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Emerging Challenges of Lumpy Skin Disease (LSD): Transmission, Prevention and Control

Govind Gurjar, Dr. Meenakshi Gahlot

Research Scholar, Department of Zoology, S.P.C. Government College, Ajmer, Rajasthan, India

Professor, Department of Zoology, S.P.C. Government College, Ajmer, Rajasthan, India

ABSTRACT: Lumpy Skin Disease (LSD) is a highly contagious viral disease of cattle that has emerged as a major transboundary animal health concern worldwide. Since its first report in Zambia in 1929, LSD has progressively spread from Africa to the Middle East, Europe, and Asia, demonstrating significant geographical expansion and complex epidemiological patterns. Understanding the epidemiology, transmission dynamics, and preventive strategies of LSD is essential for controlling its spread and minimizing its impact on livestock production and global animal health. Thus, this paper aims to understand the transmission of LSD and its prevention and control.

KEYWORDS: Lumpy Skin Disease; Cattle; Disease; Transmission; Control.

I. INTRODUCTION

LSD is a viral transboundary disease that may proliferate beyond its original outbreak area, potentially escalating into an epidemic (Casal et al., 2018; Sreedevi and Rajesh, 2021). The principal clinical signs consist of nodular lesions on the dermal layer and mucosal surfaces. These nodules commonly manifest on the exterior portions of infected cattle, including the neck, perineum, udder, head, and other locations (Molla et al., 2017; Haider et al., 2023). Affected cattle frequently exhibit differing levels of oedema and lameness (Salib and Osman, 2011). Moreover, infected animals typically display mucosal ulcerations, hyperthermia, and lymphadenopathy (Lubinga et al., 2015; Elhaig et al., 2017). A significant proportion of the impacted bovine herd may ultimately recuperate after a prolonged illness; however, they will persistently display symptoms of mastitis, pneumonia, and skin ulcerations (Selim et al., 2021). Owing to its extreme contagiousness, the World Organization for Animal Health mandates the reporting of LSD as a transmissible disease. LSDV can disseminate through multiple mechanisms, including secondary contact among animals via vectors, semen, natural suckling, biting insects, and iatrogenic transmission (Annandale et al., 2010; EFSA, 2018). Nonetheless, numerous investigations have confirmed that the disease's transmission by direct contact is difficult (Magori-Cohen et al., 2012; Mulatu and Feyisa, 2018).

II. REVIEW OF LITERATURE

Swami and Verma (2022) reported that Lumpy Skin Disease (LSD) is mainly transmitted through vectors such as ticks, mosquitoes, and flies, as well as contaminated feed and water. First reported in Zambia, the disease has now spread globally, with severe outbreaks in Rajasthan. The initial case in the state was recorded in July 2022 in Jaisalmer, after which it rapidly spread to 32 districts. Within a month, about 8,74,242 cattle were infected, with 38,191 deaths reported by September 2022. The disease showed high morbidity and mortality (~1.5%) and was more prevalent during the monsoon season. Clinically, LSD is characterized by 2–6 cm skin nodules, which may rupture into wounds, with an incubation period of 5–7 days (up to 4–5 weeks). Severe cases may lead to eye lesions and blindness. Control measures include movement restriction, quarantine, surveillance, vector control, vaccination, and supportive practices like disinfection and traditional remedies.

Choudhary (2023) conducted a survey in Jodhpur district during October–November 2022 involving farmers, dairy owners, and gaushala operators. The study found that 56% of cattle were affected, with a mortality rate of 32.14%, mainly due to delayed diagnosis and inadequate treatment. Milch animals were most vulnerable, contributing to 48% of deaths. The study also reported challenges such as lack of financial support and difficulty in gaining trust of livestock owners.

Dhaka et al. (2024) carried out a clinical study in Bikaner on 32 crossbred cattle, confirming LSD through clinical signs and PCR testing. Common symptoms included fever, lacrimation, lethargy, lymph node enlargement, skin nodules, and oedema. Significant increases in body temperature, heart rate, and respiration rate, along with reduced rumen motility, indicated systemic effects of the disease.

