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Government Initiatives for Climate-Resilient Livestock Production

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Livestock sustain rural livelihoods and contribute about 24.32% of India's agricultural Gross Value Added, yet climate change threatens their productivity and welfare. This article reviews Indian government initiatives for climate-resilient livestock production. It examines the National Innovations on Climate Resilient Agriculture (NICRA), the National Livestock Mission, the Rashtriya Gokul Mission, the National Animal Disease Control Programme, and the National Mission for Sustainable Agriculture. It also covers renewable energy schemes such as NBOMP, SATAT, and GOBAR-Dhan, illustrated by biogas and Bio-CNG case studies from Bengaluru and Gujarat. Emerging digital tools, including precision livestock farming, artificial intelligence, drones, and robotics, are discussed alongside the contribution of resilient livestock systems to the Sustainable Development Goals. Greater convergence of programmes and wider access to technology for smallholders are identified as priorities.

Keywords: Climate resilience, Livestock, NICRA and precision livestock farming.

Why Livestock Matter

For millions of rural households, livestock are food, income, and security in one. The sector contributes about 40% of global agricultural GDP and sustains nearly 1.3 billion livelihoods (FAO, 2013). India, home to one of the world's largest livestock populations, derives approximately 24.32% of its agricultural Gross Value Added (GVA) and 4.66% of its national GVA from the sector (Ministry of Finance, 2024–25). Livestock also supply manure, draught power, and nutrient recycling to crop systems, making the sector central to the Sustainable Development Goals (SDGs).

Government Schemes at a Glance

The Ministry of Agriculture & Farmers' Welfare, the Department of Animal Husbandry and Dairying (DAHD), the Indian Council of Agricultural Research (ICAR), and State Governments support climate-resilient livestock production through research, technology transfer, infrastructure, and farmer training.

Table 1: Major Indian initiatives for climate-resilient livestock production (ICAR-CRIDA, 2023)

Initiative	Focus	Climate relevance
NICRA (ICAR, 2011)	Climate-resilient crop, livestock, and fisheries technologies	Heat-stress management, THI thresholds, climate-smart shelters

Initiative	Focus	Climate relevance
National Livestock Mission	Productivity, entrepreneurship, fodder, breed conservation	Fodder security, indigenous breeds
Rashtriya Gokul Mission	Genetic improvement of indigenous bovines	Heat-tolerant, disease-resistant breeds
NADCP	Control of foot-and-mouth disease (FMD) and brucellosis	Healthier, more resilient herds
NMSA	Water, soil health, agroforestry, climate risk management	Benefits integrated crop–livestock systems
AHIDF	Investment in dairy, meat, and feed infrastructure	Enables value addition and waste utilization
NBOMP, SATAT, GOBAR-Dhan	Biogas, Bio-CNG, and organic manure from dung	Methane capture, renewable energy

NICRA: A Closer Look

Launched by ICAR in 2011, NICRA brings crop science, livestock, fisheries, natural resource management, and agricultural engineering under one climate-resilience programme. Its aims are to strengthen climate resilience, develop and demonstrate proven technologies on farmers' fields, build research capacity, prepare district-level adaptation plans, and train farmers (ICAR-CRIDA, 2023).

Its livestock achievements include:

- **Stressol-G**, an herbal anti-stress formulation.
- **Herbal supplementation** with ashwagandha, tulsi, amla, and turmeric in poultry.
- **Summer supplementation** with betaine, organic trace minerals, and antioxidants.
- **Temperature Humidity Index (THI) thresholds** for sheep and dairy cattle.
- **Climate-smart shelters** promoted at farm level.

Together, these technologies have improved productivity and reduced stress-related mortality (ICAR-CRIDA, 2023).

Case Studies: Dung to Energy

AISIN biogas system, Shri Bhagya Lakshmi Farms, Bengaluru. Large dairies produce more dung than they can use. AISIN Corporation (Japan), working with Indian partners, built an integrated system that turns this waste into power. From about 1,000 kg of fresh dung per day, it yields roughly 40 m³ of biogas, 200 kg of organic fertilizer, and renewable electricity.

Banas Dairy Bio-CNG initiative, Gujarat. One of India's pioneering Bio-CNG projects, it collects dung from surrounding villages and converts it into fuel. This shows how dairy cooperatives can link farm waste, clean energy, and rural income.

Emerging Technologies

The Fourth Industrial Revolution is bringing digital tools to the farm (Wolfert et al., 2017):

- **Precision Livestock Farming (PLF):** Sensors, artificial intelligence (AI), robotics, and big data monitor heat stress, disease, estrus, feeding behaviour, and water intake before productivity falls (Berckmans, 2014).
- **AI:** Machine-learning models support disease diagnosis, milk-yield prediction, heat-stress forecasting, precision feeding, and genetic evaluation.
- **Drones:** Used for pasture and fodder assessment, water-resource mapping, livestock surveillance, and disaster response.
- **Robotics:** Automatic milking, feed-pushing, cleaning, and health-monitoring systems reduce labour and improve consistency.

Linking Livestock to the Sustainable Development Goals (SDGs)

Climate-resilient livestock production advances several SDGs (United Nations, 2015).

Table 2. Contribution to the Sustainable Development Goals

SDG	Contribution
1 – No Poverty	Higher productivity raises rural income
2 – Zero Hunger	Resilient livestock secure food supply
3 – Good Health and Well-being	Animal-source foods improve nutrition
6 – Clean Water and Sanitation	Better manure management protects water
7 – Affordable and Clean Energy	Biogas promotes renewable energy
12 – Responsible Consumption and Production	Efficient systems reduce waste
13 – Climate Action	Methane reduction and carbon-efficient farming
15 – Life on Land	Sustainable grazing conserves biodiversity

Conclusion

India's schemes already cover research, breeding, animal health, infrastructure, and clean energy. The next step is convergence: linking these programmes at the farm level and extending digital tools to smallholders, who keep most of the country's livestock.

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