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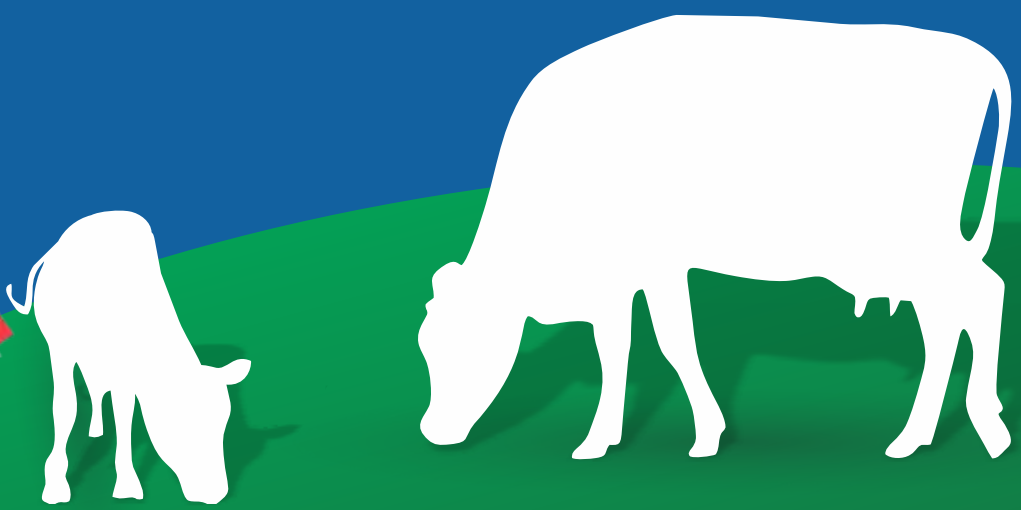

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HEALTH
Benefits of A2 Milk

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.

From the Pen of Chief Editor

Thriving in Winter: Strategies for Optimal Cattle Performance

Winter stress in cattle poses a significant challenge for livestock producers. When temperatures drop below their comfort zone, cattle expend more energy to maintain body temperature, diverting resources away from essential functions like growth, milk production, and immune function. This increased energy expenditure can lead to reduced feed intake, decreased growth rates in calves, and compromised immune systems, making them more susceptible to diseases like pneumonia and respiratory infections.

Cold stress manifests in various ways. Cattle may exhibit shivering, huddling behavior, and reduced activity levels to conserve energy. In extreme cases, hypothermia can occur, leading to serious health consequences and even mortality. Factors like wind chill, wet conditions, and inadequate shelter can exacerbate the impact of cold stress.

To mitigate the effects of winter stress, farmers must implement a comprehensive approach. **Provide Adequate Shelter with** well-insulated barns, windbreaks, or other structures to protect cattle from harsh weather conditions like wind, rain, and snow and ensure adequate bedding to provide insulation and a dry resting surface.

Optimize Nutrition with high-quality forage, such as hay with high energy and protein content, to meet the increased energy demands of cattle during winter. Consider supplemental feeding with concentrates, particularly for high-producing dairy cows, growing calves, and thin animals and ensure consistent access to clean, unfrozen water.

Proactive Health Management by implementing a robust vaccination program to protect cattle from common winter diseases. Conduct regular health checks to identify and address any health issues early on and implement effective parasite control programs.

Select breeds that are better adapted to cold climates, such as those with thicker coats and higher levels of body fat. By implementing these strategies, farmers can effectively manage winter stress in cattle, ensuring their health, productivity, and overall well-being throughout the colder months.

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The Current Status of the Dairy Sector in India: Opportunities and Challenges

Krishna Nand Bansal[1], Chandra Shekhar Saraswat[1], Sumit Prakash Yadav[1] , Abhay Meena
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India's dairy sector is a cornerstone of its rural economy and agricultural heritage. Recognized as the world's largest milk producer, the country contributes more than 23% of global milk output. While the sector's growth has been impressive, it also faces unique challenges and opportunities that influence its trajectory.

An Overview of India's Dairy Industry

India's dairy sector predominantly relies on smallholder farmers, with most owning one to three animals. These farmers collectively account for a significant share of milk production, making India a global leader. The sector is central to rural livelihoods, offering a consistent income source to millions.

Production Figures: India's milk production reached approximately 221 million metric tons (MMT) in 2022-23.

Consumption Trends: Almost all milk produced is consumed domestically, with per capita availability at 444 grams daily.

Economic Importance: Dairy contributes around 4.5% to India's GDP and about 25% to agricultural GDP.

The Cooperative Movement

The cooperative movement is one of the defining features of India's dairy success. Organizations such as the Gujarat Cooperative Milk Marketing Federation (Amul) have played a transformative role, empowering farmers and ensuring fair prices.

Dr. Verghese Kurien, often called the "Father of the White Revolution," pioneered this model, which remains the backbone of the dairy industry. Today, over 200 dairy cooperatives connect 16 million farmers, fostering efficient production, processing, and distribution systems.

Emerging Trends

Changing Consumer Preferences

Rising health awareness has shifted demand toward low-fat, fortified milk and functional products like probiotics. Traditional dairy items such as ghee and paneer are also gaining traction, not only in domestic markets but globally.

Export Potential

Although a top producer, India's share in global dairy exports remains small. Strategic focus on products like skimmed milk powder (SMP) and ethnic dairy items could improve its export presence.

Digital and Technological Advancements

Tools like mobile applications for cattle management, AI-based milk analyzers, and blockchain technology are enhancing efficiency and transparency in the sector.

Sustainability

Addressing climate change, the sector is gradually adopting eco-friendly practices, such as reducing methane emissions and promoting efficient resource use.

Challenges Hindering Growth

Despite its strengths, the Indian dairy sector faces critical challenges:

Fragmentation in Production

The dominance of small-scale farming often limits productivity. Many farmers lack access to quality feed, veterinary services, and advanced milking techniques.

Quality and Safety Concerns

Ensuring milk quality in the unorganized sector is challenging due to issues like adulteration, poor handling, and inadequate cold storage infrastructure.

Rising Costs

Feed and fodder, which account for most production costs, are becoming increasingly expensive, impacting farmer profitability.

Climate Change

Rising temperatures, water scarcity, and fodder shortages caused by climate change are negatively affecting milk production.

Market Dynamics and Policy Gaps

Milk price fluctuations, limited government interventions, and fragmented regulations hinder the sector's ability to compete globally.

Unlocking the Sector's Potential

Despite these hurdles, the dairy industry holds immense potential for growth and development:

Value-Added Products

The demand for cheese, flavored milk, ice cream, and other value-added products is growing. Expanding into these markets can enhance revenue for producers.

Export Expansion

With the rising global popularity of organic and ethnic dairy products, India can strengthen its position as a significant exporter. Standardized quality certifications will be key to tapping international markets.

Improving Livestock Productivity

Introducing advanced breeding techniques like artificial insemination and embryo transfer technology can boost cattle productivity. Disease control programs and improved veterinary services are equally crucial.

Building Infrastructure

Investments in cold chains, processing facilities, and technology can bridge inefficiencies in production and supply chains.

Empowering Women Farmers

Women comprise a large portion of the dairy workforce. Supporting their participation through training, financial aid, and leadership opportunities can drive sectoral growth.

Roadmap for the Future

To sustain growth, India's dairy sector requires targeted interventions across multiple fronts:

Policy Support: Strengthening initiatives like the National Dairy Plan (NDP) to improve productivity and rural incomes.

Public-Private Partnerships: Collaborative efforts can accelerate infrastructure development and market penetration.

Technology Integration: Tools like IoT, artificial intelligence, and blockchain should be scaled up to optimize processes.

Capacity Building: Farmer training programs on best practices, sustainable farming, and disease prevention can enhance productivity.

Conclusion

India's dairy sector is a symbol of its agricultural potential and economic resilience. As it faces the dual challenge of meeting domestic demand and competing in global markets, innovation and strategic planning will play a critical role.

By addressing production inefficiencies, strengthening infrastructure, and supporting smallholder farmers, the sector can unlock significant growth. With the right policies and initiatives, India can not only maintain its leadership in global milk production but also emerge as a dominant player in value-added dairy exports.

Heifer Management & Strategies to Manage Winter Vagaries

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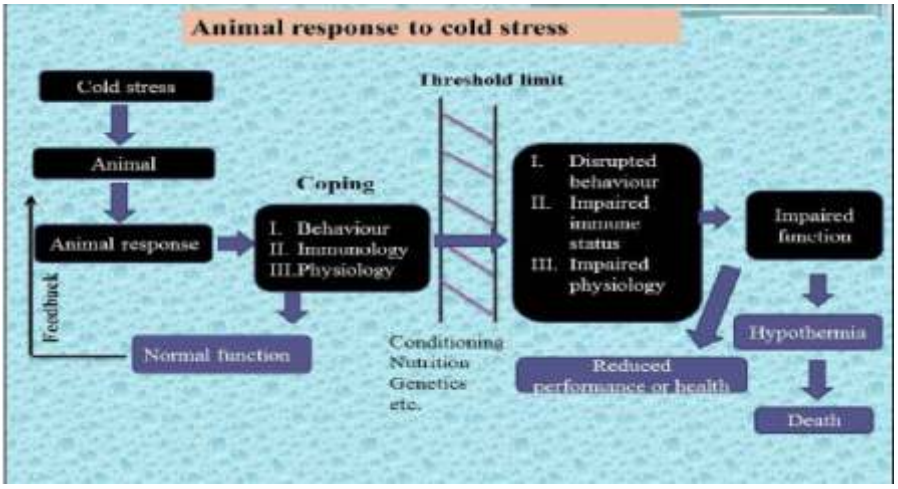
Introduction

Heifer management is important for maintaining growth rates, minimizing health problems, and optimizing current and future profitability of the dairy farm. Dairy heifers account for about 30% of the feed costs on a dairy farm, and the costliest period for raising heifers is during the preweaning period. The animal's susceptibility to disease is greatest during this period, and the cost per unit of dry matter (DM) consumed is the highest. Maintaining animals between lower and upper critical temperature of thermo-neutral zone optimizes production. Cows being homo-thermic animals need to maintain a constant temperature of 38 °C. Animals kept within the thermo neutral zone; need not to expend extra energy to suffice their body temperature. Temperatures below the lower end of this range, the lower critical temperature, result in cold stress in cows. Optimum health and production of dairy animal mandates adequate management. Acclimatization to cold stress thrusts on increase in voluntary food intake, rise in resting metabolic rate, augments metabolic capacity, increase in hair coat thickness, hair length and density, shivering and non-shivering thermogenesis accompanied with adrenal hormonal rush as cold exposure advances.

Strategies to manage winter vagaries

Nutritional management

1. Increase the energy content (77% vs. 70 -72% TDN) and protein (17.5% vs. 14.5% CP).
2. Rations containing about 20%



vs. 17% fiber in the animal feed are helpful to reduce the effects of cold temperatures

3. Animals outdoors will require about 15 to 20% more feed for the season than animals kept in confinement housing.

Winter provisions

1. Concentrates: Feed Blocks, UMMB Licks, Cubes, Meals and cakes.
2. Conserved Forage: Hay, Silage, Haylage, Leaf meal, etc.
3. Crop residues: Stover, Straw etc.
4. Cultivated fodders: Paddy, Oat, Maize, Berseem, Leucerne, Turnip, etc.
5. Fodder tree leaves: Willow, Robinia, Alanthus, Callyandra, Sesbania, Salix Populus, Ulmus and Acacia, Moras and Malus.
6. Aquatic vegetation: Typhaangustata, Phragmiteselephant oides, Nympheatetragona.
7. Establishment of fodder banks: Surplus forages during summer is harvested and conserved or transported from nearby states to meet the periodic unavailability
8. Reduction of wastages by chaffing: 15-20% of the straw can be conserved from wastage by chaffing.
9. Apple pomace: The dried apple pomace contains 7.7% crude protein (CP) &1.86 Mcal (ME)/kg DM. The ensiled apple pomace shows best feed conversion ratios at 15%incorporation in the diet.
10. Maize grain, molasses and chicken litter can be used for supplementary feeding of cows or growing stock.
11. Urea treatment of straws: Fertilizer grade urea @ 4-5% increases the digestibility by about five units, whereas, if it is ensiled for 10 days, the increases digestibility is twice this. Cows fed urea treated wheat straw-based diet got higher live weight gain than cows fed hay-based diet.

