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Climate-Resilient Livestock Farming: Practical Adaptation Strategies for Indian Farmers

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★ Key message

- Climate change is reducing livestock productivity through heat stress, fodder shortages, water scarcity, and increased disease risks.
- Improved housing, water management, and fodder conservation can help farmers minimize climate-related losses.
- Indigenous breeds, preventive healthcare, and climate-smart management practices are key to sustainable livestock farming.

Abstract

Climate change is emerging as a major challenge for livestock farming, affecting animal health, productivity, and farm profitability. Rising temperatures, irregular rainfall, water scarcity, and increased disease incidence contribute to heat stress, reduced feed intake, lower milk production, and fertility problems in livestock. Climate-resilient management practices such as improved housing, efficient water management, fodder conservation, balanced nutrition, and preventive healthcare can help minimize these adverse effects. Indigenous livestock breeds, owing to their better adaptability and heat tolerance, also play an important role in sustaining production under changing climatic conditions. Strengthening farmer awareness, extension services, and weather-based advisory systems is essential for promoting climate-smart livestock farming. Adoption of these practical and sustainable strategies will enhance the resilience of livestock production systems and help safeguard farmer livelihoods against future climate-related challenges.

Livestock farming has always been closely connected with nature and seasonal conditions. Farmers have traditionally adjusted their management practices according to rainfall, temperature and fodder availability. However, in recent years, climate conditions have become far more unpredictable. Long heat waves, irregular rainfall, water scarcity and sudden disease outbreaks are now affecting livestock production across many parts of India. For dairy

and livestock farmers, these changes are creating new challenges. Animals exposed to extreme heat often eat less, produce less milk and become more vulnerable to diseases. Fodder shortages during drought periods increase feeding costs, while humid weather encourages the spread of infections and parasites. Climate change is no longer a future concern for livestock farmers. Its effects are already visible at the farm level. The need of the hour is to adopt practical and climate-resilient livestock management practices that can help farmers protect animal health, maintain productivity and reduce economic losses.

How Climate Change Affects Livestock Farming

Animals are highly sensitive to environmental conditions. Sudden fluctuations in temperature and humidity affect their normal body functions and overall performance. High temperatures reduce feed intake and increase water requirements. Heat stress affects milk production, growth, fertility and immunity. In dairy animals, prolonged heat exposure often leads to reduced conception rates and lower milk yield. Irregular rainfall patterns create additional problems. Drought conditions reduce fodder availability, while excessive rainfall and waterlogging increase the risk of infectious diseases and parasitic infestations. Small and marginal farmers are particularly vulnerable because they often have limited resources to manage these changing conditions.

Heat Stress: One of the Biggest Challenges

Among all climate-related problems, heat stress has become one of the most serious concerns in livestock farming. When animals are unable to maintain normal body temperature due to excessive environmental heat, they experience physical stress. Buffaloes and crossbred cattle are especially sensitive during summer because they struggle to dissipate body heat efficiently.

Common signs of heat stress include:

- Fast breathing or panting
- Reduced feed intake
- Excess salivation
- Drop in milk production
- Weakness and dullness
- Reduced fertility

If proper care is not provided, severe heat stress may even threaten animal survival during extreme heat waves.

Importance of Climate-Resilient Livestock Management

Climate-resilient livestock farming does not necessarily require expensive technology. In many cases, simple improvements in housing, feeding and animal care can significantly

reduce climate-related losses. The main objective is to help animals remain comfortable, healthy and productive even under difficult environmental conditions. Farmers who prepare in advance are often better able to manage seasonal stress and avoid major economic losses.

Improving Animal Housing

Proper housing is one of the simplest and most effective ways to protect livestock from climate stress.

During summer:

- Animal sheds should allow good airflow
- Side walls should remain partially open for ventilation
- Roofs should provide adequate insulation from heat
- Overcrowding should be avoided

Thatched roofs, shade nets and tree plantations around sheds can help reduce environmental temperature naturally. In areas experiencing intense summer heat, sprinkling water on shed roofs or using simple foggers and fans may improve animal comfort.

