animals such as cattle and buffaloes play an important role in providing milk, income, employment, and livelihood to farmers. Maintaining good health of dairy animals is essential for obtaining optimum milk production, reproductive efficiency, and economic returns. However, dairy animals are exposed to various infectious and non-infectious diseases throughout their productive life. Diseases such as mastitis, foot-and-mouth disease, haemorrhagic septicaemia, black quarter, brucellosis, lumpy skin disease, parasitic infections, respiratory diseases, diarrhoea, milk fever, ketosis, and reproductive disorders can cause significant economic losses to dairy farmers. These losses occur due to reduced milk production, infertility, abortion, increased treatment costs, mortality, and premature culling. Therefore, disease prevention is an important part of successful dairy farming. Preventive healthcare is generally more economical and effective than treating an established disease. A successful disease-prevention programme should include proper housing, hygiene, balanced nutrition, vaccination, biosecurity, parasite control, proper milking practices, reproductive management, calf care, regular health monitoring, and responsible use of medicines.

1) Proper housing and farm sanitation are among the most important measures for

preventing diseases in dairy animals. The animal shed should be clean, dry, well ventilated, and spacious enough to allow animals to move comfortably. Overcrowding should be avoided because it increases stress and facilitates the transmission of infectious diseases. The floor should be properly constructed and have adequate drainage so that urine, faeces, and wastewater do not accumulate. Wet and dirty floors provide favourable conditions for the multiplication of microorganisms and can increase the occurrence of mastitis, foot rot, and other infections. Manure should be removed regularly, preferably every day, and the shed should be disinfected periodically using suitable disinfectants.

2) Adequate and balanced nutrition is another important factor in disease prevention. Dairy animals require sufficient energy, protein, minerals, vitamins, fibre, and water to maintain normal body functions and immunity. Nutritional deficiencies can weaken the immune system and make animals more susceptible to infectious diseases. Minerals and vitamins such as calcium, phosphorus, copper, zinc, selenium, vitamins A and E have important roles in maintaining health and immunity. Special attention should be given to animals during late pregnancy and the transition period around calving because nutritional requirements

change considerably during this period. Sudden changes in the ration should be avoided, and concentrate feed should be introduced gradually. Proper feeding management also helps prevent metabolic disorders such as ketosis, milk fever, and ruminal disturbances. Negative energy balance in early lactation happens when cow's daily energy requirement for maintenance and high milk production is greater than energy the animal is taken from feed. So, supplements like propylene glycol, molasses or protected fats added to diet to boost dietary energy. Clean and fresh drinking water should be available throughout the day.

3) Vaccination is one of the most effective methods of preventing important infectious diseases in dairy animals. A suitable vaccination programme should be prepared according to the recommendations of veterinary authorities, local disease prevalence, the age and physiological status of the animals. Vaccines may be used against diseases such as foot-and-mouth disease, haemorrhagic septicaemia, black quarter, brucellosis, and lumpy skin disease, etc. Vaccines should be stored and handled properly, and the cold chain should be maintained to preserve their effectiveness. Vaccination should be performed by trained personnel or under veterinary supervision. Farmers should maintain proper records containing the animal identification number, vaccine administered, date of vaccination, and next due date. Regular vaccination

significantly reduces the risk of outbreaks and protects not only individual animals but also the entire herd.

4) Biosecurity is another essential component of disease prevention. It includes all measures taken to prevent the introduction and spread of disease-causing organisms on a farm. Newly purchased animals should not be immediately mixed with the existing herd. They should be kept separately for an appropriate quarantine period and examined by a veterinarian. Where necessary, they should be tested for important diseases before being introduced into the herd. Visitors should have limited access to animal areas, particularly during disease outbreaks. Farm workers should maintain personal hygiene and avoid moving directly between healthy and sick animals without cleaning and disinfecting footwear, clothing, and equipment. Equipment such as buckets, ropes, grooming tools, and feeding utensils should not be unnecessarily shared between farms. Dead animals should be disposed of safely according to veterinary and local regulations because improper disposal can contaminate the environment and spread infection.

5) Regular parasite control - Parasites can significantly affect the health and productivity of dairy animals. Internal parasites such as gastrointestinal worms can cause weight loss, anaemia, diarrhoea, poor growth, reduced milk production, and general weakness. External parasites such as ticks, lice,

mites, and flies can cause skin irritation, blood loss, stress, and transmission of infectious diseases. Control of rodents, flies, mosquitoes, ticks, and other insects is also important because they may act as mechanical or biological vectors of diseases. Feed stores should be protected from rodents, and spilled feed should be cleaned immediately. Manure should be removed regularly to reduce fly breeding. Standing water should be eliminated wherever possible to reduce mosquito breeding. Parasite control should be based on veterinary advice, local parasite prevalence, and, where appropriate, diagnostic testing. Keeping feed troughs raised above the ground can reduce contamination with faeces and consequently reduce the ingestion of infective parasite stages. To effectively control parasites and prevent disease in dairy animals, combine routine internal deworming with strict external pest management should be done. Administration of veterinary-approved dewormers to eliminate internal worms and flukes, ensuring you strictly follow milk withdrawal periods. Concurrently, control external ticks, lice, and flies using pour-on ascaricides, sprays, and regular shed disinfection to prevent the transmission of fatal blood-borne diseases. Utilization of rotational grazing to stop pasture reinfection and rotate chemical classes to prevent drug resistance. Using flame guns is a highly effective, non-chemical method for controlling parasites and their eggs in agricultural, livestock,

and kennel environments. Direct heat destroys the protective protein shells of parasite eggs and larvae that chemicals often cannot penetrate.

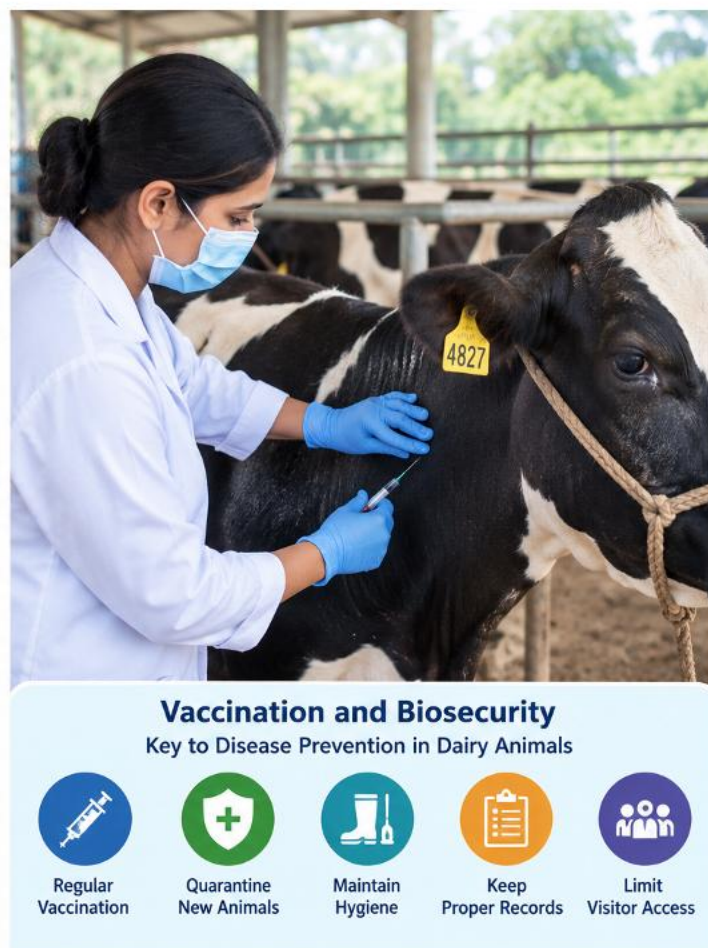
6) Control of Reproductive Diseases - Reproductive health is also closely associated with disease prevention in dairy herds. Reproductive diseases may cause infertility, repeat breeding, abortion, retained placenta, uterine infections, and prolonged calving intervals, leading to considerable economic losses. Artificial insemination should be performed hygienically by trained personnel at the appropriate time. Diseases such as brucellosis are particularly important because

they can cause abortion and reproductive losses and may also have zoonotic significance. Aborted foetus, placental tissues, and contaminated materials should be handled and disposed of safely to prevent transmission of infection. Cleanliness during calving and obstetrical procedures is essential to reduce reproductive tract infections. Provide enough space for cows to move and exercise freely instead of overcrowding sheds. Maintain a balanced diet with proper energy levels to avoid a negative energy balance.

7) Isolation of Sick Animals - Regular observation and early detection of disease can greatly reduce losses. Farmers

should observe animals every day and look for changes in appetite, milk production, body temperature, behaviour, respiration, faecal consistency, gait, and udder condition. Sick animals should be separated from healthy animals, when an infectious disease is suspected. A separate isolation area is useful on larger farms. Equipment used for sick animals should be cleaned and disinfected before being used for healthy animals.

8) Proper Calf Management - Calf management should also receive special attention because young calves are highly susceptible to infectious diseases, particularly diarrhoea and respiratory infections. The newborn calf



should receive adequate good-quality colostrum as soon as possible after birth to obtain essential maternal antibodies. Navel should be disinfected appropriately, and calves should be housed in clean, dry, well-ventilated areas protected from extreme weather. Overcrowding should be avoided and calves should be provided with adequate nutrition and clean drinking water. Good calf management reduces mortality and improves growth, future reproductive performance, and lifetime productivity.