Shelter management

Proper sheds should be provided to prevent from the prevailing chilly winds.

1. Provision of heating facilities like room heaters, provision of curtains.
2. Bedding (4-6 inches in large animals and 2 inches for smaller animals) should be clean and dry on concrete floor to reduce body heat loss.
3. Shed should be cleaned at least twice in a day for proper disposal of wastes and minimum piling up of ammonia gases.
4. Ventilation should be appropriate & draft free; relative humidity in the range of 40 to 80% is ideal.
5. Snow creates serious feeding and bedding issues and a snow removal plan needs to be developed.
6. Strategy to move calving season too late in spring/ early summer, preventing cows to spend late lactation in cold months.

Health management

1. Vaccinations, nutritional supplementation deworming protocols should be followed.
2. Encourage exercise by varying the location of feeding and watering sites.
3. Exercise will help prevent obesity and overgrown hooves.
4. Prevent wet, muddy conditions to prevent threat of coccidiosis.
5. A teat dip powder will reduce risk of frost-bitten teats during cold winter.
6. Check bruises on soles, trim overgrown hooves and prevent laminitis and lameness.

Conclusion

Management and housing strategies need to be in place to reduce the maintenance energy requirement of calves during the winter by providing ample clean, dry bedding; windbreaks; and other improvements to the housing to lessen the cold stress without going overboard to increase the risk of respiratory problems. Feeding heifers during winter needs to be changed to provide adequate energy for continued growth rates achieved during other times of the year. Animals show optimum performance in their production and reproductive traits with in the thermoneutral zone. The condition above upper critical temperature and below lower critical temperature, animal's performance gets compromised. To mitigate this ill effect the management in terms of nutrition, shelter, watering, mud accumulation, health, etc. are emphasized, so as to prevent the cold stress related abnormalities; also calving season is deferred to late spring /early summer.

Maintenance of LN_2 Containers for Successful Artificial Insemination Programs

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The successful implementation of artificial insemination (AI) programs is a cornerstone of modern breeding techniques in both animal husbandry and reproductive biotechnology. One of the most critical components in these programs is the effective storage and preservation of sperm, which is often achieved through cryopreservation. Liquid nitrogen (LN_2) containers are essential for storing sperm samples at ultra-low temperatures, typically around -196°C, to ensure long-term viability and fertilization potential. However, the efficiency and success of AI programs heavily depend on the proper maintenance and management of these LN_2 containers. Maintaining LN_2 containers is not a straightforward task; it requires careful attention to factors such as temperature regulation, regular monitoring of LN_2 levels, and ensuring the integrity of the storage units. Neglecting these factors can lead to the degradation of valuable genetic material, resulting in poor reproductive outcomes or the loss of genetic resources. Therefore, it is crucial to implement a systematic maintenance routine that includes routine inspections, proper handling procedures, and effective training for staff involved in AI programs. This ensures that the containers remain functional, secure, and capable of preserving sperm at optimal conditions, thus supporting the overall success of AI initiatives. When storing LN_2 containers, specific room characteristics are essential for safety and compliance. Important considerations are:

1. Ventilation

- Adequate ventilation is crucial. Since nitrogen displaces oxygen, leaks could create an asphyxiation hazard.
- Rooms should have mechanical ventilation to prevent the build-up of nitrogen gas. Ideally, an air exchange rate of at least 6 air changes per hour is recommended.
- Oxygen sensors with alarms are also advisable to detect oxygen depletion.

2. Temperature and Humidity

- Liquid nitrogen should be stored in a cool and dry area away from direct sunlight or heat sources, Ideal temperature range: 15-25°C (59-77°F).

- Low humidity levels help to minimize frost build-up around the containers, Ideal Range: 40-60%.

3. Access and Location

- The storage room should be well-marked and restricted to authorized personnel only.
- Ensure clear labelling for the room, warning of low oxygen risks and cryogenic hazards.
- Keep the room close to ventilation or emergency exits, making sure there are no obstacles for quick evacuation.

4. Fire and Safety Equipment

- Although nitrogen itself is non-flammable, cryogenic hazards demand safety gear nearby, such as face shields, gloves, and aprons.
- Emergency oxygen masks may be kept on hand for handling emergencies.
- Eyewash stations and safety showers should be available near the storage area.

5. Spill Containment

- Floors should be constructed of non-combustible materials and be resistant to low temperatures to handle accidental LN_2 spills.
- Avoid storing other chemicals or flammable substances near liquid nitrogen containers.

6. Container Stability and Spacing

- Containers must be stored in a stable, upright position to prevent tipping.
- Maintain sufficient space between containers for airflow and to avoid crowding, which can hinder handling and increase the risk of accidental spills.

Proper maintenance of these characteristics minimizes the hazards associated with storing liquid nitrogen and helps to ensure a safer environment. Maintaining LN_2 containers or cryogenic storage tanks under field conditions is critical for ensuring the viability of spermatozoa. There is generally a temperature gradient in a liquid nitrogen storage container, with the lowest temperatures found at the bottom and the highest near the neck. The specific temperatures can vary based on the design of the container, how it is filled, and how often it is accessed. Regular monitoring of temperatures in different sections of the container is essential for ensuring optimal storage conditions for semen straws.

Expected Temperature Gradient

- Bottom of the Container: Close to -196°C (the temperature of liquid nitrogen). Straws submerged in LN2 will maintain this temperature.
- Middle of the Container: May range from -196°C to around -180°C, depending on how far from the liquid phase the straws are located.
- Neck of the Container: This area can be significantly warmer, with temperatures possibly ranging from -150°C to -196°C, as some nitrogen vapour collects and reduces the cooling effect.

Here are key maintenance practices and considerations:

1. Regular Inspection

- **Visual Checks:** Examine the container for any signs of damage, such as dents, rust, or leaks.
- **Pressure Gauge:** Monitor the pressure gauge if available, ensuring it remains within safe operating limits.
- **Check for Frost:** Excessive frost can indicate a leak or poor insulation, which may affect temperature maintenance. Use the lid that comes with the container and avoid leaving the container open longer than necessary to reduce nitrogen loss and prevent ice build-up.

2. Temperature Monitoring

- **Thermometers:** Use digital thermometers or data loggers to monitor the temperature inside the tank.
- **Alerts:** Set up alarms for temperature deviations outside of acceptable ranges (-196°C for liquid nitrogen).

3. Liquid Nitrogen Level Maintenance

- **Regular Refilling:** Liquid nitrogen evaporates over time. Monitor the fill level frequently and refill as necessary to prevent the tank from running low.
- **Use of Pressure Relief Valve:** Ensure that the pressure relief valve is functioning properly to prevent over-pressurization.

4. Cleaning and Sanitization

- **External Cleaning:** Regularly clean the outside of the tank to prevent contamination.
- **Internal Inspection:** Occasionally inspect the inside

of the container for any contaminants or debris, ensuring it remains sterile.

5. Documentation

- **Record Keeping:** Maintain detailed logs of nitrogen levels, temperatures, refill dates, and maintenance checks. This is crucial for tracking the condition of the samples.
- **Inventory Management:** Keep an updated inventory of stored samples to ensure proper organization and retrieval.

6. Environmental Considerations

- **Placement:** Ensure that the nitrogen container is placed in a cool, dry area, away from direct sunlight or heat sources. In outdoor environments, consider shielding the container from wind, which can increase evaporation rates.

7. Training and Protocols

- **Staff Training:** Ensure that all personnel handling liquid nitrogen are adequately trained in safety and operational protocols.
- **Emergency Procedures:** Develop and communicate emergency procedures for handling spills, leaks, or accidents involving liquid nitrogen.

8. Periodic Maintenance

- **Manufacturer Guidelines:** Follow the manufacturer's guidelines for maintenance and servicing of the liquid nitrogen containers.
- **Professional Servicing:** Schedule regular professional inspections and maintenance checks to ensure long-term reliability.

9. Disposal and Replacement

- **Life Span Awareness:** Be aware of the expected lifespan of the cryogenic tank and plan for timely replacement or disposal as needed.
- **Responsible Disposal:** Follow local regulations for the disposal of liquid nitrogen and cryogenic containers.

Handling LN2 requires careful attention due to its extremely low temperature (-196°C or -321°F) and the potential hazards it presents. Here are essential precautions to follow during liquid nitrogen handling:

1. Proper Personal Protective Equipment (PPE):

- **Cryogenic gloves:** Insulated gloves specifically designed for handling cold substances.
- **Face shield or goggles:** To protect the eyes from splashes or vapour.
- **Lab coat or apron:** To protect skin from accidental splashes.
- **Closed-toe shoes:** To prevent liquid nitrogen from contacting bare feet.

2. Avoid Direct Contact:

- **Do not touch liquid nitrogen directly:** It can cause severe frostbite or cold burns if it contacts skin. Always use gloves or tongs when transferring Ln2.
- **Do not inhale nitrogen gas:** The gas is odourless and can displace oxygen, leading to suffocation in poorly ventilated areas.

3. Handling Spills:

- Handle Containers Carefully as sudden movements or tilting can cause splashing or spills. Use trolleys or carts for large containers to avoid spills and reduce risk. In case of a spill, allow the liquid nitrogen to evaporate in a well-ventilated area. Liquid nitrogen quickly turns into gas and does not leave hazardous residues, but it can displace oxygen and create an asphyxiation hazard.

4. Emergency Procedures:

- If liquid nitrogen splashes on the skin, treat the area as a burn by slowly warming it and seeking medical attention immediately.
- If you are in a confined space and feel dizzy, faint, or short of breath, exit the area immediately and seek fresh air.

In conclusion, maintaining LN_2 containers in specified storage room and under field conditions, is an essential aspect for sustainability and efficacy of AI programs. Proper upkeep of these storage units guarantees the preservation of sperm at optimal conditions, safeguarding the genetic material crucial for breeding success. The risks associated with handling liquid nitrogen can be minimized by following precautionary measures, ensuring a safe working environment. By investing in thorough maintenance protocols and staff training, AI programs can significantly improve reproductive outcomes.

Mitigation of Cold Stress in Dairy Cattle and its Strategies

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Cold stress in dairy cattle

Dairy cattles are warm blooded animal and need to maintain a constant core body temperature of about 101ºF. During the winter months, the need for cattle is to maintain their core body temperature becomes a challenge and can cause cold stress.

Cold stress in cattle is when their body temperature drops because their body's natural metabolic processes plus the heat provided by a heavy winter coat are not enough to keep them warm. When cattles are cold stressed, they will change their behavior such as seeking shelter to avoid the cold. With good body condition, a clean, dry coat, shelter, fresh water and good nutrition, dairy cattle can tolerate temperatures well below zero.

Upper and Lower Critical Temperature for Cattles

Within a range of environmental temperatures called the "thermoneutral zone," animals do not have to expend any extra energy to maintain their body temperature. However, below the lower limit of the thermoneutral zone, in the "lower critical temperature," the animal experiences cold stress. To combat cold stress, the animal must increase its metabolic rate to supply more body heat. This increases their dietary requirements, particularly for energy.

Cold stress in calves

Raising calves is a huge expense on any dairy farm and getting them off to a great start is important in cold weather as much as warm weather. Cold stress can increase the risk of disease in pre-weaned calves. Additionally, growth rates can reduce during the cold months unless we provide energy through a higher plane of nutrition or preserve energy by improving the calf's environment. If not managed well, death rates in calves are higher during cold weather.

Effects of stressful winter on dairy animals

It directly affects the production, reproduction, body condition score, feed utilization and health of animal and indirectly affects the forage production, water quality and quantity, causes shelter over-burden and mud accumulation.

- **Milk production:**

Cold exposure may directly limit the milk yield by reducing mammary gland temperature, may act indirectly by affecting the udder's blood supply.

