

Lumpy Skin Disease: How a Virus Changed India's Cattle Industry

Dr. Rokade Prashant Prakash¹, Dr. Diksha Singh², Dr. Neeraj Kumar Gangwar³

Introduction:

India possesses the world's largest cattle population and the dairy sector plays a crucial role in rural livelihood, nutrition, and the national economy. However, emerging and re-emerging infectious diseases pose a serious threat to sustainable cattle production. One such disease that dramatically altered India's cattle industry in recent years is Lumpy Skin Disease (LSD).

Lumpy Skin Disease is a highly contagious viral disease of cattle characterized by fever, nodular skin lesions, reduced milk production, infertility, and sometimes death. Although LSD was historically confined to Africa, its unexpected emergence and rapid spread across India since 2019–2022 caused massive economic losses and panic among farmers. The disease not only affected animal health but also exposed gaps in disease surveillance, vaccination preparedness, and vector control strategies in the country.

What is Lumpy Skin Disease?

Lumpy Skin Disease is caused by the Lumpy Skin Disease Virus (LSDV), a member

of the *Capripoxvirus* genus under the family *Poxviridae*. The virus is closely related to sheep pox and goat pox viruses and shows strong host specificity, primarily affecting cattle and buffaloes.

The virus is highly resistant in the environment and can survive for long periods in dried scabs, skin lesions, and contaminated materials, making disease control challenging (Tuppurainen & Oura, 2012).

Epidemiology and Emergence in India

LSD was first reported in India in 2019, but large-scale outbreaks occurred during 2021–2022, affecting almost all major cattle-rearing states including Rajasthan, Gujarat, Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, and Maharashtra. The rapid spread was facilitated by:

- ☛ Abundant insect vectors
- ☛ Movement of animals
- ☛ Lack of herd immunity
- ☛ Initial absence of a dedicated vaccine

By 2022, LSD caused mortality in thousands of cattle and resulted in severe milk

Dr. Rokade Prashant Prakash¹, Dr. Diksha Singh², Dr. Neeraj Kumar Gangwar³

1,2, M.V. Sc Pathology, 3, Associate Professor
College of veterinary science DUVASU Mathura

production losses, significantly impacting small and marginal farmers (Sudhakar et al., 2022).

Transmission: How the Virus Spreads

LSD is mainly transmitted through **blood-feeding arthropod vectors**, making it a vector-borne disease.

Major modes of transmission include:

- ☛ Biting flies (*Stomoxys, Tabanus*)
- ☛ Mosquitoes
- ☛ Ticks
- ☛ Mechanical transmission via contaminated needles and instruments

Direct contact plays a minor role, but secretions from skin nodules, saliva, nasal discharge, and milk can contain the virus (Carn & Kitching, 1995).

Pathogenesis: How LSD Damages the Animal

After entering the body ~~through vector bites~~, the virus replicates locally and then spreads via blood and lymphatics, causing **viremia**.

Key pathological events include:

1. **Fever and Viremia** – Virus multiplies in lymph nodes and spreads systemically.
2. **Skin Nodule Formation** – Virus infects endothelial cells leading to vasculitis, thrombosis, and necrosis of skin tissues.

3. **Internal Organ Involvement** –

Lesions may occur in lungs, gastrointestinal tract, and reproductive organs.

4. **Immune Suppression** – Infected animals become more susceptible to secondary bacterial infections.

The characteristic nodules may slough off, leaving deep wounds that predispose animals to myiasis and chronic debility (Weiss, 1968).

Clinical Signs in Cattle

The severity of clinical signs varies depending on age, breed, immune status, and viral strain.

Common clinical signs include:

- ☛ Sudden onset of high fever (40–41°C)
- ☛ Firm, round nodules on skin (2–5 cm diameter)
- ☛ Swelling of lymph nodes
- ☛ Nasal and ocular discharge
- ☛ Lameness due to limb lesions
- ☛ Drastic reduction in milk yield
- ☛ Emaciation and weakness
- ☛ Infertility, abortion, or temporary sterility in bulls

Indigenous cattle often show milder signs compared to crossbred and exotic cattle, which suffer more severe disease.

Post-Mortem Lesions

Characteristic lesions observed during necropsy include:

- ☞ Necrotic skin nodules extending into subcutaneous tissue
- ☞ Edema and hemorrhages in skin and muscles
- ☞ Nodules in lungs and trachea
- ☞ Enlarged lymph nodes
- ☞ Secondary bacterial infections and septicemia in severe cases

Economic Impact on India's Cattle Industry

Lumpy Skin Disease caused unprecedented economic losses in India.

Major losses include:

- ☞ Milk yield reduction up to 30–50%
- ☞ Death of productive cattle
- ☞ Cost of treatment and supportive therapy
- ☞ Reduced draught power in rural areas
- ☞ Trade restrictions and movement bans
- ☞ Long-term infertility and poor reproductive performance

It is estimated that LSD outbreaks caused losses worth several thousand crores of rupees to India's dairy sector, severely affecting farmer income and national milk production (DAHD, 2022).

Diagnosis of Lumpy Skin Disease

Field Diagnosis

- ☞ Based on typical skin nodules, fever, and herd history

Laboratory Diagnosis

- ☞ PCR for viral DNA (gold standard)
- ☞ Virus isolation

- ☞ Serological tests (ELISA)

Early laboratory confirmation is essential for rapid containment and control.

Prevention and Control Strategies

1. Vaccination

Vaccination is the most effective tool against LSD. In India, **Goat Pox vaccine** has been successfully used due to cross-protection, and later an indigenous **LSD-specific vaccine (Lumpi-ProVac®)** was developed.

Mass vaccination campaigns significantly reduced disease spread (ICAR, 2022).

2. Vector Control

- ☞ Regular insecticide spraying
- ☞ Fly repellents and tick control
- ☞ Proper manure and waste management

3. Movement Control

- ☞ Restriction of animal movement from affected areas
- ☞ Quarantine of newly purchased animals

4. Supportive Treatment

There is no specific antiviral treatment. Management includes:

- ☞ Antipyretics and anti-inflammatory drugs
- ☞ Broad-spectrum antibiotics to prevent secondary infections
- ☞ Wound care and fly control
- ☞ Nutritional and mineral supplementation

Lessons Learned and the Road Ahead

The LSD outbreak highlighted the importance of:

- ☛ Strong disease surveillance systems
- ☛ Indigenous vaccine development
- ☛ Farmer awareness and extension services
- ☛ Climate-sensitive vector management

With coordinated efforts from veterinarians, researchers, policymakers, and farmers, India can better prepare for future transboundary animal diseases.

Conclusion

Lumpy Skin Disease emerged as a major challenge to India's cattle industry, transforming disease preparedness and vaccination strategies across the country. Though the virus caused heavy losses, it also accelerated scientific innovation, vaccine self-reliance, and awareness among farmers. Sustainable control through vaccination, vector management, and biosecurity is essential to safeguard India's cattle wealth and dairy economy.

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