9) Proper Animal Handling -

Proper handling of dairy animals is important for maintaining both health and welfare. Animals should be handled calmly and without unnecessary beating, shouting, or other stressful practices. Excessive stress can negatively affect immunity, production, and reproductive performance. Rough handling of animals causes cuts, scrapes, and bruises. Germs enter through these broken areas, leading to skin infections or severe conditions like Tetanus.

10) Regular veterinary health check-ups

are essential for maintaining herd health. A veterinarian can identify diseases at an early stage and recommend appropriate vaccination, parasite-control, nutritional, reproductive, and biosecurity programmes. Farmers should seek veterinary assistance when animals show persistent

fever, severe diarrhoea, respiratory distress, sudden reduction in milk production, abortion, severe lameness, inability to stand, or other unusual clinical signs. Regular health examinations are particularly valuable for high-producing animals, pregnant animals, newborn calves, and animals with a history of recurrent disease.

11) Record Keeping and Farm Monitoring - Proper record keeping helps farmers monitor the health and productivity of their herd. Records should include animal identification, vaccination dates, deworming, diseases, treatments, reproductive events, calving dates, milk production, laboratory test results, and medication withdrawal periods. Such records allow farmers and veterinarians to identify recurring health problems, monitor disease trends, and evaluate the effectiveness of preventive measures. They also help in making informed decisions about breeding, culling, nutrition, and herd management

Conclusion

Disease prevention in dairy animals is not merely a method of avoiding illness; it is a scientifically planned approach to safeguard animal health, productivity, welfare, farm profitability, and public health. A healthy dairy herd is the result of a well-coordinated system in which biosecurity, vaccination, balanced nutrition, hygienic

housing, parasite control, reproductive management, clean milking practices, and early disease detection work together as a single preventive strategy. Modern dairy farming must therefore shift its focus from a **“TREAT THE DISEASE”** to a **“PREVENT THE DISEASE BEFORE IT OCCURS”**. Early recognition of health problems, accurate record keeping, prudent antimicrobial use, and regular veterinary supervision further strengthen this preventive framework. Most Importantly, Disease prevention also contributes to One Health, because controlling diseases in livestock helps protect food safety, reduce antimicrobial resistance, and minimize the risk of zoonotic infections. Thus, prevention is an investment rather than an expense. It reduces avoidable losses while improving the longevity and productive efficiency of the herd. Ultimately, every healthy animal represents not only more milk, but also better welfare, safer food, a stronger livelihood, and a more sustainable dairy industry. The foundation of profitable dairy farming is therefore simple yet powerful: healthy animals, healthy farms, and a healthier future.



Smart Farming in the Livestock Sector : A Practical Guide for Indian Farmers



Dr. Megha Verma*
M.V.Sc. (Livestock Production
and Management),
ICAR-Indian Veterinary
Research Institute,
Izatnagar, Bareilly,
Uttar Pradesh – 243122

Introduction

India's livestock sector is the backbone of rural income, and the country produced an estimated 239.30 million tonnes of milk in 2023–24 (Press Information Bureau 2024). Yet average productivity per animal is low, and farmers struggle with rising costs, labour shortages, disease and a changing climate. Smart farming, the use of sensors, mobile phones, software and automation to manage animals, can help farmers of every size get more from each animal. This article follows the farm cycle from breeding to marketing and shows where smart tools fit in (Fig. 1).

Smart Tools Across the Farm Cycle

- **Breeding:** Activity collars and pedometers detect
- **Feeding:** Ration-balancing apps match feed to each animal's yield using local feeds. Automatic feeders, silage making and total mixed rations reduce waste on larger farms.
- **Health:** Rumination sensors and rumen boluses warn of illness before visible signs. Tele-veterinary advice and digital vaccination and treatment records linked to the animal's ear tag speed up care.
- **Housing:** Climate sensors switch fans and foggers on
- **Milking:** Heat accurately, even at night, so insemination happens on time. Sex-sorted semen produces mostly female calves, and genomic selection helps choose better bulls and heifers early.
- **Marketing:** Automatic milk collection, digital payments and insurance, traceability

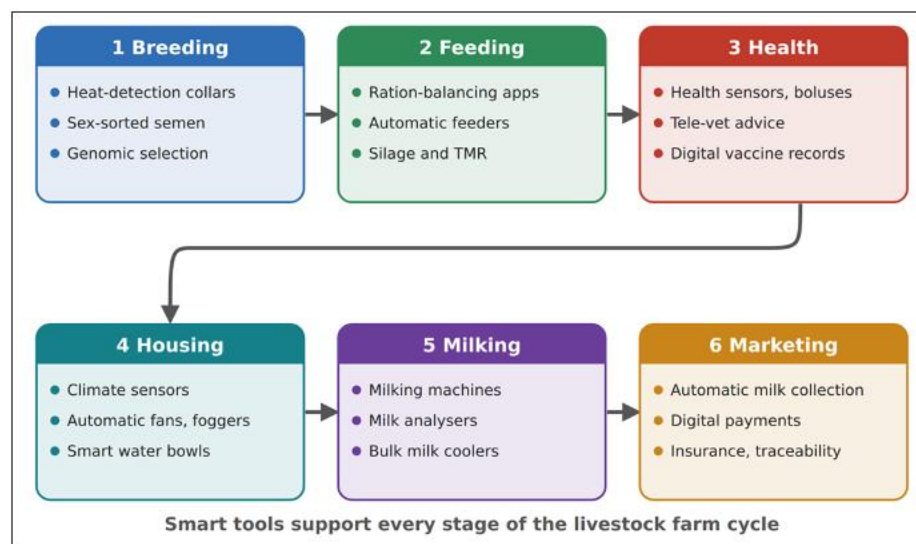


Fig. 1: Smart tools at each stage of the livestock farm cycle

when the shed gets too hot, and float-valve water bowls keep clean water available without waste.

- **Milking and milk quality:** Milking machines save labour, milk analysers check quality at the farm, and bulk milk coolers keep milk fresh until collection.
- **Marketing and finance:** Automatic milk collection units record quantity and fat, payments go straight to bank accounts, and ear-tag identification supports livestock insurance and traceable milk.

The same ideas work for other livestock too: automatic climate control and feeders in poultry houses, and electronic identification and weighing for goats and sheep.

How a Smart Farm Works

Every smart system follows the same five steps (Fig. 2). Devices sense what is happening, data travels over the mobile network, software analyses it, the farmer receives an alert, and action follows, either by the farmer or automatically (Simitzis et al. 2022). The value lies in the last step: an alert helps only if someone acts on it.

For example, a neck collar notices that a cow is walking far more than usual at 2 a.m. The app sends a heat alert, and the farmer calls the insemination technician in the morning, at the right time for conception. A missed heat, which would have cost three weeks of production, is avoided.

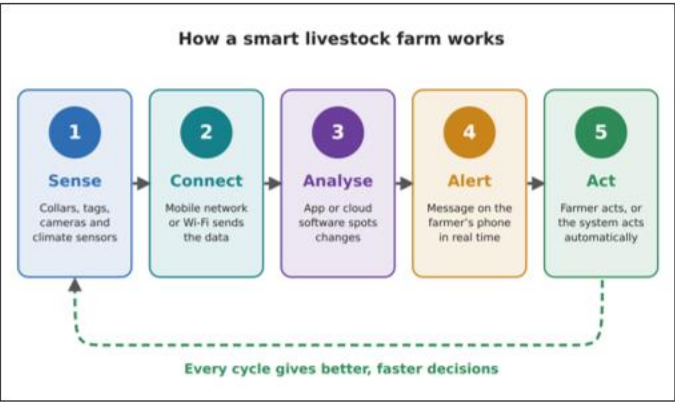


Fig. 2: The sense–connect–analyse–alert–act cycle

Benefits for Farmers

Smart farming brings benefits that farmers can see in their daily work:

- **Higher productivity:** Aimely insemination and early treatment mean shorter calving intervals and more milk per animal.
- **Lower costs:** Balanced feeding and early disease detection cut feed and medicine waste.
- **Less labour:** Automation and alerts reduce the time spent watching animals and keeping records by hand.
- **Better access to finance:** Reliable digital records support loans, insurance claims and better milk prices.
- **Animal welfare and climate:** Healthier, more comfortable animals produce more milk with less waste per litre.

Challenges and Solutions

Smart farming has hurdles, but each has a practical answer (Table 1).

Table 1: Common challenges and practical solutions

Challenge	Practical solution
High cost of devices	Start with low-cost apps; share equipment through cooperatives and FPOs; use government schemes and bank loans
Weak mobile network	Choose devices that store data offline and sync later
Limited skills	Hands-on training by KVKs, dairy unions and para-vets; apps in local languages
Data privacy	Ask who owns the data; share only with trusted agencies
Repairs and service	Buy only where local service and spare parts are available

Support Available to Farmers

Farmers do not have to start alone. The Pashu Aadhaar ear tag and the Bharat Pashudhan system give every animal a digital identity and health record. Government and cooperative apps provide information on breeding, feeding and disease. Krishi Vigyan Kendras, veterinary universities and dairy unions run training on new technologies, and cooperatives often provide automatic milk collection, bulk milk coolers and ration-balancing advice to their members.