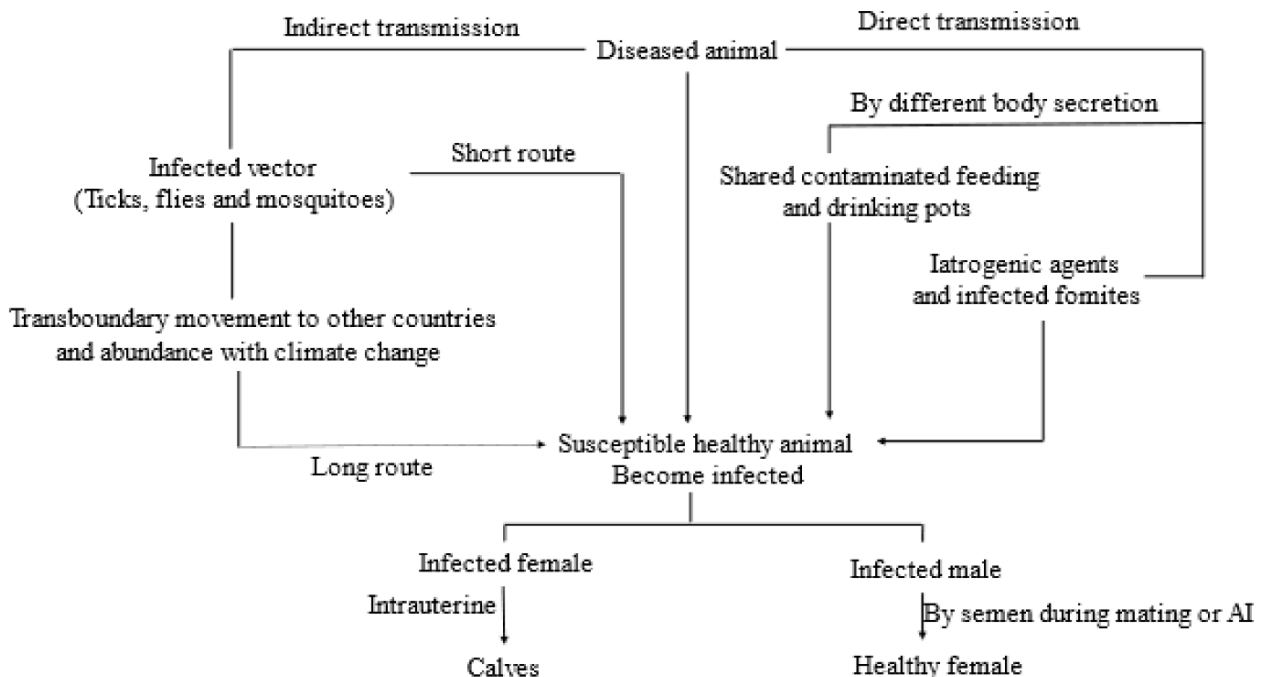
Meena et al. (2025) assessed LSD prevalence using ELISA on 455 samples collected across Rajasthan during 2023–2024. The study reported an overall positivity rate of 30.7%, providing important insights into disease distribution for better control strategies.

Rajawat et al. (2026) investigated constraints faced by livestock owners in five highly affected districts of Rajasthan. Based on 300 respondents, the study identified high treatment cost, transportation difficulties, and irregular veterinary services as major healthcare constraints. Management issues included lack of facilities for carcass disposal, absence of disposal sites, and inadequate isolation infrastructure. The study concluded that LSD outbreaks significantly disrupt livestock management and emphasized the need for improved veterinary infrastructure and preparedness.

Transmission of Lumpy Skin Disease: -

The transmission of the LSD virus (LSDV) is mostly attributed to blood-feeding arthropods, such as biting flies, mosquitoes, and ticks (Davies, 1991; Khaton et al., 2025). Direct interaction with an infected animal is seen as having a negligible impact on the spread of the virus. The potential for transmission through fomites, such as the consumption of feed and water contaminated with infected saliva, remains uncertain; nevertheless, the emergence of newly identified recombinant field strains indicates that these pathways may be involved. The incidence of LSD infection is elevated during periods of increased vector activity, namely in warmer temperatures. The principal mode of long-distance transmission of LSDV is through the movement and trading of infected livestock. Nonetheless, as LSD is a vector-borne illness transmitted by biting insects, it can also be disseminated over considerable distances by wind delivering infected insects.