Thermoneutral zone			
Animals	Lower Critical Temperature	Comfort zone	Upper Critical Temperature
Cow	-5 to -10℃	13 to 18℃	25 to 28℃
Buffalo	-10 to -15℃	10 to 17℃	25℃
Calf	0 to -4℃	15 to 22℃	25℃

- **Reproduction:**

Increasing age at first calving, decreased pregnancy rates, increases calving intervals and decreases fertility of bulls due to underfeeding.

- **Body Condition Score:**

Higher body condition score maintain cows to insulate against winter stress and cows position themselves to minimize surface area exposed to harsh weather. Body reserves get depleted due to winter stress causing loss of live weights thus reversing weight gains made in summer. Cows losing more body weight (16%) are unlikely to re-conceive during the next breeding season.

- **Health:**

Increases incidence of respiratory infections & hypoxia, decreases immune response in ill ventilated barn, increases basal metabolic rate, frost bite, asthma, sore throats, coccidiosis, increases postnatal mortality, also causes hurdling, shivering and lack of coordination.

Mitigation strategies

For Calves

First 24 hours of Newborn calves are most important, they should be moved to a warm environment to help dry off quickly and avoid chilling. Newborn calves have only 3-4% body fat and will burn through this fat reserve quickly if they remain wet and/or in a drafty area. Adequate amounts of colostrum should also be fed within the first 3 hours as it is high in fat and Immunoglobin contents.

For Pregnant Cattles

Pregnant cattles in the herd should be segregated and provided feed separately to ensure they receive adequate nutrition and are not denied feed by more dominant cows/bulls. Generally, these groups of animals may also require better quality feed and supplements in order to fare well during this period. Feed testing of winter hay should be done to ensure that they will meet the nutritional needs of the animals. Energy and protein levels are particularly important and testing will help determine the level of supplemental feeding/nutrition required (e.g., grains, vitamins, minerals).

For Adult Cattles

Nutrition Management

- Increase the energy content (77% vs. 70 -72% TDN) and protein (17.5% vs. 14.5% CP).
- Rations containing about 20% vs. 17% fiber in the animal feed are helpful to increase fat percentage in milk & reduce the effects of cold temperatures.
- Animals outdoors will require about 15 to 20% more feed for the season than animals kept in confinement housing.
- Winter provisions like Concentrates, Feed Blocks, Conserved Forage- Hay, Silage, Haylage and Crop residues- Stover, Straw, Cultivated fodders - Paddy, Oat, Maize, Berseem, Leucerne and Fodder tree leaves.

Shelter Management

- Proper sheds should be provided to prevent from the prevailing chilly winds.
- Provision of heating facilities like room heaters, provision of curtains.
- Bedding (4-6 inches in large animals and 2 inches for smaller animals) should be clean and dry on concrete floor to reduce body heat loss.
- Shed should be cleaned at least twice in a day for proper disposal of wastes and minimum piling up of ammonia gases.
- Ventilation should be appropriate & draft free; relative humidity in the range of 40 to 80% is ideal.
- Calf jackets and blankets are also helpful to keep calves warm.
- Strategy to move calving season too late in spring/ early summer, preventing cows to spend late lactation in cold months.

Water Management:

When the water temperature is 47°F or above, it is recommended to utilise tank heaters to keep water sources from freezing. Ensuring of getting adequate drinking water that promotes maximum health and performance.

Mud Management:

Providing adequate resting time is an important aspect of dairy management, both for production and welfare. Dairy cows in confinement should lie down for approximately 12 hours/day, however, if facilities are not sufficiently clean or comfortable, cows will often remain standing. Wetness of mud can make parasite survival more likely as well. Suggestions may include the development of geo textiles, gravel, gutters, sand or woodchips.

Health Management

1. Vaccinations, nutritional supplementation and deworming protocols should be followed.
2. Encourage exercise by varying the location of feeding and watering sites.
3. Exercise will help prevent obesity and overgrown hooves.
4. Prevent wet, muddy conditions and contamination of feed by manure as it will increase the threat of coccidiosis.
5. A teat dip powder will reduce risk of frost bitten teats during cold winter.
6. Check bruises on soles, trim overgrown hooves and prevent laminitis and lameness.

Conclusion :

Animals show optimum performance in their production and reproductive traits within the thermoneutral zone. The condition above upper critical temperature and below lower critical temperature, animal's performance gets compromised. To mitigate this ill effect the management in terms of nutrition, shelter, watering, mud accumulation, health, etc. are emphasized, so as to prevent the cold stress.

Mitigation of Antimicrobial Resistance (AMR) in Dairy Farming Industry

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Milk has a unique significance in India, beyond merely being a common dietary item. It has great cultural and historical significance in the lives of the Indian people. The Indian dairy industry is also an important aspect of the country's economy, making significant contributions to agriculture and rural development. The Indian dairy industry has progressed from a country with an acute milk shortage to the world's greatest milk producer. The Indian dairy market was valued at USD 130 billion in 2021 and is projected to reach USD 300 billion by 2027, driven by both volume and value terms.

The dairy business in India confronts numerous hurdles as well. India has low per-animal productivity of milk. The primary factors are restricted availability and affordability of quality feed and fodder, traditional feeding methods, lack of enough veterinary services, limited supply of quality animals and unsuccessful breeding programmes of dairy animals etc. Inadequate farm management, insufficient financial access, a lack of inexpensive technology and access to knowledge has all contributed to India's low production efficiency. Quality challenges in India include contaminated water, milk adulteration, pesticides, mycotoxins, heavy metals and veterinary medications.

Dairy farming is growing more intensive and organized in order to increase productivity while using fewer resources. With a growing human population and improved economic conditions, there is an increasing demand for animal based foods especially milk. The intensification of farming operations coupled with inadequate management may put dairy cows under significant production pressure, leading to diseases like mastitis, metritis, lameness, and reproductive abnormalities that frequently require antibiotic treatment. The antibiotics used to prevent and treat infectious illnesses in the dairy industry add up to the antimicrobial resistance (AMR). AMR become a major worldwide concern which has broad ramifications for animal welfare, agricultural production, environmental sustainability and public health.

Inadequate animal husbandry infrastructure, the easy

accessibility of antibiotics and economic demands to sustain output sometimes resulted in inefficient antimicrobial use. There is a lack of understanding among many dairy farmers, particularly smallholders regarding the potential long term effects of antibiotic use. They frequently rely on informal providers for animal health treatments, which results in uneven and under or overuse of antibiotics. Furthermore, there is a lack of awareness and execution of appropriate biosecurity measures. Dairy farm manure, which frequently contains antibiotic residues and resistant microorganisms, contributes to the environmental reservoirs of antibiotic resistance. These environmental antibiotic resistance genes can pass eventually to the human populations via water, soil and food contamination.

Antimicrobial resistance is a serious health threat that can be combated in many ways.

1. One Health approach

AMR is a complicated issue that necessitates sector-specific efforts in human health, food production, animal welfare and the environment, as well as a coordinated strategy across these sectors. One Health is an integrated, unified approach that seeks to produce optimal and long-term health outcomes for humans, animals, and ecosystems. It acknowledges that the health of humans, domestic and wild animals, plants, and the surrounding environment are inextricably interrelated and interdependent. The One Health strategy to avoiding and managing AMR brings together stakeholders from relevant sectors to communicate and collaborate on the design, implementation, and monitoring of programmes, policies, laws, and research to reduce AMR and improve health and economic results.

2. Awareness

Dairy entrepreneurs must be made more aware of AMR and the proper use of antimicrobials. Farmers should be trained in disease prevention strategies that do not include antimicrobials, including as immunization, improved nutrition and better housing. Extension agencies should also try to educate farmers on the right use of antibiotics, with a focus on using them solely under veterinary supervision and understanding the harmful environmental consequences of poor farm waste management.

3. Alternative methods

Ethnoveterinary practices often involve the use of plants, herbs and other natural resources to treat and prevent diseases in livestock and other animals. In many parts of the world, particularly in rural or indigenous communities, these are the primary method for veterinary care due to limited access to modern veterinary services. Dry cow treatment, vaccination and use of probiotics can also help to reduce the need for antibiotics. Selective dry cow therapy includes delivering antibiotics exclusively to cows with existing infections during the drying process, rather than treating all cows, which can drastically minimize antimicrobial usage while maintaining udder health.

4. Biosecurity and AMR

Biosecurity measures, such as controlling the movement of livestock, monitoring disease outbreaks, and ensuring proper sanitation in healthcare settings, can help limit the overuse of antimicrobials and prevent the spread of resistant pathogens across communities, countries, and ecosystems.

5. Regulatory policies

The importance of regulatory frameworks in regulating antibiotic usage cannot be emphasized. Stricter rules for antibiotic use in dairy farming, such as prohibiting over-the-counter antibiotic sales, requiring prescription based purchase and limiting the use of antimicrobials of human importance, are very essential. Effective implementation of these standards will help to ensure that antibiotics are used correctly and only when it is necessary.

In conclusion, addressing AMR through coordinated worldwide initiatives is vital to maintaining public health, ensuring effective treatments for infections and preventing future pandemics or outbreaks of resistant diseases in the dairy industry.

Exploring the Impact of Animal Husbandry on Biodiversity: Challenges and Solutions

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Animal husbandry has played a crucial role in human progress, providing essential resources like food and supporting economic development. However, as this practice intensifies globally, it has triggered significant ecological concerns. Biodiversity, both in genetic variation and ecosystem health, faces substantial challenges due to activities like habitat destruction, pollution, and the spread of invasive species. These issues demand urgent action as the world seeks sustainable ways to balance agricultural needs with environmental preservation.

The Challenges of Animal Husbandry on Biodiversity

1. Habitat Loss and Fragmentation

Expanding livestock farming often requires converting forests, wetlands, and grasslands into grazing areas or fields for feed crops. This process not only reduces habitats for wildlife but also fragments them, complicating species' ability to migrate, find resources, or reproduce. The resulting loss of connectivity threatens many species' survival.

2. Genetic Erosion

Intensive animal husbandry practices often focus on a limited number of breeds that are favored for their productivity. This focus on a few high-yield breeds can lead to genetic erosion, where the diversity within livestock species diminishes. As local breeds are replaced by commercial breeds, valuable genetic traits that contribute to resilience against diseases and changing environmental conditions are lost. This reduction in genetic diversity makes livestock populations more vulnerable to disease outbreaks and climate change.

3. Pollution and Eutrophication

Animal husbandry generates substantial waste, including manure, urine, and chemical runoff from fertilizers and pesticides used in feed crop production. When these substances enter water bodies, they can lead to eutrophication, where excessive nutrients cause algal blooms that deplete oxygen levels and harm aquatic life. Additionally, methane emissions from ruminants contribute to climate change, indirectly affecting biodiversity through altered ecosystems and weather

patterns.

4. Invasive Species

The introduction of non-native livestock breeds can inadvertently lead to the establishment of invasive species. These species can outcompete local flora and fauna, disrupting existing ecosystems. Invasive species often lack natural predators in their new environments, allowing them to proliferate unchecked, which can lead to significant declines in native species.

Solutions for Sustainable Animal Husbandry

1. Promoting Sustainable Practices

To mitigate the negative impacts of animal husbandry on biodiversity, promoting sustainable farming practices is essential. This includes implementing rotational grazing, agroforestry, and integrated crop-livestock systems. Such practices can enhance soil health, improve water retention, and increase habitat availability for wildlife. Sustainable practices also help maintain genetic diversity by encouraging the use of local breeds that are better adapted to specific environments.

2. Conservation of Genetic Resources

Efforts to conserve genetic diversity within livestock populations are critical. This can be achieved through the establishment of gene banks and breeding programs that prioritize the preservation of local and indigenous breeds. By maintaining a diverse genetic pool, farmers can ensure that their livestock are resilient to diseases and environmental changes, ultimately benefiting both agriculture and biodiversity.

3. Restoration of Habitats

Restoring degraded habitats can help counteract some of the negative impacts of animal husbandry. Initiatives that focus on reforestation, wetland restoration, and the creation of wildlife corridors can enhance biodiversity. These efforts not only support wildlife but can also improve the overall health of agricultural landscapes, benefiting livestock production in the long run.