Start Small, Grow Step by Step

Farmers need not adopt everything at once (Fig. 3). Begin with ear tags, digital records and mobile advice, which cost little. Add sensors for heat detection and health once the herd grows, then automated cooling, feeding and milking. Artificial intelligence, such as camera-based weight estimation and disease prediction, is the next step and will become more affordable over time.

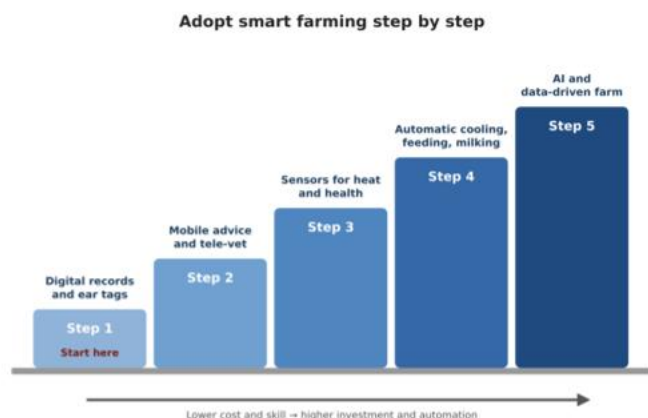


Fig. 3: A step-by-step path to smart livestock farming

Conclusion

Smart farming is not only for large commercial farms. Used step by step and backed by good training and local support, it helps every livestock farmer make better decisions, care for animals better and earn more. The key is to start small, learn from the data and act on it every day.

References

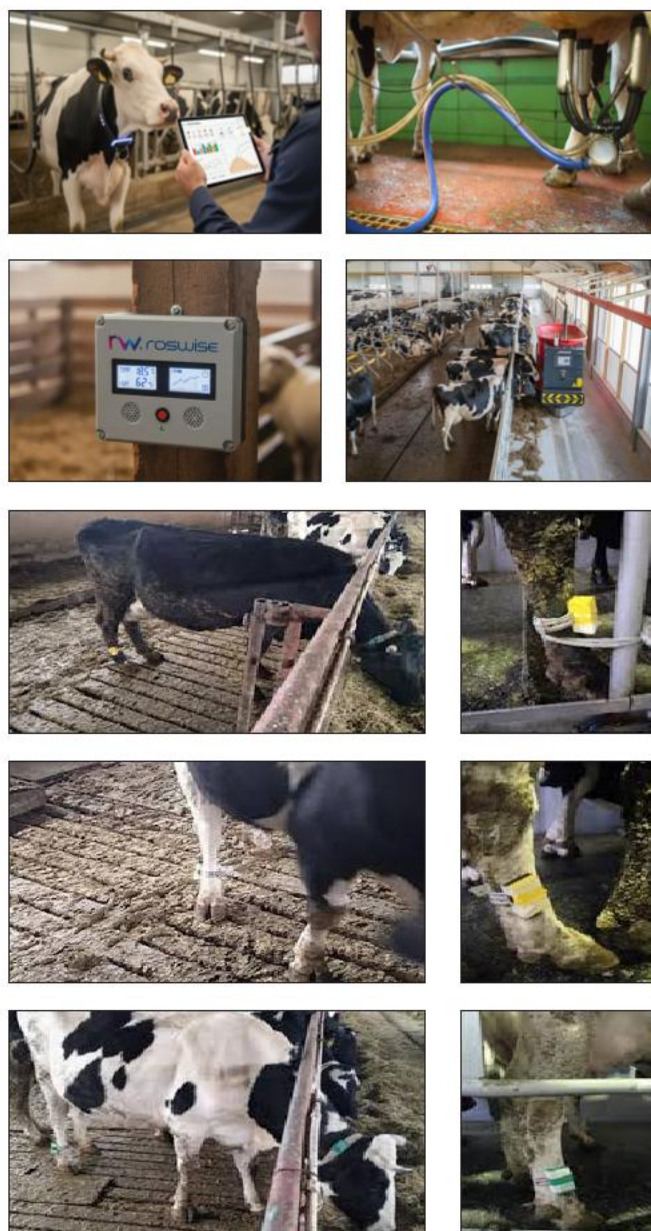
Press Information Bureau 2024, *Release of Basic*

Animal Husbandry Statistics 2024 on the occasion of National Milk Day 2024, Press Information Bureau, Government of India, viewed 1 October 2026.

Simitzis, P, Tzanidakis, C, Tzamaloukas, O & Sossidou, E 2022, 'Contribution of precision livestock farming systems to the improvement of welfare status and productivity of dairy animals', *Dairy*, vol. 3, no. 1, pp. 12–28.

About the Author

Dr. Megha Verma holds a Master of Veterinary Science (M.V.Sc.) in Livestock Production and Management from ICAR-Indian Veterinary Research Institute (IVRI), Izatnagar, Bareilly, Uttar Pradesh. Her interests include livestock management and the use of practical technology on Indian farms.





A understanding the difference between Milk Allergy and Lactose Intolerance

Vandana Chaudhary^{1*},
Neha Thakur² and Suman
Bishnoi³

¹ Assistant Professor,
College of Dairy Science
and Technology, LUVAS,
Hisar

² Assistant Professor,
Department of Livestock
Products Technology,
LUVAS, Hisar

³ Scientist, Department of
Livestock Products
Technology, LUVAS, Hisar

Progressive changes in eating habits of human beings have activated earnest changes in the quality of life. Easy availability of food with loads of calories associated has made the human population more prone to lifestyle associated disorders like obesity, diabetes, hypertension to name a few. With the upliftment of living standards and availability of wide array of foods, food allergies have become a common house hold name. Milk and dairy foods are healthy foods and are considered as nutrient dense since they serve as good sources of calcium and vitamin D as well as protein and other essential nutrients. With advancement in production and consumption pattern, safety aspect of the milk and milk products portray a very important aspect in relation to human health. There is anecdotal evidence of confusion between lactose intolerance and milk allergy among both patients and physicians, which could result in unnecessary dietary restriction or avoidable reactions. Terminology such as suspected 'milk allergy', 'milk intolerance', and also 'lactose intolerance' are often used without a clear sense of the different meanings, understanding of the different mechanisms that underlie them, or the dietary implications of the diagnosis.

Milk Allergy

Milk allergy is one of most common allergies, especially in

children. This allergy occurs when the body's immune system reacts to milk protein. It can trigger an allergic reaction. The allergic reactions may vary from mild (rashes, hives, itching, swelling, etc.) to severe (trouble breathing, wheezing, loss of consciousness, etc.) (Fig 1). It usually starts before the age of one and most of the children outgrow it by age 3.

- Symptoms of milk allergy are: (i). *Skin*
- Red, rashes, itchy and swelling (ii). *Respiratory passage, mouth*
- Trouble in breathing or swallowing
- Running nose accompanied with coughing
- Itching, swollen lips (iii). *Digestion*
- Nausea, vomiting
- Diarrhoea, cramps (iv). *Anaphylaxis*
- Acute allergic reaction, if not taken care may lead to death

Fig 1: Symptoms of milk allergy

Lactose Intolerance

Lactose is the predominant sugar in mammalian milk. Intestinal absorption of lactose requires hydrolysis of



disaccharide to its component monosaccharides D-glucose and D-galactose, both of which are rapidly transported across the small bowel mucosa (Fig 2). Infants virtually have sufficient levels of lactase to digest nearly about one litre of breast milk. The lactase enzyme is naturally produced by the cells that line the small intestine. It is also produced by the bacteria that live in the small intestine. But sometimes after weaning a genetically programmed reduction in synthesis of lactase resulting in very low lactase activity in some adult subjects, leading to a situation known as lactase nonpersistence. Lactase

loose stools or diarrhoea, a condition known as lactose intolerance (LI). Symptoms of lactose intolerance manifest 30 minutes to 1 to 2 hours after ingestion of milk containing (dairy) products.

