



NextVets Magazine

Volume1(Issue1) June – August 2026

Super El Niño and India's Animal Husbandry Sector: Assessing Risks, Strengthening Preparedness, and Building Climate Resilience

^{*1}Dr. Pulikanti Radhakriishna, ²Dr. M. V. Reddy, IAS (Retd.)

¹Head, Department of Veterinary Physiology
Officer Incharge of Student Activities, CVSc, Korutla
P. V. Narsimha Rao Telangana Veterinary University

²Former Director, Department of Animal Husbandry and Dairying (DAHD),
Government of Andhra Pradesh and Former Collector & District Magistrate,
Bhadradi & Medchal Districts, Government of Telangana
Email id: *radhakrishnapulikanti@gmail.com

Received: July2026

Published: July2026

©Allrights are reserved by

Dr. Pulikanti Radhakriishna

Abstract

Super El Niño is an exceptionally intense phase of the El Niño–Southern Oscillation (ENSO), characterized by unusually warm sea surface temperatures across the central and eastern tropical Pacific Ocean. Such events significantly alter global atmospheric circulation and frequently disrupt the Indian monsoon, leading to prolonged droughts, severe heat waves, erratic rainfall, water scarcity, and increased climate variability. India's animal husbandry sector, which contributes about 31% of the agricultural and allied Gross Value Added (GVA) and approximately 5.5% of the national GVA, while supporting the livelihoods of over 20 million people, is particularly vulnerable to climatic disturbances (DAHD, 2025). Livestock experience heat stress, reduced feed intake, declining reproductive efficiency, increased disease susceptibility, water shortages, and lower productivity. Poultry, dairy, sheep, goat, and pig production systems are all affected directly or indirectly. The economic consequences include rising production costs, declining farm incomes, disruptions in milk, meat, and egg supply chains, and increased price volatility. However, scientific preparedness and climate-smart

livestock management can substantially reduce these risks. This review discusses the anticipated impacts of Super El Niño on India's animal husbandry sector and highlights practical adaptation and mitigation strategies, including climate-resilient housing, nutritional interventions, genetic improvement, precision livestock farming, disease surveillance, early warning systems, digital advisory services, One Health approaches, and supportive public policies. Building resilient livestock systems will be essential for ensuring food security, sustainable rural development, and long-term climate resilience.

Introduction:

India possesses the world's largest livestock population and ranks among the leading producers of milk, eggs, meat, and fisheries. Livestock contribute significantly to rural livelihoods, especially among small and marginal farmers. Super El Niño events are much stronger than ordinary El Niño episodes and can profoundly influence India's climate by weakening the southwest monsoon, increasing temperatures, delaying rainfall, and intensifying drought conditions. These climatic anomalies create multiple challenges for livestock production systems and threaten national food security. Super El Niño affects livestock production through prolonged heat stress, water scarcity, feed and fodder shortages, and increased disease risks. These stresses reduce feed intake, growth, milk yield, reproductive efficiency, and egg production while increasing mortality and production costs.

Climatic changes also alter the distribution of pathogens and vectors, increasing disease incidence and threatening livestock productivity, food security, and rural livelihoods, particularly in countries such as India (IPCC, 2022).

1. Understanding Super El Niño:

The El Niño–Southern Oscillation (ENSO) is a naturally occurring climate phenomenon involving periodic warming of the equatorial Pacific Ocean. A Super El Niño generally refers to an exceptionally strong El Niño event associated with:

- Sea surface temperature anomalies exceedingly approximately 2°C
- Weakening of trade winds
- Major shifts in global rainfall patterns
- Increased frequency of climate extremes

India generally experiences:

- Below-normal southwest monsoon
- Delayed onset of rainfall
- Heat waves
- Droughts
- Erratic rainfall distribution
- Occasional extreme rainfall events in localized regions despite overall rainfall deficits.

3. Importance of Animal Husbandry in India:

Animal husbandry contributes significantly to:

- National food security
- Nutritional security
- Agricultural Gross Value Added
- Rural employment
- Women's empowerment
- Export earnings
- Sustainable farming systems

More than two-thirds of rural households depend partly or fully on livestock, making climate resilience a national priority.

4. Effects on Feed and Fodder Resources:

Super El Niño frequently reduces fodder availability through:

- Poor pasture growth
- Reduced crop residues
- Decline in fodder crop production
- Drying of grazing lands

- Increased fodder prices

Consequently:

- Feed shortages become widespread.
- Farmers are forced to purchase expensive concentrates.
- Livestock body condition deteriorates.
- Production costs increase.

5. Heat Stress and Animal Physiology:

Heat stress is among the most serious consequences.

Animals experience:

- ✓ Increased body temperature
- ✓ Elevated respiration rate
- ✓ Panting
- ✓ Increased water intake
- ✓ Reduced feed intake
- ✓ Hormonal imbalance
- ✓ Oxidative stress

Heat stress increases the production of reactive oxygen species (ROS) beyond the capacity of endogenous antioxidant defenses, resulting in oxidative stress that damages cellular lipids, proteins, and DNA. This oxidative damage impairs immune function, reproduction, metabolism, and overall livestock productivity (Bernabucci et al., 2010).

Physiological effects include:

- Increased cortisol secretion
- Reduced thyroid hormone activity

- Electrolyte imbalance
- Altered immune function
- Disturbed metabolic homeostasis

These changes ultimately reduce productivity.

6. Impact on Milk Production:

Dairy animals are highly susceptible to thermal stress.