4. Education and Awareness

Educating farmers, policymakers, and consumers about the value of biodiversity and sustainable farming methods is vital. Awareness campaigns can promote the adoption of environmentally friendly practices and encourage consumer demand for sustainably sourced products.

5. Policy and Regulation

Governments and international organizations play a vital role in promoting sustainable animal husbandry practices. Implementing policies that incentivize environmentally friendly practices, protect natural habitats, and support biodiversity conservation can lead to more sustainable livestock production systems. Regulations that limit pollution and promote the responsible use of resources are also essential for safeguarding ecosystems.

The impact of animal husbandry on biodiversity presents significant challenges that require urgent attention. However, by adopting sustainable practices, conserving genetic resources, restoring habitats, and fostering education and policy initiatives, it is possible to mitigate these impacts. By prioritizing biodiversity, we can create a more resilient and sustainable agricultural system that benefits both people and the planet. A future-oriented approach to animal husbandry that recognizes and values the interconnectedness of ecosystems and agriculture is essential for achieving a sustainable coexistence between humanity and nature.

The challenges posed by animal husbandry on biodiversity underscore the need for innovative solutions that embrace sustainability without compromising food security. To achieve this balance, it is crucial to integrate ecological principles into agricultural practices, fostering a symbiotic relationship between farming systems and natural ecosystems.

The future of animal husbandry lies in a holistic approach that integrates environmental stewardship, social responsibility, and economic viability. By adopting a multifaceted strategy that leverages technology, agroecology, and community empowerment, it is possible to mitigate the adverse effects of livestock farming on biodiversity. Such an approach not only safeguards ecosystems but also ensures the long-term sustainability of agricultural systems, creating a world where both humanity and nature thrive in harmony.

Breeding Strategies For Improvement of Dairy Herd Health

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Cattle and buffalo form the major backbone for the dairy industry in any country. Dairy consumption will increase because it provides essential nutrients more efficiently than many other agricultural systems. Dairy farming will become modernized in developing countries and milk production per cow will increase, doubling in countries with advanced dairying systems (Britt et al., 2018). Animal Breeders have given emphasis for selection of high milk producing animals. Genetic differences in resistance to various pathogens and disease resistant has not yet been utilized.Health events result in substantial economic losses, including losses due to on-farm death, increased veterinary and treatment costs, premature culling, and reduced milk production (Liang et al., 2017). However, a new approach is needed to meet the increasing demand for milk production and address the increased concerns about animal health and welfare (Sun et al., 2019). It is now easy to collect and access large and complex data sets consisting of molecular, physiological, and metabolic data as well as animal-level data (such as behavior). This provides new opportunities to better understand the mechanisms regulating cow performance. Breeding for disease resistance in animals aims to develop populations with enhanced natural defenses against specific diseases. This approach integrates genetics, genomics, and traditional breeding methods to reduce disease incidence, improve animal health, and reduce reliance on antibiotics and other treatments. Use of molecular genetic selection holds the promise to elucidate the genetic architecture controlling different physiological systems to allow simultaneous improvement of disease resistance and production traits (Warner et al., 1987).

Accurate cattle production can only be attained with the rapidfor early warning of illnesses, feeding precision and remote diagnosis (Džermeikaitė et al., 2023).The long-term sustainability of the dairy animal industry depends on the development of balanced breeding goals to simultaneously improve animal health and welfare.

Disease resistance

Disease resistance is the ability to prevent or reduce the presence of diseases in otherwise susceptible hosts. Disease resistance refers to an animal's ability to prevent, reduce, or control the impact of infectious agents such as bacteria, viruses, fungi, parasites, or other pathogens. It reflects the capacity of an animal to either avoid infection altogether or minimize the damage caused by a pathogen, ensuring that the animal remains healthy and productive. Disease resistance can be inherited, and breeding efforts often focus on selecting animals with superior resistance traits. Some traits related to disease resistance (e.g., immune response) are moderately to highly heritable, meaning they can be passed from parents to offspring.

Breeding for Disease Resistance

The wide availability of genomic tools provides a great venue to genetically improve traits that are difficult or expensive to measure (e.g., disease resistance, welfare, longevity) as well as to better manage genetic diversity (Meuwissen et al., 2020). The refinement of breeding programsto incorporate novel breeding objectives requires the developmentof high-throughput phenotyping technologies (and structured andcontinuous data

recording streams), investigation of the geneticrelationship between novel traits and those routinely recorded(and the potential consequences of selection for every single trait),the performance of large-scale genomic studies, especially genomicpredictions and genome-wide association studies, and refinementof selection indexes to reflect improved knowledge ofbiology, new sources of data, and changing conditions in the environmentand economy (Cole and VanRaden, 2018). This approach minimizes dependency on antibiotics, reduces treatment costs, and enhances animal welfare by reducing susceptibility to diseases. By selecting for genes associated with disease resilience, farmers can reduce the prevalence of health issues like mastitis, lameness, and respiratory diseases in dairy herds.

The natural resistance-associated macrophage protein 1 (NRAMP1) gene has been linked with resistance to brucellosis, tuberculosis, and salmonellosis. Major histocompatibility complex (MHC) genes are linked to specific immunological responses. A region on chromosome 1 was associated with infectious keratoconjunctivitis (pinkeye) in cattle, which is heritable. Bos indicus breeds are observed to have better resistance to tick infestation and tick-borne diseases, as revealed through higherhemolytic complement activity.

Candidate gene Selection

Scanning the genome to find QTL regions for disease resistance can be complemented with theapproach of studying specific candidate genes that control resistance traits. These genes maybe candidates because of their genomic position (mapping to a QTL location revealed througha genome scan), or they may be biological candidate genes because of a previously reportedassociation with resistance or immunity traits in the same or another species, Gene structural variation assessedby SNP has successfully been associated with disease resistance traits.

Genes identified for mastitis resistance: Beta-defensin, Lactoferrin, CD14, Interleukin-8 receptor, Toll-like receptors (TLRs) TLR2 and TLR4, Lysozyme, MHC, Cathelicidin, Butyrophilin, Interferon, Lysostaphin, Molecule possessing ankyrin repeats induced by lipopolysaccharides, Lanthionineecontaining antimicrobial peptide, Signal transducer and activator of transcription 3, Nuclear factor-kb (NF-kb), Polymeric immunoglobulin gene (pIgR), Tumor necrosis factor (TNF), or cachectin. Other genes reportedly responsible for mastitis resistance were BNBD5, IgJ, MIP-3, MnSOD, AHCY, WIP, PRKDC, HNRPU, and OSTF1.

A GWAS with a F2 population of Holstein x Gir cattle identifed genes involved in the immunological functions, as Triggering receptor expressed on myeloid cells (TREM) 1 and2 and Cluster of diferentiation 83 (CD83) genes that were associated to tick resistance. Most of animals resistant to tick infestation presented both maternal and paternal alleles originated from Gir breed (Otto et al., 2018).

Genomic selection

Genomic selection and breeding programs utilize cutting-edge genetics and genomics to propel genetic advancement and enhance herd performance. By pinpointing animals with exceptional genetic attributes about health, and disease resistance, farmers are empowered to make strategic breeding choices that elevate the genetic caliber of their herds over time. Genomic selection will expand in areas related to immunity, disease resistance, reproduction, and mastitis (Thompson-Crispi et al., 2012; Miglioret al., 2014; Parker Gaddis et al., 2014).

Genome Editing (GnEd)

Modern breeding techniques that use genome editing can introduce new genetic traits that are impossible to transfer through conventional breeding. Genome editing is remarkably powerful to edit bovine endogenous genes (Gim and Jam, 2024). The development of various genome editing tools, such as zinc-finger nucleases (ZFNs), transcription activator-like effector nucleases (TALENs), and clustered regularly interspaced short palindromic repeats (CRISPR)/Cas9, has made genome editing highly convenient and precise. Through the technologies, the cattle with improvement of disease resistance, and enhancement of the frequency of alleles or polymorphisms that are associated with favorable traits like heat tolerance were produced (Wall et al., 2005; Richt et al., 2007). Gene editing technologies can be applied to decrease the negative effects of heat stress on productivity. Some of the examples in cows related to animal health and welfare have been presented in Table 1.

Off-target mutations may result in knock-out events or silent mutations in protein-coding genes, or interference with transcriptional regulation in genome editing. DNA-free genome editing strategies and Somatic cell nuclear transfer (SCNT) could profoundly reduce the risk of off-target mutations (Xu et al., 2022; Liu et al., 2022). Genome editing experiments in cattle have primarily focused on three main areas of improvement (1) animal health and welfare, (2) product yield or quality, and (3) reproduction or novel breeding schemes, which are all areas that are highly aligned with the goals of conventional breeding programs. Presently, GnEd is well-suited for introgressing alleles affecting typically qualitative, Mendelian traits at a more rapid pace than is possible using conventional selection alone. However, most of the traits that animal breeders seek to improve are polygenic and quantitative (Meuller and Van Enennaam, 2022).

Breeding for Heat Stress / Thermotolerant

With climate change increasing heat stress in dairy cows, breeding for heat tolerance has become essential. Thermotolerant is a heritable trait that is important to consider as global temperatures rise and heat waves become more frequent. Heat stress is another factor negatively impacting dairy cattle performance and welfare, and consequently, causing huge economic losses and welfare issues to the dairy industry (Santana et al., 2017). There is a negative genetic relationship between milk production under thermoneutral conditions and milk

Table 1: Examples of genome editing in cows				
Gene	**Modifications**	**Methods**	**Applications**	**References**
Sp110	Knock In	TALENs	Disease resistance (Tuberculaosis)	Wu et al., 2015
PRNP (Prion Protein): susceptibility to BSE	Disrupted the PRNP gene	TALENs	Disease resistance: (bovine spongiform encephalopathy- BSE)	Choi et al., 2015
PRNP (Prion Protein): susceptibility to BSE	Disrupted the PRNP gene	CRISPR/Cas9	Disease resistance: (bovine spongiform encephalopathy- BSE)	Bevacqua et al., 2016
PRNP (Prion Protein): susceptibility to BSE	Substituted valine in place of glycine at position 127 to confer resistance	CRISPR/Cas9	Disease resistance: (bovine spongiform encephalopathy- BSE)	Park et al., 2020
Cd18	Point mutation	ZFN	Disease resistance (bovine respiratory disease-BRD)	Shanthalingamet al., 2016
IARS (Isoleucyl-tRNA synthetase)	Knock In	CRISPR/Cas9	Animal welfare	Ikeda et al., 2017
POLLED allele	Knock In	TALENs	Animal welfare	Carlson et al., 2016
CSN2 (Beta-Casein): milk protein gene	Knock In - Inserted Staphylococcal lysostaphin (antimicrobial) gene	ZFN	Mastitis, Disease Resistance	Liu et al., 2013
CSN2 (Beta-Casein): milk protein gene	Knock In - Inserted human lysozyme (antimicrobial) gene	ZFN	Mastitis, Disease Resistance	Liu et al., 2014
Intergenic region between FSCN1 (Fascin Actin Bundling Protein 1) and ACTB (Actin Beta)	Knock In - Inserted human NRAMP1 (Natural Resistance Associated Macrophage Protein 1) gene	CRISPR/Cas9	Disease resistance: Tuberculosis	Gao et al., 2017
PMEL (Premelanosomal Protein): coat color	Introduced a 3 bp deletion associated with diluted, or silver, coat-color	CRISPR/Cas9	Thermo-tolerance	Laibleet al., 2020
PRLR (Prolactin Receptor): hair coat length	Disrupted PRLR gene to generate a SLICK (short, sleek hair coat) phenotype	CRISPR/Cas9	Thermo-tolerance	Rodriguez-Villamil et al., 2021

production under thermo-stress conditions (Sigdel et al., 2019). There are harmful effects of heat stress on cow's performance. Therefore, there is need for breeding for thermotolerance, which is a heritable trait (Nguyen et al., 2016). Recently, the Australian dairy industry introduced a genetic evaluation for thermotolerance which allows selection of animals that are more resistant to the detrimental effects of heat stress (Nguyen et al., 2016). Using genetic selection to develop cows that can better tolerate heat helps maintain productivity and health during warmer periods.