During rainy seasons:

- Proper drainage should be maintained
- Waterlogging near sheds should be avoided
- Floors should remain clean and dry

Good housing not only reduces stress but also lowers disease risk.

Water Management is Critical

Climate change is increasing pressure on water resources in many regions. Livestock require adequate clean water for maintaining body temperature and productivity. During summer, animals consume significantly more water. Farmers should ensure continuous access to clean drinking water throughout the day.

Useful water management practices include:

- Cleaning water troughs regularly
- Preventing water contamination
- Harvesting rainwater where possible
- Creating water storage systems for dry periods

Buffaloes benefit greatly from occasional bathing or wallowing during hot weather. Cooling animals during peak heat hours helps reduce stress and maintain productivity.

Fodder Conservation and Feed Planning

One of the major effects of climate variability is fodder shortage during droughts and dry seasons. Farmers often face sudden increases in feed costs when green fodder becomes scarce. Preparing fodder reserves in advance can reduce this problem considerably.

Important fodder conservation practices include:

- Silage preparation
- Hay making
- Storage of crop residues
- Azolla cultivation
- Fodder banks at community level

Silage preparation from maize, sorghum or other fodder crops helps farmers maintain feed availability during lean periods. Balanced feeding is equally important because animals under climate stress require proper nutrition to maintain immunity and productivity.

Importance of Indigenous Breeds

India possesses several indigenous livestock breeds that are naturally adapted to local climatic conditions. Breeds such as Sahiwal, Gir, Red Sindhi and Tharparkar generally tolerate heat stress better than many exotic breeds. These animals often show:

- Better heat tolerance
- Greater disease resistance
- Lower maintenance requirements
- Improved adaptability under harsh conditions

Although high-yielding crossbred animals may produce more milk under ideal conditions, indigenous breeds frequently perform more consistently under stressful environments. Conservation and scientific improvement of indigenous breeds can therefore play an important role in climate-resilient livestock farming.

Disease Prevention Becomes More Important

Climate variability often increases disease outbreaks in livestock populations. Hot and humid conditions favour the growth of disease-causing organisms and parasites. Preventive healthcare is therefore becoming increasingly important.

Farmers should focus on:

- Timely vaccination
- Deworming schedules
- Clean animal housing
- Proper disposal of waste
- Isolation of sick animals

Reducing stress itself improves immunity and lowers disease susceptibility. Regular consultation with veterinarians and livestock extension workers helps farmers respond quickly to emerging health problems.

Role of Farmers and Extension Services

Climate adaptation cannot succeed through technology alone. Farmer awareness and field-level extension support are equally important. Krishi Vigyan Kendras (KVKs), veterinary universities, ICAR institutes and state animal husbandry departments play a major role in guiding farmers regarding:

- Seasonal management
- Disease prevention
- Fodder conservation
- Climate advisories
- Breed selection

Timely dissemination of weather-based livestock advisories can help farmers take preventive measures before extreme climatic events occur. Farmer training programs on climate-smart livestock practices should be expanded further, especially in vulnerable regions.

Moving Toward Sustainable Livestock Farming

Climate-resilient livestock farming is not only about managing immediate weather problems. It is also about building long-term sustainability. Efficient use of water, scientific feeding, better waste management and improved animal welfare can help reduce environmental pressure while maintaining productivity. Farmers who adopt climate-smart practices are often able to reduce input costs and improve overall farm stability. As climate conditions continue to change, livestock farming systems must also evolve accordingly.

Conclusion

Climate change is creating new and complex challenges for Indian livestock farmers. Rising temperatures, irregular rainfall, fodder shortages and increasing disease risks are already affecting animal productivity and farmer income in many regions. However, several practical and affordable adaptation strategies are available. Better housing, proper water management, fodder conservation, preventive healthcare and the use of climate-adapted breeds can significantly reduce climate-related stress in livestock. The future of Indian livestock farming will depend not only on increasing production but also on improving resilience. Farmers who adopt climate-smart and sustainable management practices today will be better prepared to face the environmental challenges of tomorrow.