Major effects include:

- Lower feed consumption
- Reduced milk yield
- Decreased milk fat percentage
- Lower milk protein content
- Increased mastitis incidence
- Poor udder health
- Reduced lactation persistence

High-yielding crossbred cattle are generally more vulnerable to heat stress than indigenous cattle because of their greater metabolic heat production associated with higher milk yield. Under elevated temperature–humidity index (THI) conditions (>72), crossbred cows may experience a 10–25% decline in milk yield and a 20–30 percentage-point reduction in conception rate, whereas indigenous *Bos indicus* breeds such as Sahiwal and Hariana exhibit significantly greater heat tolerance, maintaining higher productivity and reproductive performance under similar conditions due to superior

thermoregulatory adaptations (Frontiers, 2026; Behl et al., 2006).

7. Reproductive Consequences:

Heat stress severely affects reproduction.

Observed problems include:

- Silent estrus
- Delayed puberty
- Poor conception rate
- Early embryonic mortality
- Increased abortion
- Reduced semen quality
- Lower libido in breeding males

These effects prolong calving intervals and reduce herd productivity.

8. Disease Risks During Super El Niño:

Climate variability alters disease ecology.

Potential risks include:

- ✓ Vector-borne diseases
- ✓ Tick infestations
- ✓ Fly populations
- ✓ Internal parasites
- ✓ Water-borne infections
- ✓ Food-borne diseases
- ✓ Stress-induced

immunosuppression further increases susceptibility to infectious diseases.

- ✓ Continuous surveillance is

essential.

9. Poultry Production Challenges:

The poultry industry is particularly sensitive to heat stress.

Heat stress causes:

- Reduced feed efficiency
- Lower egg production
- Thin eggshells
- Increased mortality
- Poor broiler growth
- Reduced hatchability
- Immunosuppression

Feed shortages further increase production costs.

10. Sheep, Goat and Pig Production:

Small ruminants generally tolerate harsh climates better than cattle.

However, prolonged drought leads to:

- Reduced grazing
- Weight loss
- Poor reproductive performance
- Increased kid and lamb mortality
- Reduced meat production

Pig production is also adversely affected by heat stress and water scarcity.

11. Socio-economic Impacts:

Climate-induced livestock losses directly affect:

- Smallholder farmers
- Landless livestock keepers

- Women farmers
- Dairy cooperatives
- Meat industries
- Poultry enterprises

Economic consequences include:

- Declining household income
- Rising livestock mortality
- Reduced market supply
- Increased consumer prices
- Rural indebtedness

12. Climate-Smart Livestock Management:

Adaptation measures include:

- ✓ Heat-resistant housing
- ✓ Shade structures
- ✓ Foggers and sprinklers
- ✓ Adequate ventilation
- ✓ Cool drinking water
- ✓ Precision feeding
- ✓ Balanced mineral supplementation
- ✓ Electrolyte supplementation
- ✓ Antioxidants
- ✓ Climate-resilient fodder production

These interventions improve animal comfort and productivity.

13. Genetic Improvement and Breed Conservation:

Indigenous livestock breeds possess:

- Better heat tolerance
- Disease resistance
- Lower maintenance requirements

- Superior adaptability

Future breeding programmes should incorporate:

- Genomic selection
- Heat tolerance markers
- Climate-resilient breeding objectives
- Conservation of indigenous germplasm

14. Early Warning Systems and Digital Technologies:

Modern technologies can substantially improve preparedness.

Useful tools include:

- Weather forecasting
- Heat stress alerts
- Satellite monitoring
- Remote sensing
- Artificial Intelligence (AI)
- Internet of Things (IoT)
- Precision livestock farming
- Mobile advisory services

Timely information enables farmers to reduce production losses.

15. Policy Priorities and One Health Approach:

Government agencies should strengthen:

- Climate-resilient livestock infrastructure
- Livestock insurance
- Emergency fodder banks
- Water harvesting

- Disease surveillance
- Vaccination programmes
- Farmer training
- Extension services

The One Health approach integrating animal, human, and environmental health provides a comprehensive framework for climate adaptation.

Additional Strategic Measures for Enhancing Livestock Resilience During Super El Niño:

- ✓ Special attention should be given to small and marginal farmers, landless households, and wage-labour families owning livestock. Sustaining and enhancing livestock production during El Niño can compensate for crop income losses while safeguarding household nutrition.
- ✓ Promote drought-resistant and low water-consuming fodder crops, perennial grasses, fodder trees, and horti-pasture systems.
- ✓ Encourage drip and sprinkler irrigation, rainwater harvesting, and efficient water-use practices for fodder production.
- ✓ Provide mineral mixtures and concentrate feed, especially to productive animals, along with electrolytes and balanced nutrition.
- ✓ Implement preventive healthcare

through vaccination, deworming, de-ticking, surveillance, and biosecurity.

- ✓ Reduce heat stress through shade, ventilation, cooling, and adequate drinking water.
- ✓ Conduct extensive farmer awareness programmes on El Niño preparedness and climate-smart livestock management.
- ✓ Ensure coordinated action by Animal Husbandry, Agriculture, Horticulture, Irrigation, Rural Development and allied departments to promote fodder crops, crop residues, intercropped fodders, fodder trees and horti-pastures.
- ✓ Strengthen government support through backward and forward linkages, including fodder banks, veterinary services, insurance, credit, processing and marketing support for vulnerable livestock-owning families.

16. Conclusion:

Super El Niño represents a major emerging challenge for India's livestock sector. Heat stress, water scarcity, feed shortages, reproductive failure, and disease outbreaks collectively threaten livestock productivity. Economic losses arising from these challenges also jeopardize

rural livelihoods. Nevertheless, scientific planning, resilient production systems, climate-smart technologies, precision livestock management, conservation of indigenous breeds, digital advisory platforms, and supportive public policies can substantially reduce vulnerability. Strengthening preparedness today will enable India's animal husbandry sector to withstand future climate extremes while ensuring food security, farmer welfare, and sustainable agricultural growth

References:

Please contact the corresponding author.