Local breeds are already adapted to certain management and environmental challenges; it might be more economically feasible to genetically improve local breeds for greater performance in these systems than selecting cosmopolitan dairy breeds (e.g., Holstein) for better adaptation and welfare under harsher conditions. Local breeds are more adapted to less intensive and suboptimal management practices and harsher environmental conditions such as high temperature and relative humidity, endo- andecto-parasites, higher altitudes, or lower-quality feed and havegreater fertility and longevity. Therefore, local breeds are a reservoir of genetic material to be potentially transferred to the key dairy breeds (e.g., Holstein, Jersey) through genome editing. Different tools and approaches can be adopted to collect phenotypes to be used for genetic selection. For instance, precision technologies (e.g., activity sensors, feeding behavior recorders, automated milking robots, computer vision) can generate a wealth of data to maximize genetic progress for traits related to resilience and welfare, as reviewed by Berghof et al. (2019) and Brito et al. (2020),

respectively.

Several promising candidate genes (ACLY, PDHA2, MDH1, SUCLG2, and PCK1) for heat tolerance were identified in Holstein cows by GWAS study (Cheruiyot et al., 2021). However, a crossbreeding program was initiated in New Zealand to build homozygous SLICK bulls with up to 75% New Zealand dairy genetic background (Davis et al., 2017). Future efforts should aim at introgressing the causal mutation for this gene in the dairy population lacking the SLICK gene to better cope with heat stress (Hansen, 2020).

Breeding strategies with assisted reproductive technologies (ART)

Assisted reproductive technologies (ART) like Artificial insemination (AI), Embryo transfer technology (ETT), In vitro fertilization (IVF), cloning etc can improve dairy herd health in rapid way. Livestock genetic improvement programs, beginning with selective breeding using statistical prediction methods, such as estimated breeding values (EBVs), and more recently genomic selection (GS), in combination with assisted reproductive technologies (ART) have enabled more precise selection and intense utilization of genetically superior parents for the next generation to accelerate rates of genetic gain.

Genomic information provides knowledge on specific alleles and haplotypes and therefore, can be used to more accurately assess genetic diversity levels, relatedness between individuals and populations, and presence/absence of deleterious mutations (e.g., Guarini et al., 2019). The wide use of reproductive technologies, coupled with short generation intervals (due to the implementation of genomic selection) can speed up the multiplication and transmission of deleterious alleles across populations. In this context, genomic information should be better used to manage genetic diversity in dairy cattle populations and remove deleterious mutations (Brito et al., 2021).

Different gene editing approaches can be used to edit the PRLR gene, which would make it easier to generate animals with the SLICK phenotype. SLICK animals can be generated from embryos produced by nuclear transfer performed with gene-edited somatic or embryonic stem cells (animal cloning), or from in vitro fertilized zygotes injected or electroporated with CRISPR/Cas9 (Camargo et al., 2022).

Genome editing in livestock is only possible through the use of ART (Meuller and Van Enennaam, 2022). Synergetic effects of Genomic selection and ART reduce the generation interval and enhance the genetic gain.

Breeding for Health Traits

Dairy cows' health is becoming increasingly important in theglobal breeding system, and many countries have included healthtraits in dairy cattle selection indices (Costa et al., 2019; Pfeifferet al., 2015).Health disorders can also increase milk production loss, veterinary treatment costs, involuntary culling rates (Proboet al., 2018) and decreased fertility of cattle (HU et al., 2024). Health disorders include reproductive disorders, udder health,metabolic disorders, hoof health, respiratory and circulatory diseases, and digestive disorders. Kerslake et al. (2018) found thatthe main reasons for culling were poor fertility and udder disease, and reproductive diseases were the first common cause of cows (34.9%). Mastitis and metritis are the most-recorded diseases and with high incidence.Therefore, early monitoring of disease is definitely crucial. Breeding for longevity and health traitssuch as improved immunity, fertility, and calving easecan reduce the rate of involuntary culling, allowing cows to stay productive longer. Theseresults into healthier, longer-living cows reduce replacement rates, which lowers the overall carbon footprint of dairy production, making it more sustainable and cost-effective.

Genetic parameters of health traits in various dairy cattle populations over time and countries found to be low and ranging from 0 to 0.23 (Costa et al., 2019; Zwald et al., 2004; Wang et al., 2022).As the estimate of heritability is low direct selection will not be effective for improvement. The genomic data contribute to the refinement of the estimation of breeding values and could improve the effectiveness of the selection response for health and longevity traits (Zavadilováet al., 2021). Health traits may be used as indicators to select and breed the longevity of dairy cows.There is an unfavorable genetic correlation between longevity and health traits, especially metabolic diseases, which have a strong genetic impact on productive life, and the genetic correlation is −0.98 (Shabalina et al., 2020). Molecular selection and breeding will be helpful to improve health traits and longevity traits.

Conclusion

Remarkable achievements have been accomplished in the dairy cattle industry over the past decades, with a massive increase in milk productivity which has been unfortunately accompanied by loss of genetic diversity and deterioration of key biological mechanisms (e.g., health, resilience, robustness, welfare, longevity) in the most common dairy animal breeds especially in cattle. Modern breeding strategies focus not only on production but also on building resilience and improving overall animal welfare. The development of a more sustainable dairy animal farming will require continued innovations in multiple areas, especially in genetics, strong involvement of all stakeholders (e.g., farmers, technical and scientific sectors, consumers, policy-makers), diversification of production systems, and great support from governments and private institutions toward experiencing and developing alternative production systems. Genetic selection of high-yielding dairy animals will need to be part of more systemic approaches at the farm scale to favor profound transitions toward sustainable farming systems. Genomic selection or genome editing with assisted reproductive technologies will accelerate the dairy farm herd health improvement. These breeding innovations support the economic and environmental viability of dairy operations, which is essential in the face of global agricultural challenges.

Dairy Cows: Reducing Cells that Count – Naturally

By **Dr Temitope A Aloba, Dr Iris Wortmann and Dr Bernhard Eckel, Dr. Eckel Animal Nutrition**

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

Somatic cell count: an ally that comes with drawbacks

In a sense, SCC functions like two sides of a coin. As somatic cells are part of the innate immune system of dairy cows that provides a rapid and nonspecific response to foreign invaders, they are also an indicator of susceptibility to mastitis or poor udder health. White blood cells, such as neutrophils and macrophages, and epithelial cells are the main components of SCC. While the mammary gland's epithelial cells are usually shed and renewed, the white blood cells migrate to the site of infection and release various substances to kill or neutralize pathogens. They also produce cytokine signalling molecules that regulate inflammation and coordinate the immune response. However, SCC can also negatively affect the udder and milk quality. When SCC is too high or prolonged, it can cause tissue damage and impair milk synthesis. The substances released by white blood cells can degrade the milk components, such as fat, protein, and lactose, and increase the somatic cell score (SCS), a logarithmic transformation of SCC. In the event of high SCS, milk's shelf life and processing value are reduced, increasing the risk of penalties or price deductions from milk buyers. Therefore, SCC is a complex and dynamic parameter that reflects the udder's balance between immunity and threat. A SCC below 200,000 cells/mL is considered normal and safe for individual cows, while a SCC above 500,000 cells/mL indicates clinical mastitis, a severe infection requiring immediate treatment. A SCC between 200,000 and 500,000 cells/mL may indicate subclinical mastitis, a mild infection that does not show

visible symptoms but still affects milk quality and yield. Dairy farmers must monitor and manage SCC to optimize milk production, quality, animal welfare, and profitability.

Feed cow immune system without cutting corners

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

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

Don't stop at just enough

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

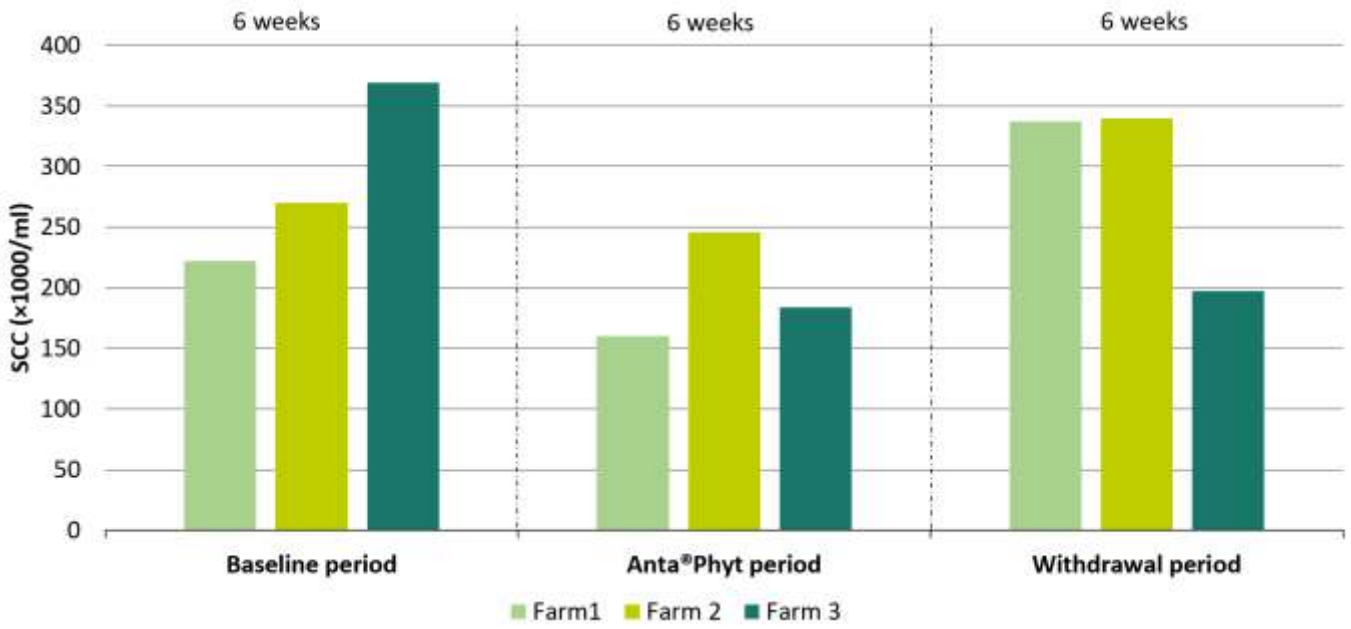

Figure 1: Changes in the SCC of three dairy farms across three different periods of supplementation with or without Anta® Phyt

Secretary DAHD Urges Dairy Federations to Join Circular Economy Movement; Calls for Biogas Projects at State Level to Reduce Dairy Sector's Carbon Footprint

Over 27,000 Household Biogas Plants Installed across 19 States; 1,040 Farmers Earned 11,000 Carbon Credits

India's Milk Market Stable with Low Inflation Rates in November 2024; Dairy Federations Urged to Boost Participation in Midday Meal and ICDS Programs for Greater Impact

A meeting to review the Milk Situation in the country was held under the Chairpersonship of Smt. Alka Upadhyaya, Secretary, Department of Animal Husbandry & Dairying (DAHD), Ministry of Fisheries, Animal Husbandry and Dairying on 18th December 2024 in New Delhi. The meeting was attended by representatives from National Dairy Development Board (NDDB),National Cooperative Dairy Federation of India (NCDFI) along with officials of DAHD and State Cooperative Dairy Federations Milk Unions across the country. Milk situation in the country and the progress being made by the State Milk Federations were discussed in detail during the review.