Fig 2:

<https://ib.bioninja.com.au/standard-level/topic-2-molecular-biology/25-enzymes/lactose-intolerance.html>

LI can be diagnosed by performing certain medical tests:

(i) *Stool Acidity Test*- This test is usually exercised for infants or little kids. Stool sample is taken to find if lactose is hydrolyzed to

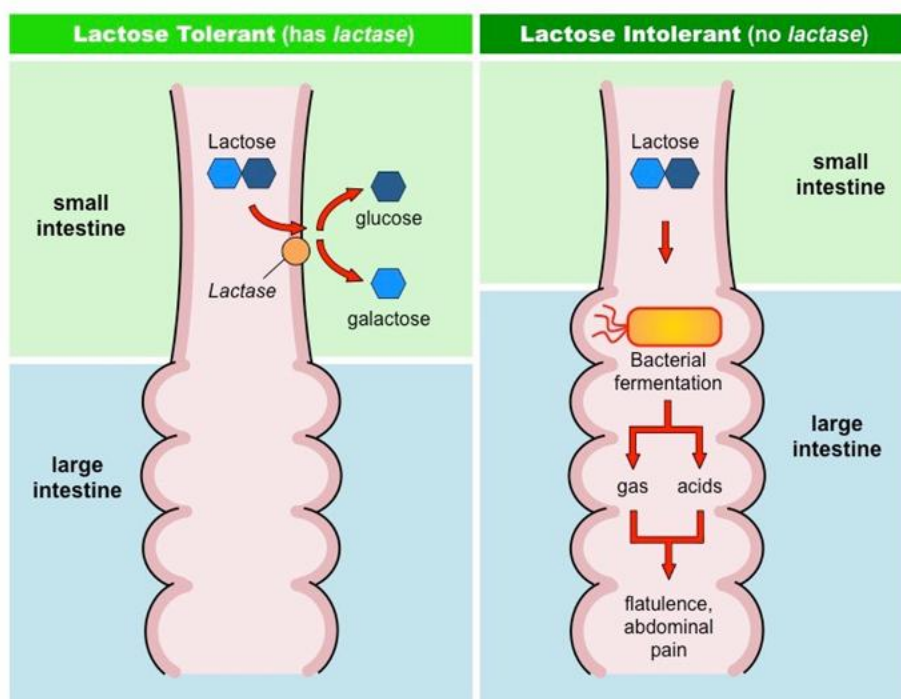
level of hydrogen in breath indicates that the body is not able to digest or absorb lactose properly.

(iii) *Lactose Intolerance Test*- In this test the person is made to consume liquid containing lactose. Blood samples are taken after every two hours to check the blood glucose levels. If there is no hike in blood glucose level, suggesting LI.

The person having LI are directed to limit the intake of products containing lactose such as milk, buttermilk, soft cheese, cream, custard etc.

Conclusion

Both milk allergy and lactose intolerance are manageable conditions with slight diet modifications. There are a number of alternatives available for individuals with milk allergy like breast milk for high risk infants for as long as possible. Additionally, hypoallergic formulas containing hydrolyzed proteins are safe to consume and least likely to cause an allergic reaction. Soy-based formulas are also an alternative but the drawback is that soy itself is an allergen to many individuals. Lactose can be managed by dietary modification and lactase enzyme supplementation. These products are available in many grocery stores and are just as healthy as regular milk and milk products. Alternative sources of milk nutrients like calcium, vitamin A etc are fish with soft bones, broccoli and leafy green vegetables, oranges, almonds, Brazil nuts, dried beans, tofu, products with labels that show they have added calcium, such as some cereals, fruit juices and soy milk.



nonpersistence then further leads to partial digestion of consumed lactose; thus leading to malabsorption of lactose and the lactose reaches the colon. Attributed to enough amount of lactose in colon, person may experience symptoms of abdominal cramps, bloating and rumbling sound in stomach, excess flatulence, vomiting and

simple sugars. Otherwise fermentation of lactose in intestine will lead to the formation of lactic acid which decreases the pH of stool.

(ii) *Hydrogen Breath Test*- This is the most common test to check LI. In this test, hydrogen content of breath is measured after consumption of a lactose containing drink. Increase in the



Dorb In Cattle Feed : Why Balance Matters In The Dairy Ration

De-Oiled Rice Bran can contribute protein, fermentable energy, fibre and phosphorus but its value appears only when it is part of a balanced, quality-controlled ration.



Ankit Bansal
Director
Business Development,
Rudrapur Solvents Private Limited

The first question is not 'is DORB cheap?'

For dairy farmers and cattle-feed makers, the more useful question is: what role can a good DORB batch play in the complete ration? De-Oiled Rice Bran is the solid material left after oil is extracted from rice bran. In a well-made batch, it brings a useful combination of moderate protein, fermentable carbohydrate, natural fibre, phosphorus and B-complex vitamins. That combination makes it a practical balancing ingredient—not a miracle feed and not a filler.

Milk yield, fat, SNF, fertility and body condition are outcomes of the whole ration, forage quality, water, health and management. DORB can support those outcomes, but it cannot correct a ration that is short of effective fibre, energy, minerals or amino-acid balance. Final inclusion should therefore be set by a qualified nutritionist for the animal's stage and production level.

1. Supporting the rumen with usable fibre and energy

Ruminants are equipped to use fibre through microbial fermentation. Natural bran fibre, when controlled, can help maintain a steadier rumen environment than a ration built only around rapidly fermentable starch.

DORB also contributes digestible carbohydrate that can support energy supply without making maize or another high-starch ingredient carry the entire burden. The objective is not to maximise DORB; it is to combine ingredients so the rumen receives enough effective fibre, fermentable energy and protein at the same time.

2. Why phosphorus deserves attention

Phosphorus is important for skeletal strength, energy metabolism and reproductive performance. DORB is naturally recognised as a useful phosphorus-bearing feed ingredient. That does not remove the need for a properly designed mineral mixture, because calcium-to-phosphorus balance and the animal's total ration still matter. It does, however, make DORB especially relevant when the nutrition team is trying to build a cost-conscious concentrate without overlooking mineral contribution.

3. DORB and cottonseed cake: complementary roles

Cottonseed cake can contribute bypass protein, residual oil and effective fibre. DORB brings a different profile: fermentable energy, phosphorus and economic

flexibility. Used together under professional formulation, they can complement one another better than either ingredient viewed in isolation. The point is balance. Cottonseed cake should not be treated as the sole answer to protein, and DORB should not be treated as a complete replacement for every protein or energy source. Ingredient quality and the complete ration decide the result.

4. Quality determines whether the promise reaches the animal

A dairy buyer should not approve DORB from the protein number alone. Review the batch-specific report with crude fibre, moisture, ash, sand or silica and acid-insoluble ash. Excessive fibre may indicate husk or other lignified material; high ash and silica can signal non-nutritive load. The delivered material should be fresh, free-flowing and free from musty odour, clumping, visible grit or abnormal darkening. Take a

representative composite sample and retain a sealed counter-sample so the report belongs to the actual lot received.

Good storage matters after purchase as well. Keep bags off the floor, away from walls and protected from rain, condensation and direct heat. Use first-in, first-out handling and investigate any change in smell, flow or appearance before feeding. A quality report is a decision aid only when it is connected to the lot, the storage record and the ration in which the ingredient is used.

A simple receiving routine protects value

At the feed mill or farm, record the supplier, vehicle or lot reference, date of receipt and storage location. Draw a composite sample from more than one bag or stack position, seal a counter-sample and compare the physical material with the batch report. If the smell, colour, flow or

laboratory pattern is unexpected, place the lot on hold rather than blending it into the ration. This small pause protects the concentrate, the animal and the reliability of later milk records.

The beginning of a practical dairy-feed series

DORB's importance in cattle feed comes from balance: moderate protein, usable fibre, fermentable energy and phosphorus in one domestic feed ingredient. The next questions for dairy readers are equally practical—how to read a DORB report, how much quality variation costs per litre of milk, how storage changes value, and how inclusion should differ between high-yielding cows, dry animals and growing calves. Those decisions should be made with evidence, not with the lowest invoice price.

MAXIMISING DORB IN DAIRY & CATTLE FEED

SUPPORTING THE RUMEN



USABLE FIBRE & ENERGY for microbial fermentation.
A STEADIER RUMEN environment than rapid starch.
BALANCED INGREDIENTS ensure effective fibre and energy.

PHOSPHORUS BENEFITS



VITAL MINERAL for skeletal strength, energy metabolism & reproductive performance.
COST-CONSCIOUS CONCENTRATE creation.
Balance with proper **MINERAL MIXTURE**.

DORB & COTTONSEED CAKE



COMPLEMENTARY ROLES.
DORB: Fermentable energy, Phosphorus, economic flexibility.
COTTONSEED: Bypass protein, residual oil, effective fibre.
PROFESSIONAL FORMULATION for balance.

QUALITY DETERMINATION



BEYOND CRUDE PROTEIN.
Review **BATCH-SPECIFIC REPORTS:** Crude Fibre, Moisture, Ash, Silica.
FRESH, FREE-FLOWING material, free from musty odor or grit.

SIMPLE RECEIVING ROUTINE



PROTECT VALUE. Record supplier, lot ref, date.
Draw **COMPOSITE SAMPLE & SEAL COUNTER-SAMPLE.** Compare physical material with batch report.

GOOD STORAGE MATTERS



AFTER PURCHASE care. Keep bags **OFF FLOOR**, away from walls.
Protect from **RAIN, CONDENSATION**, direct heat.
Use **FIRST-IN, FIRST-OUT** handling.

EVIDENCE-BASED DECISIONS FOR PRACTICAL DAIRY NUTRITION



Indigenous Cattle Breeds of India: Heritage, Potential and Sustainable Future



***Swarup Debroy¹,
Uma Kant Verma²,
Hansmeet Kour³,
Shalini Pandey³
and Narendra Kumar⁴**

¹Assistant Professor,
Veterinary Anatomy &
Histology, CoVAS, Banda
University of Agriculture
and Technology, Banda.

²Assistant Professor,
Animal Genetics & Breeding,
CoVAS, Banda University of
Agriculture and Technology,
Banda.

³Assistant Professor,
Veterinary Microbiology,
CoVAS, Banda University of
Agriculture and Technology,
Banda.