Secretary (DAHD), Smt. Alka Upadhyaya emphasized that India holds the top position globally in milk production, generating approximately 239.3 million metric tons in the year 2023-24. She emphasized that Dairy Federations should focus on enhancing milk procurement and increasing the price paid to the farmers, while also considering consumer interests. **Secretary DAHD said that the overall milk situation in the country is stable and the Wholesale Price Index (WPI) & Consumer Price Index (CPI) with the year-on-year inflation rates for milk recorded at 2.09 and 2.85 respectively for the month of November 2024. There is an adequate commodity stock of Skimmed Milk Powder, Whole Milk Powder, White Butter, and Ghee. At the same time, there has been an improvement in milk procurement and milk procurement prices over the year.** Secretary (DAHD) advised, all Milk Federations to take up active participation in the Midday Meal and Integrated Child Development Services (ICDS) programs of the Ministry of Women and Child Development (MoWCD) and the Ministry of Human Resource Development (MoHRD), as these represent the largest institutional domestic market for the dairy sector. During the meeting , the initiatives undertaken by the State Milk Federations such as Amul (Gujarat), Nandini (Karnataka), Saras (Rajasthan), and Megha (Jharkhand) were commended, and it was recommended that other Federations should undertake similar efforts. DAHD is also consistently collaborating with MoWCD and MoHRD to promote the inclusion of milk in the Midday Meal and ICDS programs. It was observed that commensurate to the production, consumption of processed dairy has increased by 20%. A detailed discussion was held concerning the strategies and initiatives required to further

enhance the processing of milk to value added products and accordingly detailed presentations was made by NDDB which also offered support to the states for evaluating projects under National Programme for Dairy Development particularly in light of evolving consumer preferences for packaged milk and value-added offerings.

During the review, a presentation on Circular Economy was made by NDDB highlighting the interventions made in the area with respect to the dairy sector. In its presentation, the National Dairy Development Board demonstrated three models of bio gas generation namely the Zakariyapura Model (The Household level biogas-based Manure Value Chain model), the Banaskantha Model (Dung based large capacity biogas plant to produce Bio CBG and Organic Fertilizer) and the Varanasi Model (Dung based large capacity biogas plant to suffice Steam and Power needs of Dairy Plant). These biogas plants are giving a boost to the circular economy by promoting sustainable green fuel energy and producing organic fertilizers. **Till date more than 27,000 household biogas plants have been installed in 19 states across the country under various schemes/ CSR initiatives/ through NDDB support etc.** Two large capacity dung based CNG/Biogas plants with a total capacity of 140 MT/Day of dung are already operationalised and another 11 plants having a combined capacity of 675 MT/Day are under various stages of being taken up.

Further the Household biogas initiative has also helped in generating carbon credits for the Dairy cooperative sector. Under first such initiative, a total of 11,000 carbon credits have been earned by 1,040 farmers, giving boost to both farmer incomes and contributing to the aim of achieving circular economy. It was also informed that NDDB has entered into an MOU with Suzuki R&D Centre India Pvt Ltd (An affiliate of Suzuki Motor Corporation). The major objective of the MOU is to jointly design, develop, implement and scale up innovative business models to efficiently utilize cow dung as a source of energy for fuelling transportation needs and as a rich source of organic fertilizer while achieving carbon neutrality.

Secretary, DAHD advised the dairy federations to work on circular economy in the dairy sector and be proactively involved in getting the benefits in consultation with NDDB. She stated that during the Department's upcoming conference on circularity in the Dairy sector, every State should come up with at least one project on Biogas to join the circularity movement. This will help in reducing the carbon footprint of the dairy sector and at the same time also help in enhancing income of Dairy Farmers. The discussion also included the use of water within the dairy value chain and approaches to ensure its efficient utilization. It was pointed out that the integration of automation could lead to a considerable reduction in water consumption at processing plants, thereby aiding the efforts of the National Water Mission and the National Action Plan on Climate Change.

Secretary DAHD concluded the meeting with remarks on the need of benchmarking in the dairy industry for bringing efficiency, reducing cost of production and the carbon footprint of the industry. The milk federations were also directed to speed up formation of cooperative societies to enhance milk procurement and bring more milk in the organized sector in order to improve the social and economic status of milk producers in India.

ICAR inks MoU with Amity Universities and Institutions

A Memorandum of Understanding was signed between the Indian Council of Agricultural Research and Amity Universities and Institutions, Noida, today at the Agricultural Education Division, Krishi Anusandhan Bhawan, Pusa, New Delhi.

Dr R.C. Agrawal, Deputy Director General (Agril Education), and Dr W. Selvamurthy, President, Amity Science Technology Innovation Foundation, signed the MoU on behalf of their respective institutes in the presence of the ADGs, senior officials of ICAR, and Amity Universities and Institutions.

Dr Agrawal provided an overview of ICAR's initiatives in Agricultural Education and stated that the MoU would mutually benefit both academia and research.

Dr Selvamurthy highlighted the achievements and ongoing initiatives of AMITY. He also lauded ICAR's contributions to food security.

The MoU outlines plans to foster a collaborative academic and research ecosystem, leveraging the strengths of both parties to drive innovation in agriculture. Key areas for future collaboration include joint research, shared facilities, faculty exchanges, and staff training. The partnership aims to enhance agricultural education and research, improve faculty competence, attract talent through scholarships from Amity Universities, and boost the quality of research output.

ICAR-DMAPR Signs MoU with Kamdhenu University to Develop Ethnoveterinary Products

ICAR-Directorate of Medicinal and Aromatic Plants Research signed a Memorandum of Understanding with Kamdhenu University in Gandhinagar today to collaborate on the development of ethnoveterinary products using Medicinal and Aromatic Plants (MAPs). ICAR-DMAPR is a national leader in the research and development of medicinal and aromatic plants, while Kamdhenu University focuses on research, education, and extension in veterinary, dairy, fisheries, and allied sciences in Gujarat.

Dr N.H. Kelawala, Vice-Chancellor, Kamdhenu University, highlighted the vast potential of this collaboration in addressing critical issues related to animal health through the application of herbal products.

Dr Manish Das, Director, ICAR-DMAPR, emphasized the importance of action-oriented initiatives to ensure the direct impact of their research on the well-being of end-users.

Dr M.M. Trivedi, Director, Extension Education, Kamdhenu University, also graced the occasion.

The MoU aims to foster joint project proposals and facilitate the sharing of expertise and resources to accelerate research and product development related to the use of medicinal plants for animal health. Key areas of collaboration include the development of innovative herbal products for animal health, the promotion and sale of these products, as well as the exchange of scientific knowledge to enhance research capabilities. The agreement also emphasizes skill development, capacity building, and joint programs for students, entrepreneurs, and scientific faculty.

ICAR-NBAGR organises a workshop in Leh focusing on the Animal Genetic Resources of Ladakh

In a significant step towards preserving and promoting Ladakh's animal genetic resources (AnGR), a workshop and stakeholder meet on 'Status and Way forward for Characterization, Registration & Value Addition of Animal Genetic Resources of Ladakh' was organized by ICAR-National Bureau of Animal Genetic Resources, Karnal, in collaboration with the Animal Husbandry Department of Ladakh at Leh today.

The Chief Guest Shri Tashi Gyalson, Chief Executive Councillor, Ladakh Autonomous Hill Development Council, emphasized the importance of conserving Ladakh's distinct breeds. This day will be marked in golden words, and future generations will remember the significant work carried out by ICAR-NBAGR, he added. Shri Gyalson also lauded the initiative for securing a Geographical Indication (GI) tag for Ladakhi cow churpi.

The Guest of Honour, Tashi Namgyal Yakzee, Executive Councillor (Animal Husbandry), LAHDC, Leh highlighted the activities and schemes carried out by the council for farmers of Ladakh.

Dr Raghavendra Bhatta, Deputy Director General (Animal Science), ICAR, highlighted the importance of such initiatives in sustaining the biodiversity of high-altitude regions and creating avenues for value addition and economic upliftment for local communities.

Dr B P Mishra, Director, ICAR-NBAGR, Karnal, discussed the activities and achievements under the mission to achieve zero ND in AnGR of India, with a particular focus on exploring the animal genetic resources of Ladakh's high-altitude region. He also highlighted ICAR-NBAGR's decade-long efforts in characterizing and documenting the AnGR of Ladakh.

Dr O.P. Chaurasia, Director, Defence Institute of High Altitude Research, Leh, highlighted the usage and work carried out by DIHAR on horses, ponies, and yaks as pack animals.

The workshop featured the release of publications on Ladakh's animal genetic resources and a documentary on Ladakh AnGR.

More than 60 pastoralists from across Ladakh rearing cattle, yak, sheep, goats, donkeys, horses, etc., were felicitated on the occasion.

ICAR-NBAGR confers Breed Conservation Awards on Rashtriya Kisan Diwas

ICAR-National Bureau of Animal Genetic Resources, Karnal, organised the 'Breed Conservation Award-2024' today on National Farmers Day, honoring animal breeders, farmers, and institutions from across the country for their efforts in conserving Indigenous animal breeds.

The Chief Guest, Dr A.K. Srivastava, Vice Chancellor, U.P. Pt. Deen Dayal Upadhyay Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Ansundhan Sansthan, Mathura, emphasized preserving indigenous breed diversity and urged creating larger associations among all kinds of stakeholders in the country.

The Guest of Honor, Shri Jagat Hazarika, Advisor (Statistics), Department of Animal Husbandry & Dairying, Ministry of Fisheries, Animal Husbandry & Dairying, said that the native livestock breeds are the country's heritage.

Dr B.P. Mishra, Director of ICAR-NBAIR, emphasized that the institute is committed to conserving indigenous livestock biodiversity by collaborating with various agencies and stakeholders. He also mentioned that the institute has been organizing this event annually since 2017, recognizing farmers and stakeholders for their efforts in breed conservation on Kisan Diwas.

40 applications from different states of the country received the award under the individual and institutional categories.

The programme was organised by Dr S.K. Niranjan, I/C PME coordinated the programme.

Mother Dairy Becomes Exclusive Distributor for Bharat Organics in NCR

Mother Dairy has inked a contract with the National Cooperative Organics Ltd (NCOL) to market the latter's organic goods under the 'Bharat Organics' brand only in the Delhi-National Capital Region (NCR).

According to a statement released by Mother Dairy, the company has "signed up with 'Bharat Organics' as the exclusive distribution partner for their range of organic staples to the Delhi NCR market." In accordance with the program, Mother Dairy will guarantee that customers in the National Capital area (NCR) have access to packaged and certified brand Bharat Organics' products by using its diverse network of booths located across the area. As a result of this partnership, Bharat Organics Atta and Bharat Organics Sweetener (Jaggery) have been introduced to the market in the National Capital Region (NCR).

By forming this cooperation, Mother Dairy hopes to contribute to the development of a more sustainable and healthier India. "We are uniquely positioned to bridge the gap between premium organic products and affordability," said Manish Bandlish, Managing Director of Mother Dairy. "We are able to do this by combining NCOL's expertise in organic farming with our extensive distribution network and deep consumer trust."

Under the terms of a memorandum of understanding (MoU) that Mother Dairy has signed with NCOL, the Bharat Organics brand will be distributed across a variety of distribution channels and geographical areas.

Within the Delhi National Capital Region (NCR), the Bharat Organics collection will be made accessible at about 10,000 general trade outlets and 300 Safal shops, in addition to being made available via contemporary trade and e-commerce channels.

According to Vipul Mittal, the Managing Director of NCOL, "Atta is just the beginning." Our goal is to provide a comprehensive selection of organic essentials that meet the requirements of everyday life, all while guaranteeing that organic farmers get a fair return on their investments. In the year 1974, Mother Dairy was given the go-ahead. It has recently become a subsidiary of the National Dairy Development Board (NDDB), which is a completely owned company.

A significant participant in the dairy industry, Mother Dairy is responsible for the production, marketing, and sale of milk and milk products, such as cultured goods, ice creams, paneer, ghee, and other items, all of which are sold under the Mother Dairy brand.

Additionally, the firm has a diverse portfolio that includes items in the category of edible oils under the brand name Dhara, as well as fresh fruits and vegetables, frozen

vegetables and snacks, unpolished pulses, pulps and concentrates, and other products under the brand name Safal.

NCOL is a cooperative society that is funded by NDDB, NAFED, NCDC, GCMMF Ltd., and NCCF. It is a multistate cooperative society. The cooperative concept, the formation of organic clusters, and the promotion of fair trade practices are all goals of this organisation, which was established to encourage organic farming.

Kumaraguru Institutions, TANUVAS, and EDF Launch Tamil Nadu Climate Smart Dairy Programme

Kumaraguru Institutions, Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), and Environmental Defence Fund (EDF) signed a Memorandum of Understanding (MoU). The purpose of the MoU is to encourage climate-smart practices in dairy and agriculture, with the goal of addressing water management, cattle feed optimisation, and other challenges.

This occasion marked the beginning of the Tamil Nadu Climate Smart Dairy Entrepreneurship Programme, which aims to empower dairy farmers and businesses in order to increase production, decrease costs, and promote environmentally friendly practices. There is an expectation that one hundred rural entrepreneurs would lead sustainable operations, which will further solidify Tamil Nadu's position as the pioneer in climate-smart dairy production.

As part of the celebration, K.N. Selvakumar, the Vice-Chancellor of TANUVAS, presented a Climate Smart Dairy Handbook. This handbook focusses on environmentally responsible techniques that may help small-scale farmers enhance their production and provide assistance. The purpose of the manual was to give the entrepreneurs with important insights into sustainable practices that would allow them to increase their productivity while simultaneously reducing their effect on the environment.

In addition to highlighting India's leading position in global milk production, which accounts for 25% of world output and has 7.8% annual growth, the Vice-Chancellor underlined the importance of businesses that concentrate on value-added goods such as ice cream and yoghurt, for which he predicted a growth rate of 30-50% each. According to him, the partnership between TANUVAS and the Environmental Defence Fund for the purpose of promoting sustainable dairy practices would pave the way for an integrated strategy to achieve economic development and environmental sustainability in India's dairy and livestock sectors.

During his presentation, Sarangdhar Ramchandra Nirmal, the founder of Kisan Konnect, provided an outline of the dairy industry, elaborating on the

potential and problems that are present.

UP to Invest Rs 278 Crore in Two Veterinary Schools in Gorakhpur and Bhadohi

For the purpose of fostering breed development and increasing milk output, the government of Uttar Pradesh has made the decision to create two veterinary schools. These institutions will be located in Gorakhpur and Bhadohi. According to a spokeswoman for the government, the institutions would be of great assistance to cattle producers in the states of Uttar Pradesh, Bihar, and Nepal, with Purvanchal being the most prominent benefactor.

An early research that was carried out by the Uttar Pradesh Livestock Development Board (UPLBD) found that the state of Purvanchal in Uttar Pradesh was seeing a decrease in milk output as a result of widespread malnutrition among animals.

Animals that were malnourished had negative effects on their health and productivity, as well as a decrease in milk production and a contribution to infertility.

The Yogi administration has undertaken a thorough effort to liberate grazing areas from encroachment, in addition to addressing the concerns of cattle producers in the state of Purvanchal. The objectives of this effort are to increase milk output, enhance animal health, and guarantee that appropriate grazing grounds are available.

According to him, Uttar Pradesh is the number one producer of milk in the nation and accounts for sixteen percent of the overall output.

The Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan (DUVASU) in Mathura will serve as the organisation that will be connected with the veterinary institutions going forward.

One of the institutions is going to be built on 80 acres of land in Gorakhpur, which is located on the highway that connects Gorakhpur and Varanasi. The first phase of development is being anticipated to cost 228 crore rupees. The budget for the year 2024 has already set up one hundred crores of rupees for the project. The facilities of the veterinary college in Gorakhpur will consist of a hospital building, an academic block, residential accommodations for the faculty and staff, and dormitories.

In the state budget for February 2024, Rs 50 crore was earmarked for the building of a new veterinary college that is going to be established in Bhadohi. The institution will be situated on a 15-acre plot of land that will include the villages of Jorai and Vedpur.

A block-level court complex will occupy the remaining five acres of land that will be used for this institution, which will consist of academic buildings, labs, and dorms on a total area of ten acres.

Young people from ten different districts in Purvanchal will be able to take advantage of the undergraduate, postgraduate, and specialised veterinary programs that will be offered by both of the institutions.

Sterling Biotech Targets Eco-Friendly Dairy Proteins with New Gujarat Facility

The construction of the world's first facility for precision fermentation-based dairy protein has begun in the Bharuch region of Gujarat according to Sterling Biotech, which is a joint venture between Perfect Day and Zydus. This 27-acre property is scheduled to begin operations at the beginning of the year 2026. With the laying of the foundation stone on Thursday, this huge project officially got off the ground.

The facility is intended to serve as a key manufacturing hub for dairy proteins that are determined via

the process of precision fermentation. Specifically, it intends to meet the growing demand for environmentally friendly food ingredients all around the world. According to the corporation, the majority of the facility's capacity has already been reserved, which is an indication of the significant market demand. In addition, there are plans in place to acquire property and support infrastructure in order to facilitate future development.

The Chief Executive Officer of Perfect Day, TM Narayan, emphasised the importance of this facility in fundamentally altering the food sector on a worldwide scale. "By leveraging precision fermentation technology, we are advancing the creation of high-quality dairy proteins without the environmental footprint of traditional methods," said the researcher. The environmental advantages of these proteins were brought to light by Shayri Roychoudhury, who serves as the Chief Business Operations Officer of Perfect Day Inc. "This facility will produce fermentation-based dairy proteins that are not only better for the planet but also meet the diverse needs of customers worldwide," she said to reporters.

In addition to ice creams, sports nutrition, and baked goods, Perfect Day's precision-fermented proteins have previously been used in a variety of other items. A further expansion of the company's product and service offerings will be made possible by the new Bharuch location. A more robust and sustainable global food ecosystem will be created as a result of this development.

Within the statement issued by the corporation, it was said that this project represents a critical milestone in the process of modernising the ways of food production. Sterling Biotech's goal is to produce dairy proteins with a lower effect on the environment than is possible with conventional techniques by using cutting-edge technology.

The concept of sustainable food production is becoming more popular, and our project represents that trend. As the demand for environmentally friendly components continues to increase, facilities such as this one play an essential role in satisfying the requirements of consumers while also minimising the impact on the environment.

MRCMPU Launches Kerala's First SCDA-Enabled Milk Powder Factory

It is scheduled on December 24 that the Malabar Regional Cooperative Milk Producers Union (MRCMPU), which is a member of the Kerala Co-operative Milk Marketing Federation (Milma), would officially open the first milk powder manufacturing plant in the state of Kerala. The facility will be located at Moorkkanadu,

Malappuram. This factory, which was constructed at a cost of Rs 131.03 crore, represents a significant step forward for the dairy industry in the state.

Milma is forced to rely on factories located in other states during times of excess production, such as the COVID-19 lockdowns, since Kerala does not have a facility that is capable of producing milk powder inside the state. These dependencies are going to be eliminated by this brand-new facility, which will provide a safe market for the milk that is produced by dairy farmers in Kerala. Further, it is anticipated that it would result in a significant increase in tax income for the state government as well as the creation of both direct and indirect employment possibilities.

The factory is equipped with sophisticated Supervisory Control and Data Acquisition (SCDA) systems, which allow for real-time monitoring and analysis of the manufacturing process. It has the ability to produce 10 metric tonnes of milk powder per day. This facility is the first in Kerala to incorporate SCDA-enabled technologies, and it uses spray-drying technology to accomplish this innovation. Its completion was made easier by the financial support provided by the government of Kerala as well as the Swiss Development Cooperation initiative.

The introduction of this facility coincides with the remarkable expansion that Malabar Milma has seen over the last several years. The corporation's revenue has increased by 48 percent over the course of the last five years, and milk cooperative societies have distributed a total of 5,091.7 crore to dairy farmers. Over the course of this time period, milk sales in the area climbed by 27.89%, and this growth was accompanied by a rise in income from value-added dairy products.

It is anticipated that the new factory would strengthen Kerala's dairy sector, so assuring more agricultural stability for farmers and lessening their dependency on processing facilities located outside of the state.

India's Milk Production Must Increase by 15% to Meet 2030 Demand, Says NDP-I Study

A research on the demand for milk and milk products in India was carried out by the Department of Animal Husbandry and Dairying as part of the National Dairy Plan Phase I (NDP-I) initiative. According to the findings of the research, the annual demand for milk and milk products in India is expected to reach 266.5 million metric tonnes by the year 2030, while the present output of milk and milk products is estimated to be 231 million tonnes.

The Union Minister of Fisheries, Animal Husbandry, and Dairying, Rajiv Ranjan Singh, also known as Lalan Singh, made this statement in response to a question on milk production in the country that was posed by Rajya Sabha Member of Parliament Sanjeev Arora from Ludhiana. The question was presented during the Winter Session of the Rajya Sabha assembly, which is now taking place.

The Minister further added in his reply that according to the research, it is projected that the consumption of milk products in the rural sector is going to experience a major surge by the year 2030, and the consumption would be substantially more than in urban regions. This was stated by Arora in a statement that was released here today.

The research found that the overall consumption of milk and milk products throughout the whole of India in 2019 was 162.4 million metric tonnes. This figure takes into account consumption from households as well as consumption from non-residential sources. The consumption of milk in urban regions was higher than that of rural areas in 2019, whereas the consumption of milk products was higher in rural areas compared to urban areas. This was the case throughout the year 2019.

The answer provided by the Minister went on to mention that

the Department of Animal Husbandry and Dairying is currently in the process of implementing dairy development schemes. These schemes, which include the National Programme for Dairy Development (NPDD) and Animal Husbandry Infrastructure Development Fund (AHIDF) schemes, are designed to complement and supplement the efforts that the State Government is making to support the dairy-based industry.

Additionally, it has been indicated in the response that the Department of Animal Husbandry and Dairying conducts an annual Integrated Sample Survey via the State Animal Husbandry Department in order to estimate the output of milk, meat, eggs, and wool on a state-by-state basis.

In accordance with the information that was made accessible by the Minister, the total quantity of milk that was produced in the nation during the fiscal year 2022-23 was roughly 231 million tonnes. In this regard, Punjab ranked seventh in the nation with a contribution of 14 million tonnes, which is equivalent to 6% of the overall output of the country. Following Uttar Pradesh, Rajasthan, Madhya Pradesh, Gujarat, Andhra Pradesh, Maharashtra, and Punjab in terms of milk production, Uttar Pradesh is the state that produces the most milk in the country, with 36 million tonnes, which accounts for 16% of the total.

Aavin Faces NGT Probe Over Eco-Friendly Packaging Amid Rs 1,500 Crore Conversion Cost

Aavin was given the directive on Monday by the southern bench of the National Green Tribunal (NGT) to investigate whether or not it would be possible to offer milk in plastic bottles that could be reused. A petition was submitted by S. P. Surendranath Karthik and Ayya, which urged Aavin to use ecologically friendly packaging options, such as glass bottles, as opposed to the single-use plastic packets that had been the case for the previous three decades. The instruction was issued as a reaction to the petition.

During the course of the hearing, Aavin's attorney brought up the significant financial burden (about 1,500 crore rupees) that would be incurred by converting to reusable plastic or glass bottles. As contrast to private rivals that also sell milk in plastic packets, the state government asserted that Aavin has been providing milk at more affordable prices when compared to those competitors. It was suggested that the use of glass bottles may result in an increase in the cost of milk, which would be a hardship for customers.

Aavin was given the directive to carry out a preliminary investigation on reusable plastic bottles by the judicial member of the National Green Tribunal, Justice Pushpa Sathyanarayana, and the expert member Satyagopal Korlapati. The next hearing is set to take place on March 4.

According to information that has been obtained, Aavin is expected to contest the show cause notice that was issued by the TNPCB. The notice imposed a penalty of Rs 5.1 crore on Aavin for allegedly

contaminating Korattur lake, which is located close to its Ambattur factory. A complaint against Aavin had been brought before the National Green Tribunal (NGT) by an activist from the Korattur Lake Protecting People's Movement. The case requested the TNPCB to carry out an inspection.

During the course of the inspection, it was discovered that Aavin was producing a greater amount of effluent than was authorised, and there was a penalty issued as a result. On the other hand, Aavin said that its wastewater treatment facility is capable of treating the quantity of effluent that is being produced.

Zydus Animal Health Divests from Mylab, Signs Termination Deed with Rising Sun Holding

As part of its withdrawal from its investment in Mylab Discovery Solutions Private Limited, Zydus Animal Health & Investments Limited (ZAHL) is selling its interests in the diagnostics firm to Rising Sun Holding Private Limited, which is owned by Adar Poonawalla. The initial price for the sale was 106 crores of rupees.