⁴Assistant Professor,
Livestock Production &
Management, CoVAS, Banda
University of Agriculture
and Technology,
Banda.

Introduction

India possesses a rich diversity of indigenous cattle breeds that are highly valuable for agriculture, livestock production, and rural livelihoods. These native breeds are naturally adapted to the climatic and environmental conditions of their respective regions and are generally known for their resilience and tolerance to various diseases and stresses. They contribute significantly to sustainable farming systems and provide important resources such as milk, draught power, manure, and income for rural households. With the rapid modernization of dairy farming, greater emphasis should be placed on the conservation, genetic improvement, and sustainable utilization of indigenous cattle breeds. Protecting these valuable genetic resources is crucial for maintaining biodiversity, strengthening food security, supporting farmers' livelihoods, and promoting environmentally sustainable livestock production.

Understanding Indigenous Cattle Breeds

Indigenous cattle breeds are native genetic resources that have developed and adapted over generations to the diverse climatic and geographical conditions of India. Their

natural ability to withstand heat, tolerate local diseases, and perform under limited-input production systems makes them particularly valuable to small and marginal farmers. India possesses a rich diversity of recognized indigenous cattle breeds, including Gir, Sahiwal, Red Sindhi, Tharparkar, Ongole, and Kankrej.

Traditionally, indigenous cattle have played an important role in Indian farming systems by providing:

- **Milk:** Many indigenous breeds are valued for their quality milk and genetic characteristics, including variants associated with A2 β -casein.
- **Draught power:** Strong and resilient animals have historically been used for ploughing, transportation, and other agricultural operations.
- **Organic manure:** Cow dung and urine contribute to nutrient recycling, soil fertility, and sustainable agricultural practices.
- **Cultural importance:** Cattle hold a significant place in India's traditional agricultural systems and rural culture.

Importance of Indigenous Cattle Breeds

1. Adaptation to Local Environmental Conditions

Indigenous cattle have evolved

under the diverse climatic conditions of India and are well suited to their native environments. They can perform efficiently under high temperatures, humidity, seasonal fluctuations, limited water availability, and periods of poor-quality feed. This adaptability makes them particularly suitable for low-input and resource-limited farming systems.

2. Natural Resilience to Diseases

Native cattle breeds generally possess greater resilience to several diseases and environmental stresses prevalent in their respective regions. Their ability to cope with local disease challenges can help farmers reduce expenditure on veterinary treatment and improve herd survival and productivity. Breeds such as Sahiwal are particularly recognized for their hardiness and tolerance to tropical conditions.

3. Potential for Sustainable Milk Production

Indigenous breeds contribute to milk production while being well adapted to local feeding and management practices. Milk composition can vary considerably among breeds and individual animals, and some indigenous cattle are associated with the A2 β -casein genetic variant. Growing consumer interest in breed-specific and traditionally produced milk has also increased attention toward the dairy potential of native cattle.

4. Contribution to Environmental Sustainability

Indigenous cattle can support sustainable livestock production because many breeds can maintain their performance under relatively low-input management systems. Their dung and urine are valuable for nutrient recycling, compost preparation, and organic farming. Integrating cattle with crop production can therefore improve resource utilization and reduce dependence on external agricultural inputs.

5. Cultural, Social and Economic Significance

Indigenous cattle have been closely associated with Indian agriculture, rural traditions, and cultural practices for generations. Besides providing milk and farm power, cattle contribute to household income and agricultural activities in many rural communities. Conservation and promotion of native breeds can therefore support both traditional knowledge and the economic well-being of livestock-dependent farmers.

Development and Improvement of Indigenous Cattle Breeds

The improvement of indigenous cattle breeds requires a balanced approach that combines **genetic conservation with systematic breed development**. The main objective is to increase productive and reproductive performance while preserving the distinctive characteristics, adaptability, and genetic diversity of native breeds.

Government Initiatives

The Government of India has

implemented several programmes to conserve, develop, and genetically improve indigenous cattle. Initiatives such as the Rashtriya Gokul Mission (RGM) and programmes related to bovine breeding and dairy development support breed conservation and sustainable genetic improvement. Major activities include:

- Establishment and development of Gokul Grams for scientific management and conservation of indigenous cattle.
- Development of breed-specific research, training, and genetic resource centres.
- Expansion of artificial insemination using quality semen from genetically superior indigenous bulls.
- Encouragement of farmer participation in breed conservation, identification, registration, and genetic improvement programmes.

Role of Breed Societies and NGOs

Breed associations, farmer organizations, NGOs, and gaushalas contribute to the conservation and promotion of indigenous cattle. These organizations help identify and register quality animals, create awareness about breed characteristics, maintain breed standards, and facilitate interaction between breeders and farmers. Their efforts can also support the preservation of valuable genetic resources at the community level.

Application of Scientific Breeding Practices

Modern cattle improvement programmes increasingly integrate selection methods, performance recording, genomic technologies, and advanced reproductive techniques. Artificial insemination, embryo transfer, genomic selection, and the use of genetically superior breeding animals can accelerate genetic progress for important traits such as milk production, fertility, disease tolerance, and adaptability. Combining these technologies with appropriate conservation strategies can help improve indigenous breeds without compromising their valuable native characteristics.

Challenges in the Conservation of Indigenous Cattle Breeds

Despite increasing recognition of the importance of indigenous cattle, several constraints continue to affect their conservation and sustainable development.

- **Genetic dilution:** Unplanned or indiscriminate crossbreeding with exotic cattle can reduce the genetic purity and distinctive characteristics of native breeds.
- **Limited farmer awareness:** Many livestock owners have inadequate information about the productive, adaptive, and long-term economic advantages of indigenous cattle.
- **Shortage of quality breeding resources:** In several regions, farmers have limited access to genetically superior indigenous bulls, quality semen, and reliable

artificial insemination services.

- **Inadequate feed and veterinary facilities:**

Shortages of nutritious fodder, drinking water, animal healthcare services, and breeding infrastructure can negatively influence the productivity and reproductive performance of indigenous cattle.

- **Low economic returns:** In some production systems, the comparatively lower milk yield of certain native breeds may discourage farmers from maintaining them.

- **Declining population of some breeds:** Reduced interest in traditional breeds and changes in farming practices have contributed to the declining population of certain indigenous cattle breeds.

Future Prospects of Indigenous Cattle Breeds in India

The long-term development of indigenous cattle will depend on combining traditional knowledge with modern breeding, management, and marketing technologies. Several approaches can help strengthen the conservation and economic potential of native cattle breeds:

- **Developing premium markets:** Promoting breed-specific milk, A2 milk, and value-added dairy products can create better market opportunities for farmers.
- **Strengthening farmer organizations:** Breed-based cooperatives and Farmer Producer Organizations (FPOs) can improve collective

marketing, access to inputs, technical services, and better prices.

- **Adopting digital technologies:** Digital identification, electronic livestock records, health-monitoring systems, and mobile-based advisory services can improve herd management and breeding decisions.

- **Promoting youth involvement:** Encouraging young people to adopt modern and sustainable dairy farming can generate employment opportunities and support the continuation of livestock-based livelihoods.

- **Value addition and geographical branding:** Linking unique indigenous cattle products with appropriate geographical branding, including Geographical Indication (GI) recognition where applicable may enhance their identity and market value.

Popular Indigenous Cattle Breeds of India

Gir

Native to Gujarat, Gir cattle are recognized for their adaptability to hot climates and their importance in dairy production. They are also widely valued for their genetic characteristics related to A2 β -casein.

Sahiwal

Originating from the northwestern Indian subcontinent, Sahiwal is a prominent dairy breed known for its heat tolerance, adaptability, and resilience under tropical production conditions.

Red Sindhi

Red Sindhi cattle originated in the Sindh region and are valued primarily for milk production. Their adaptability and ability to perform under challenging environmental conditions have contributed to their popularity.

Tharparkar

Tharparkar cattle are associated with the arid regions of Rajasthan and are well adapted to hot, dry conditions. Their ability to survive under limited feed and water availability makes them useful in drought-prone areas.

Ongole

Ongole cattle originated in Andhra Pradesh and are particularly known for their large body size, strength, and endurance. They have traditionally been valued for

draught work and are also important genetic resources.

Kankrej

Kankrej cattle are mainly found in parts of Gujarat and Rajasthan. The breed is valued for its adaptability, strength, and usefulness in both milk production and agricultural operations.

Conclusion

Indigenous cattle breeds represent much more than a source of livestock production; they are an important part of India's agricultural heritage, rural economy, and biological wealth. Their natural adaptability, resilience, and ability to perform under relatively low-input conditions make them valuable for developing sustainable livestock production systems. In the face of climate change,

increasing pressure on natural resources, and changing consumer preferences, the importance of conserving and improving native cattle breeds is becoming increasingly evident. A balanced approach involving scientific breeding, genetic conservation, farmer education, improved healthcare, and supportive government policies can strengthen the future of indigenous cattle. Promoting these breeds can enhance the livelihood security of rural communities while safeguarding India's valuable livestock genetic resources. Protecting and responsibly utilizing indigenous cattle today will help ensure that their unique genetic and cultural legacy remains available for future generations.