In June 2023, Zydus Animal Health acquired a 6.5 percent ownership in Mylab Discovery Solutions from Rising Sun Holdings, an investment business headed by Adar Poonawalla of the Serum Institute. This new development comes more than a year after Zydus Animal Health made the acquisition. The transaction was valued at ₹106 crore.

In accordance with the terms and circumstances of the Share Purchase Agreement (SPA), the Board of Directors of ZAHL gave its approval to the disinvestment of Sale Shares at the meeting that took place today, which was recorded as taking place on December 16, 2024. "After that, ZAHL, RSHPL, and Mylab have all signed the termination deed," Zydus Animal Health reported to the stock markets.

For the termination, there were no explanations provided. Because it brought together a pharmaceutical firm, a diagnostics company, and a vaccine maker, the initial deal was considered to be a first of its kind.

According to Zydus Animal Health, the termination is anticipated to be finalised within fifteen working days from the day that the termination deed was signed.

BAU Hosts Symposium on Animal Health with Focus on Future Strategies and Challenges

According to the Director of the RIMS, Dr. Raj Kumar, animals should be treated with the same level of seriousness, compassion, and empathy as people, and they should also be provided with

healthcare services. They are entitled to the same rights regarding illness prevention, diagnostic equipment, and clinical facilities, and the health of animals cannot be taken into consideration in isolation.

At a symposium on "Futuristic approaches for animal health, management, and welfare: challenges and opportunities" and alumni meet that took place on Friday at the College of Veterinary Science & Animal Husbandry of Birsa Agricultural University, he emphasised the importance of synergistic relationships and collaborations between researchers from different branches, policymakers, governments, and bureaucrats for the purpose of improving animal welfare.

He said that King Ashoka of Patliputra had created the first animal hospital in the world, which was equipped with a facility for diagnosis, treatment, refuge, and quarantine. According to him, the most wonderful period of time was during the reign of Lord Buddha, when India's geographical limit was at its broadest.

According to him, the alumni meet is a period of renewal and a unique chance to reconnect with friends from childhood days and college days, to reminisce about golden memories linked with the alma mater, and to have fun and frolic.

For the sake of the health, happiness, and general well-being of all living things and the earth, the Vice-Chancellor of BAU, Dr. SC Dubey, emphasised the need of collaboration among specialists in the fields of human, animal, plant, and ecosystem health medicine.

He said that India is experiencing a great deal of difficulties as a consequence of the presence of exotic illnesses and pests, and that the World Health Organisation (WHO) has advised that a protocol for international standards be followed in the process of inquiry and diagnosis in order to ensure that the findings are accepted at the world level. The venture capitalist went on to say that traditional wisdom is the foundation of contemporary science, and that a harmonious combination of the two would be more beneficial to the agricultural community.

An alumni of RVC and a former Principal Scientist in the Division of Veterinary Public Health at the Indian Veterinary Research Institute in Bareilly, Dr. DK Singh delivered a keynote presentation on the topic of "Brucellosis in India: diagnostic and control strategy." In conjunction with the event, a book titled "30 Iconic Vets" and a compilation of research papers on the topic of the symposium were also made available to the public.

While Dr. Sushil Prasad, the Dean of Veterinary, was extending his greetings to the visitors earlier, he said that the buildings that comprise Ranchi Veterinary College and RIMS were established at the same time in the early sixties. According to him, the number of instructors in the college has decreased from 105 to 32. He also said that BAU is the only agricultural varsity in the nation where the State Public Service Commission has the authority to hire new professors. In contrast, the other universities in the country are responsible for their own recruiting processes.

The proposal for a vote of gratitude was made by Dr. Praveen Kumar, who is the head of the Department of Veterinary Medicine and the organising secretary for the event. Together, Dr. Vishakha Singh and Dr. Pragya Priya Lakda served as the program's anchors. There are around 350 alumni who are taking part in the event.

Assam Aims for Self-Sufficiency in Fish, Poultry, and Dairy Production by 2030

Krishnendu Paul, the Minister of Animal Husbandry and Veterinary, Fishery, and Public Works (PMGSY), said on Saturday that the state administration, which is led by Chief Minister Himanta Biswa

Sarma, has a goal to make Assam self-sufficient in terms of the production of fish, poultry, and dairy products.

Addressing the media after distributing the 'No Dues Certificates' under the Assam Microfinance Incentive and Relief Scheme AM- FIRS (phase III, part II), Relief DBT to victims of the 2022 and 2024 floods in Cachar and funds for the Pradhan Mantri Formalisation of Micro Food Processing Enterprises Seed Capital scheme in Cachar district, Paul said: "The Government under the leadership of the Chief Minister envisions to attain self-reliance in fish production. For this reason, a plan has been developed to increase the amount of fish that is produced to a maximum of 7 lakh metric tonnes by the year 2030. We are aiming to make use of the waterbodies and wetland areas, and we will also be consulting with the Department of Forests over this matter.

In addition to this, he added that Assam is planning to become a prospective exporter of fish, poultry, and dairy products in the future, with the intention of being a potential exporter of these products to the rest of the country and even internationally. The Minister of Fisheries remembered the pledge made by the Chief Minister before to the elections in 2021 to provide assistance to borrowers who had taken out loans but were unable to repay them because to the Covid-19 epidemic. The Minister of Fisheries said that the Chief Minister has honoured his promise to provide assistance to the people.

It should be mentioned that the 'No Dues Certificates' were distributed to 1,834 beneficiaries as part of the Assam Microfinance Incentive and Relief Scheme (AMFIRS) (phase III, part II). Additionally, relief DBT in the amount of Rs 46 crore was distributed to over one lakh beneficiaries who were victims of the floods that occurred in Cachar in 2022 and 2024. Furthermore, funds for the Pradhan Mantri Formalisation of Micro Food Processing Enterprises Seed Capital scheme were distributed to 354 beneficiaries.

Mridul Yadav, the District Commissioner of Cachar, used the opportunity earlier to offer the welcoming speech and explain the purpose of the event. It was brought to his attention that the DBT would be expanded on December 16th. The Members of Legislative Assembly (MLAs) of Silchar, Udharbond, and Dholai, Dipayan Chakraborty, Mihir Kanti Shome, and Nihar Ranjan Das, respectively, have praised the efforts that have been made by the State government. They have also expressed their hope that the Barak Valley and other regions of Assam will find new opportunities for development in the days to come under the leadership of Minister Paul.

USDA Implements Multi-Phase

National Milk Testing Plan to Monitor Avian Flu

The USDA will require bulk milk tank testing nationally to combat avian flu in dairy cows.
On Friday, USDA announced a new government requirement to collect and analyse milk samples. Since March, H5N1 has been circulating in U.S. dairy animals. This will enable extensive monitoring, officials added.

The USDA says pasteurised milk is safe because it kills bacteria. However, public health experts advise against consuming raw milk, which may contain the virus.

Over 700 dairy cattle in 15 states have tested positive for avian flu, government data reveals. The bulk, over 500 cows, are in California, the leading dairy producer. Dec. 16 is the first USDA order testing date.

Agriculture Secretary Tom Vilsack said Friday that "this new milk testing strategy will build on those steps to date and will provide a roadmap for states to protect the health of their dairy herds".
"Among many outcomes, this will give farmers and farmworkers better confidence in the safety of

their animals and ability to protect themselves, and it will help us quickly control and stop the virus' spread nationwide."

Testing protects the food supply and helps regulators monitor the virus, Dr. K. Fred Gingrich II, executive director of the American Association of Bovine Practitioners, told USA TODAY.
Colorado veterinarians required bulk-milk testing in July to prevent avian flu in dairy cows. State data reveals that one Colorado herd has the pathogen.

Lactating dairy cows must be checked for avian flu before crossing state boundaries under a USDA rule since April. All commercial laboratories and state veterinarians must disclose positive test results under the mandate. USDA said Friday's directive supplements the previous one.

The CDC reports 58 avian flu cases in the U.S. this year. Of them, 35 were dairy workers and 21 poultry workers. All workers experienced slight eye redness. Two victims, including a California kid, had unclear transmission origins. No human transmission has occurred.

According to viral prevalence, the National Milk Testing Strategy divides states into five phases. Officials will collaborate with each contiguous U.S. state to implement testing. To discover illness, milk silos at dairy processing plants are tested countrywide in stage one.

Stage two involves bulk tank sampling to detect sick herds, followed by stage three, which uses incentive programs, movement limits, and contact tracking to promptly react to affected cattle. Federal authorities will maintain bulk tank samplings to prevent the illness from returning when states can prove their herds are clean. As the status remains negative, sampling will decrease. If bird flu returns, the state must revert to stage three.

After all states complete stage four, USDA will sample periodically. To demonstrate long-term absence. California, Colorado, Michigan, Mississippi, Oregon, and Pennsylvania—the states with the most cases—will be tested first under the new policy.

EU-Funded Initiative Repurposes Whey for Eco-Friendly Mycelium-Based Dairy Alternatives

Infinite Roots, a biotechnology start-up that specialises in environmentally friendly food alternatives, has announced a cooperation with Hamburg University of technique to develop a technique that use whey for the fermentation of mushroom mycelium.

The lack of casein and whey protein in the vegan cheese replacements that are now available, which has an effect on the flavour and texture of these alternatives, is the focal point of this endeavour. A total of 1.8 million euros in financing has been allocated to the initiative by the Federal Ministry of Food and Agriculture from the government.

During the course of this research, the goal is to convert whey, which is a by-product of milk production, into a substrate that may be used for mycelium fermentation. Every year, it is estimated that around 190 million tonnes of whey are produced all over the world. However, a significant amount of this whey is not processed any further, which results in difficulties being encountered with disposal and environmental issues.

In order to facilitate the manufacture of alternative dairy products, the cooperation aims to repurpose whey by enabling it to function as a source of nutrients for mycelium throughout the process. In the creation of meat replacements, mycelium has previously been acknowledged for the resource-efficient features that it has.

For the purpose of fostering innovation in the disciplines of upcycling and sustainable food technology, the cooperation includes an educational effort that is meant to involve young researchers in these subjects. In addition to product development, the relationship also includes the creation of products.

Through the integration of research and development with educational outreach, the project intends to make a contribution to the achievement of more sustainable practices within the food business.

Editorial Calendar 2025

Publishing Month:
January
Article Deadline :
28th, Dec. 2024
Advertising Deadline :
30th, Dec. 2024
Focus :
Opportunities and Challenges

Publishing Month:
February
Article Deadline :
28th, Jan. 2025
Advertising Deadline :
30th, Jan. 2025
Focus :
Budget

Publishing Month:
March
Article Deadline :
26th, Feb. 2025
Advertising Deadline :
28th, Feb. 2025
Focus :
Summer Stress Management

Publishing Month:
April
Article Deadline :
28th, March 2025
Advertising Deadline :
30th, March 2025
Focus :
Cold Chain

Publishing Month:
May
Article Deadline :
28th, April 2025
Advertising Deadline :
30th, April 2025
Focus :
Nutrition

Publishing Month:
June
Article Deadline :
28th, May 2025
Advertising Deadline :
30th, May 2025
Focus :
Milk - Production & Preservation

Publishing Month:
July
Article Deadline :
28th, June 2025
Advertising Deadline :
30th, June 2025
Focus :
Monsoon Management

Publishing Month:
August
Article Deadline :
28th, July 2025
Advertising Deadline :
30th, July 2025
Focus :
Sustainability

Publishing Month:
September
Article Deadline :
28th, August 2025
Advertising Deadline :
30th, August 2025
Focus :
Processing & Packaging

Publishing Month:
October
Article Deadline :
28th, September 2025
Advertising Deadline :
30th, September 2025
Focus :
Disease Prevention

Publishing Month:
November
Article Deadline :
28th, October 2025
Advertising Deadline :
30th, October 2025
Focus :
Biosecurity

Publishing Month:
December
Article Deadline :
28th, November 2025
Advertising Deadline :
30th, November 2025
Focus :
Winter Stress

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