EL NINO and its Potential Impact on Livestock



KAPILAN, P., Final year B.V.Sc. & A.H. student, Arawali Veterinary College, Sikar, Rajasthan

About 71% of the Earth's surface is covered by oceans, and the Pacific Ocean is the largest and deepest of them. Because the tropical Pacific Ocean plays a major role in the global climate system, significant changes in its sea-surface temperature can influence atmospheric circulation and weather patterns across many parts of the world. Under normal conditions, the tropical Pacific remains in an approximately balanced state, with the trade winds pushing warm surface water towards the western Pacific. However, periodic changes in ocean temperature and atmospheric circulation produce a climate phenomenon known as ENSO – El Niño–Southern Oscillation.

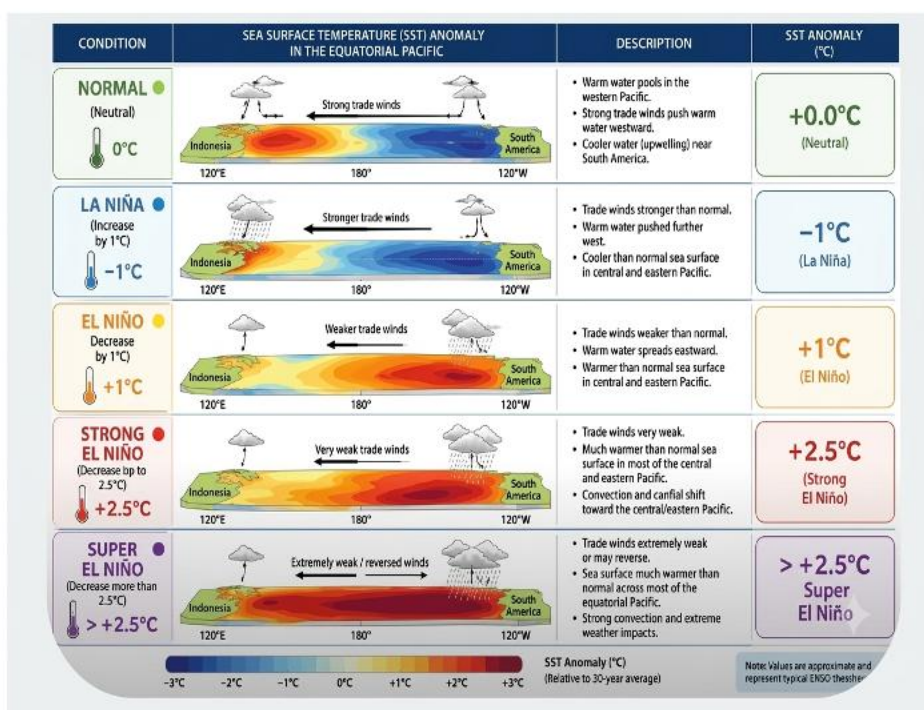
La Nina – Cooling Phase

When sea-surface temperatures in the central and eastern

equatorial Pacific become at least about 0.5°C cooler than average, and the associated atmospheric conditions persist, the phenomenon is called La Niña. La Nina can alter rainfall and temperature patterns around the world. In some regions it can increase the risk of heavy rainfall and flooding, while other regions may experience drought.

El Nino – Warming Phase

When sea-surface temperatures in the central and eastern equatorial Pacific become at least about 0.5°C warmer than average, together with the associated atmospheric changes, the condition is classified as El Nino. El Nino can cause major changes in global weather patterns. Depending on the region, it may contribute to drought, heat waves, reduced rainfall, heavy rainfall, flooding and changes in agricultural



production. In India, decreased/erratic rainfall severe drought is expected due to El Nino in 2026 and 2027 and the condition is worse in 2027.

Increasing Intensity of El Niño

The intensity of El Nino is commonly described using the magnitude of the temperature anomaly. As the positive temperature anomaly becomes larger, the event becomes stronger.

La Nina (Cooling) ↔ ENSO (El Nino Southern Oscillation) - Neutral ↔ El Nino (Warming) ↔ Strong El Nino ↔ "Super" El Niño

Why 2026–2027 Is Important

The developing 2026–27 El Nino has attracted considerable scientific attention. Current forecasts indicate a greater than 90% probability of a Super El Niño during the Northern Hemisphere autumn and winter of 2026–27. Some forecasts indicate that sea-surface-temperature anomalies in parts of the equatorial Pacific could exceed 3°C, potentially making this an exceptionally strong event. If such a super El Nino develops, its effects could extend well beyond the Pacific Ocean, influencing rainfall, temperature, agriculture, water availability, livestock production, fisheries and extreme weather events in India. Therefore, 2026–2027 is an important period for climate monitoring and preparedness, particularly for agriculture, livestock, water resources and disaster management.

States more prone for El Nino

The Union Ministry of Agriculture has identified 12 states as the most vulnerable to severe agricultural and weather impacts from the 2026–2027 El Nino. They are Karnataka,

Maharashtra, Madhya Pradesh, Gujarat, Rajasthan, Uttar Pradesh, Tamil Nadu, Andhra Pradesh, Telangana, Odisha, Bihar and Jharkhand.

Impact on Livestock Farming

Reduced rainfall can adversely affect agricultural production, leading to a decline in the availability of crop residues and fodder. Consequently, the availability of green fodder, dry fodder and feed ingredients may decrease. Shortages of grains, oilcakes and bran, which are essential ingredients for preparing concentrate feed, can increase their market prices and, in turn, raise the cost of concentrate feed. At the same time, reduced rainfall can significantly affect green fodder production, resulting in inadequate feed availability for livestock.

Water scarcity can also create a shortage of drinking water for livestock and poultry. In addition, higher temperatures associated with drought and El Nino conditions can cause heat stress, reducing feed intake, growth, milk production, egg production, reproductive performance and overall animal productivity.

Reduced Rainfall → Lower Agricultural Production → Fodder Shortage → Feed Ingredient Shortage → Increased Feed Cost → Water Scarcity + Heat Stress → Reduced Livestock & Poultry Productivity

Preparedness for El Nino Measures to Reduce Heat Stress in Livestock Sheds

- Adequate ventilation and shade should be provided in animal sheds to ensure proper air circulation and reduce heat accumulation.
- Shrubs and suitable

vegetation should be planted on the windward side of the shed to help cool the incoming air.

- Wet gunny bags may be hung on the windward side, with water applied periodically to facilitate evaporative cooling.
- Agricultural residues or suitable insulating materials may be placed over the roof and moistened periodically to reduce heat transfer into the shed.
- If asbestos roofing sheets are used, they may be whitewashed to reflect solar radiation and reduce heat absorption.
- During periods of extreme temperature, water may be sprinkled or splashed over the animals to provide immediate cooling.
- Adequate clean drinking water should be made continuously available to all animals and poultry, particularly during hot weather.

Management Practices to Reduce Heat Stress

- Animals should be allowed to graze only during the cooler periods of the day, preferably early morning and evening, and grazing during peak afternoon temperatures should be avoided.
- Mineral mixture, Vitamin B-complex, Vitamin C and electrolytes may be supplemented as appropriate to help maintain nutritional balance and support animals during heat stress.
- Clean, potable drinking water should be available at

all times to ensure adequate hydration and help animals cope with high temperatures.

Measures to Ensure Fodder Availability

- Short duration fodder crops (3 months) suitable for the agroclimatic condition should be cultivated and preserved / stored for future need.
- Tree fodder to be planted in bund area and live fencing so as to increase the fodder availability
- Silage preparation should be undertaken during periods of abundant green fodder availability and stored properly for use during fodder scarcity periods.
- Adequate quantities of dry fodder such as straw and hay should be collected and stored safely to meet future requirements.
- Wherever feasible, crop residues such as paddy straw may be treated with urea to improve their nutritional value and digestibility.
- Fodder resources should be planned and conserved in advance, particularly in anticipation of drought, reduced rainfall and prolonged dry periods.
- Proper storage of silage and dry fodder should be ensured to minimize spoilage and nutrient loss.
- Fodder trees should be cultivated wherever suitable and feasible to supplement conventional green fodder resources.
- Tree fodder can serve as an additional and sustainable

source of green fodder, particularly during periods of drought and fodder scarcity.

- Suitable fodder trees should be selected based on local climate, soil conditions, palatability and nutritional value.
- Regular pruning and proper management of fodder trees can provide a continuous supply of leaves and tender branches for livestock feeding.

Water Conservation Measures

- Rain guns, sprinklers or drip irrigation systems should be adopted according to the type of crop and local conditions to improve water-use efficiency and minimize wastage.
- Conventional channel/flood irrigation should be avoided wherever efficient irrigation methods are feasible.
- Rainwater harvesting and water conservation structures should be established to collect and retain rainwater for future use.

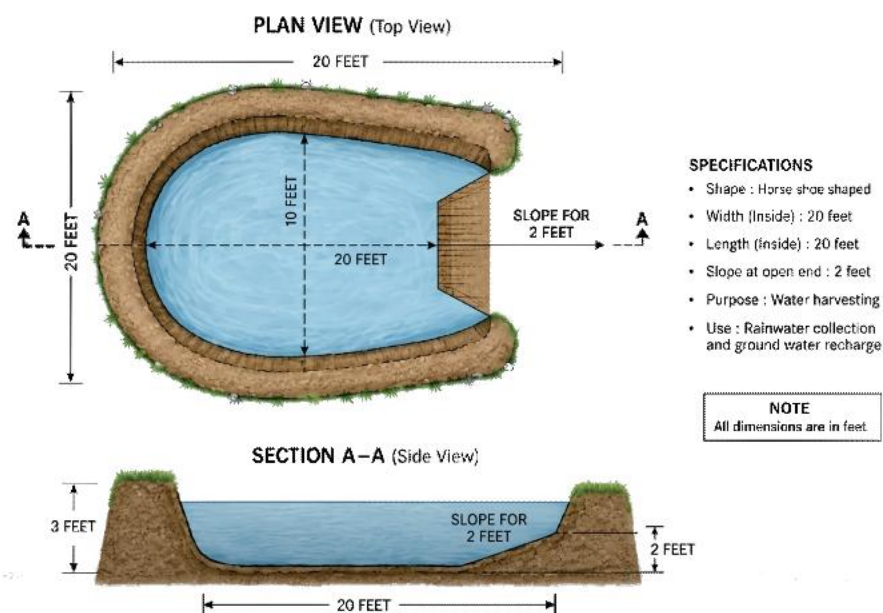
- Horseshoe-shaped water conservation structures may be planned in suitable common lands / poramboke lands, subject to applicable local permissions and site suitability.

- Wherever possible, contour-based water conservation measures should be adopted to reduce runoff, improve soil moisture and enhance groundwater recharge.

Conclusion

Proper animal shed management, ensuring adequate fodder availability, conservation of green fodder through silage making, enrichment of dry fodder, and efficient water management with minimum wastage are essential preparedness measures for El Niño conditions.

These measures will help to reduce heat stress, maintain livestock health and productivity, ensure feed and water security, and minimize the adverse impacts of drought and fodder scarcity during prolonged El Niño conditions.





Future-Ready Dairy Farms: Precision Tools and Climate-Smart Housing



Dr. Megha Verma*
M.V.Sc. (Livestock
Production and
Management), ICAR-
Indian Veterinary
Research Institute,
Izatnagar, Bareilly, Uttar
Pradesh – 243122

Introduction

India is the world's largest milk producer, with an estimated 239.30 million tonnes in 2023–24 (Press Information Bureau 2024). Yet yield per animal remains modest, and farmers face hotter summers, erratic rainfall, labour shortages and rising feed costs. Meeting these challenges needs three things working together: sound everyday management, smart use of data through precision livestock farming, and sheds designed for a changing climate. This article explains how cattle and buffalo farmers of any size can adopt each step by step.

Strong Basics: Modern Herd Management

Technology works only on a well-run farm. Five basics come first:

- **Identify every animal.** Register each animal with its 12-digit Pashu Aadhaar ear tag on the Bharat Pashudhan system, and record calving, breeding, milk yield, treatments and vaccinations.
- **Feed a balanced ration.** Match green fodder, dry fodder, concentrate and area-specific mineral mixture to each animal's yield, with clean water always available. Dairy cooperatives and veterinary officers can help balance rations using locally available feeds.

- **Breed on time.** Detect heat early, use artificial insemination with semen from proven bulls, and keep calving intervals short. Sex-sorted semen gives more female calves.

- **Follow a health calendar.** Vaccinate against foot-and-mouth disease, haemorrhagic septicaemia and other local diseases, deworm regularly and check udders for mastitis.

- **Raise calves well.** Early colostrum and good heifer rearing produce the next generation of high yielders.

Precision Livestock Farming

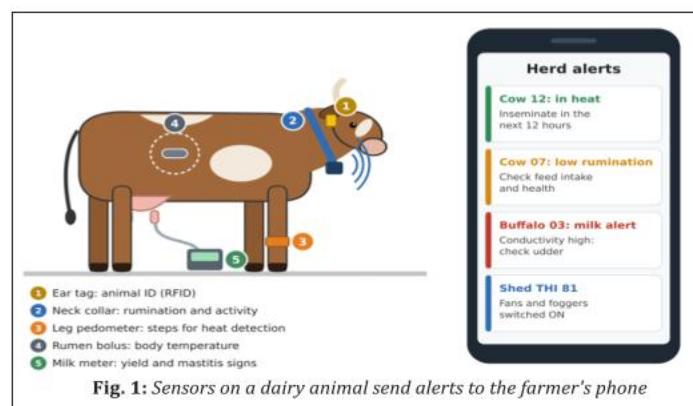
Precision livestock farming (PLF) uses sensors, cameras and software to monitor each animal continuously and alert the farmer when something changes (Simitzis et al. 2022). It does not replace the farmer's eye; it gives the farmer better eyes, day and night (Fig. 1). Common tools include:

- **Activity and rumination collars or leg pedometers:** a sharp rise in movement signals heat, often before visible signs; a fall in rumination is an early warning of illness.
- **Milk meters and conductivity sensors:** record each animal's yield and flag rising milk conductivity, an early sign of mastitis.

- **Rumen boluses and thermal cameras:** track body temperature to catch fever and heat stress.
- **Smart cameras:** use artificial intelligence to identify animals, score body condition and spot lameness from video.
- **Shed climate sensors:** measure temperature and humidity and switch fans and foggers on automatically.
- **Herd apps and RFID tags:** keep records, send reminders for vaccination, breeding and drying off, and show which animals are profitable.

Before buying any device, check that it works with a weak mobile network, offers an app in your language, has a long battery life and comes with reliable local service. Ask who owns and can access your herd data.

Start small. A low-cost record-keeping app already improves decisions. Add sensors where the benefit is clear, such as heat detection on farms where missed heats are common. Dairy cooperatives and farmer producer organisations can buy equipment jointly and share technical support. Above all, act on alerts promptly; data pays only when it changes what happens in the



shed.

Climate-Resilient Animal Housing

Climate resilience means preparing for heat waves, cold spells, floods and droughts. Heat is the biggest threat: it reduces feed intake, milk yield and fertility (West 2003). Buffaloes, with dark skin, sparse hair and few sweat glands, find it hard to shed heat. A study of Indian buffaloes found thermal stress beginning at a temperature-humidity index (THI) of about 74, with milk yield falling by more than 1% for every

unit rise above 82; crossbred cows are affected even earlier (Choudhary and Sirohi 2019). Watch for panting, drooling, reduced feeding and animals crowding around shade or water. THI combines temperature and humidity: at 36°C and



60% humidity it reaches about 88 (Fig. 2).

- **East-west orientation:** the long axis runs east-west so the sun travels along the shed and less direct sunlight enters.
- **A cool roof:** at least 3 m high at the eaves, with a ridge vent for hot air. Paint metal or cement sheets white on top, add an insulating layer such as thatch, bamboo mat or a false ceiling, and keep a wide overhang.
- **Enough space:** give each adult cow about 3.5 m² of covered area and 7 m² of open area, and each buffalo about 4 m² and 8 m², so animals are not crowded in hot weather.
- **Open sides with curtains:** open sides allow airflow in summer; roll-down curtains keep out cold winds and driving rain.
- **Active cooling:** fans combined with foggers or sprinklers in short wetting-and-drying cycles during hot hours. Buffaloes benefit greatly from showers or wallowing tanks.
- **Water and shade:** cool, clean water in shaded troughs, and shade trees on the west and south sides, preferably deciduous so winter sun still reaches the shed.
- **Flood and rain safety:** a raised plinth, sloped non-slip floors, good drainage and rooftop rainwater harvesting.
- **Clean energy:** solar panels can run fans and pumps, and a biogas plant turns dung into

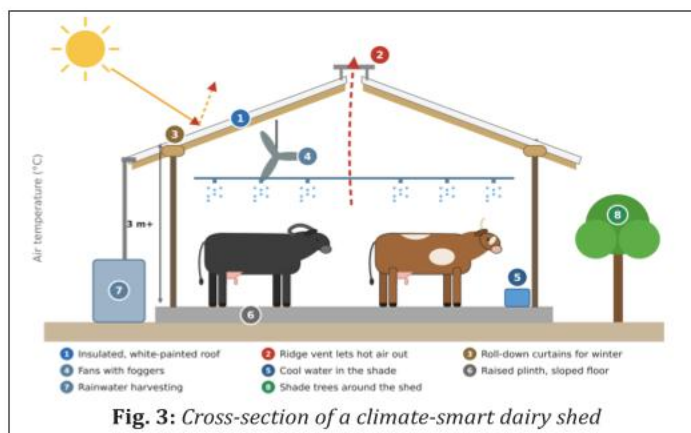


Fig. 3: Cross-section of a climate-smart dairy shed

cooking gas and slurry fertiliser.

Feed more in the cooler early morning and evening hours. In winter, lower the curtains on the windward side at night and keep bedding dry, especially for calves. Linking a THI sensor to the cooling system brings PLF and climate-smart housing together.

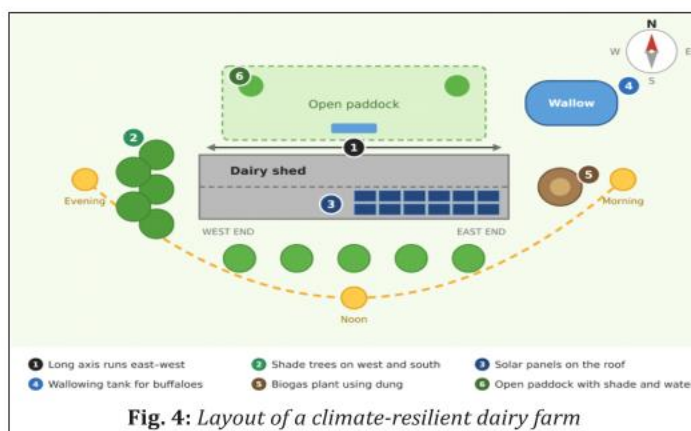


Fig. 4: Layout of a climate-resilient dairy farm

Farm size	Start with	Add next
Small (1-10 animals)	Ear tags and app-based records; white-painted roof; shade trees; cool water	Fans; shower or wallowing tank for buffaloes
Medium (10-50 animals)	Heat-detection collars; fans with foggers on timers; milk records	Climate sensor to switch cooling automatically; solar pump
Large (50+ animals)	Sensor system with herd software; milk meters	Fully automatic cooling; biogas and solar power

Getting Started: A Step-by-Step Plan

Adopt changes in stages that match your herd size and budget. Government schemes and bank loans for dairy infrastructure can help with the cost; ask your district animal husbandry office.

Conclusion

The future of Indian dairying lies in combining good stockmanship with smart tools and sheds built for a hotter, less predictable climate. Investments need not be large. Every step, from a white-painted roof to a heat-detection collar, pays back through more milk, better fertility and healthier cattle and buffaloes. Farmers who keep good records will find it easier to measure these gains and choose their next investment.

References

- Choudhary, BB & Sirohi, S 2019, 'Sensitivity of buffaloes (*Bubalus bubalis*) to heat stress', *Journal of Dairy Research*, vol. 86, no. 4, pp. 399-405.
- Press Information Bureau 2024, *Release of Basic Animal Husbandry Statistics 2024 on the occasion of National Milk Day 2024*, Press Information Bureau, Government of India, viewed 1 October 2026.
- Simitzis, P, Tzanidakis, C, Tzamaloukas, O & Sossidou, E 2022, 'Contribution of precision livestock farming systems to the improvement of welfare status and productivity of dairy animals', *Dairy*, vol. 3, no. 1, pp. 12-28.
- West, JW 2003, 'Effects of heat-stress on production in dairy cattle', *Journal of Dairy Science*, vol. 86, no. 6, pp. 2131-2144.

About the Author

Dr. Megha Verma holds a Master of Veterinary Science (M.V.Sc.) in Livestock Production and Management from ICAR-Indian Veterinary Research Institute (IVRI), Izatnagar, Bareilly, Uttar Pradesh. Her interests include modern dairy cattle and buffalo management, animal housing and the use of practical technology on Indian farms.



Amul plans local production of dahi & paneer in the US

Amul is expanding its US business beyond fresh milk and plans to produce **dahi and paneer locally**, building on its presence across 38 US states.

Fodder & water crisis hits dairy farmers in Maharashtra

Severe fodder and water shortages in parts of Vidarbha are putting dairy farmers under financial pressure. Some farmers are reportedly considering selling livestock because of the shortage.

Nandini milk price hike under review

Karnataka dairy unions have requested an **₹8-₹10/litre increase** in Nandini milk prices, citing higher feed, fodder and veterinary costs. The state government is reviewing pricing data from other states.

Milky Mist commissions 10 MW solar plant

The dairy company has commissioned a **10 MW solar power plant**, highlighting the growing focus on renewable energy and sustainability in Indian dairy processing.

Climate-smart dairy programme launched in Maharashtra

A new climate-smart dairy initiative is among the latest developments being reported for India's dairy sector, focusing on improving resilience and sustainability.

□ Global Dairy News

Global dairy market remains firm amid weather risks

Dairy markets are being supported by strong demand for **milk proteins**, while weather-related production risks and uncertain Chinese imports remain important market factors.

Global milk production growth expected to slow

Global milk volumes are forecast to grow only around **1% in 2026**, compared with 3.1% in 2025. Processors are increasingly directing milk toward **cheese, whey and higher-value protein products**.

Arla invests €63 million in high-protein dairy

Arla Foods plans to invest more than **€63 million** to expand production of **skyr and cottage cheese** in Europe, responding to rising consumer demand for protein-rich foods.

Global dairy commodity prices show mixed movement

At the latest reported GDT event, the overall price index declined **1.1%**, with butter down 5.7%, while cheddar prices increased 16.5%.

Feed and fuel costs remain a concern for dairy farmers

Rising feed and energy costs are expected to continue putting pressure on dairy farm margins, with milk prices potentially remaining range-bound heading into 2027.

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

Subscription Rates

Time Period

1 Year INR 2400 USD 250

3 Year INR 6500 USD 650

5 Year INR 10000 USD 1000

**18% GST Extra*

Contact Name : _____

Company Name : _____

Postal Address : _____

City : _____ State : _____ Mob. No. _____

Postal Code : _____ Country : _____

For more detail, contact:



Pixie Expomedia Pvt. Ltd.

C/o OmAng Hotel, Namaste Chowk, Near Janta Petrol Pump, KARNAL - 132001 (Haryana) INDIA

We wish to subscribe the following

Poultry Planner

☐ 1 Year ☐ 3 Year ☐ 5 Year
from _____ to _____

Dairy Planner

☐ 1 Year ☐ 3 Year ☐ 5 Year
from _____ to _____

Poultry Times of India

☐ 1 Year ☐ 3 Year ☐ 5 Year
from _____ to _____

Grand Total: _____

Payment Details:

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

Date: _____

Company's Stamp & Signature

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

*5% GST Extra Advertisement Tariffs

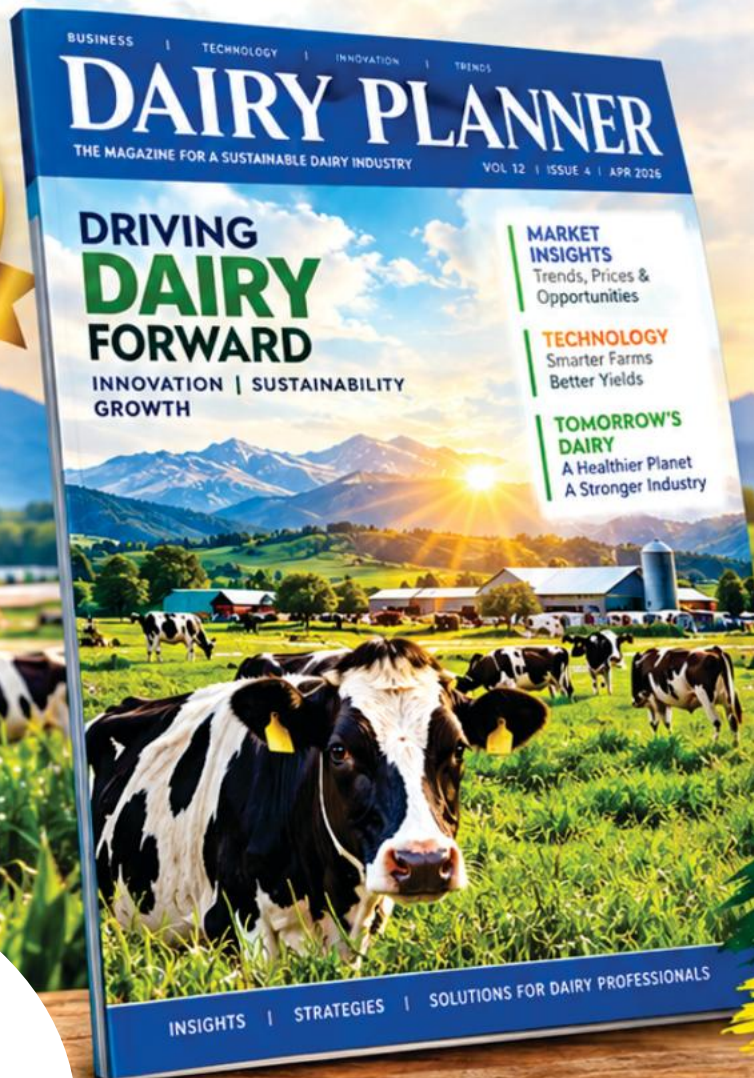
Advertisement Type	Single Issue (INR)	Single Issue (USD)	Advertisement Type	Single Issue (INR)	Single Issue (USD)	Advertisement Type	Single Issue (INR)	Single Issue (USD)
Front Cover	30,000	500	Back Cover	20,000	300	Centre Spread	25,000	400
Front Gate Fold 1A	25,000	400	Back Gate Fold 1A	20,000	300	Full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

**BOOST
 YOUR BRAND
 VISIBILITY**
with us

Advertise with us
Today

See your business
Growing ↑

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



**BRAND
 AWARENESS**



**TARGETED
 AUDIENCE**



**BUSINESS
 GROWTH**



**INDUSTRY
 CONNECTIONS**

**BE SEEN
 BE HEARD
 BE REMEMBERED**

ADVERTISE WITH US