Fig 1: Schematic Representation of Direct and Indirect Transmission of LSD

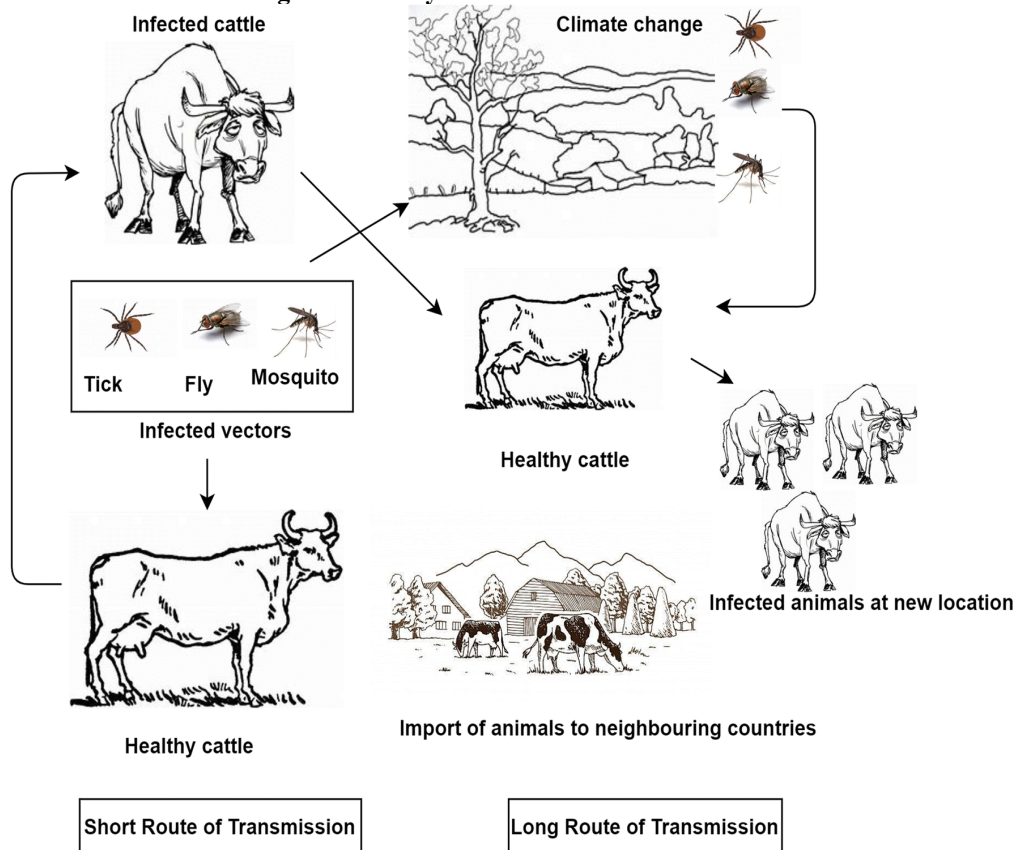


Source: Akther et al. (2023)

Certain biting insects and mosquitoes can transmit the virus. Moreover, houseflies and tsetse fly may potentially facilitate the transmission of the virus. Direct interaction with infected animals can also facilitate transmission of the

virus. The impacted animals can excrete the pathogen via oral, nasal, and ocular secretions. Occasionally, communal waterers and feeders also propagate the LSDV infection to vulnerable animals. The disease may also be transferred iatrogenically through needle injections during mass therapy in endemic or epidemic areas (Ahmed, 2024). The LSD virus exhibits considerable stability and may persist in skin lesions for as long as 35 days. The virus can be excreted by nasal and lacrimal secretions, milk, and semen, surviving for up to 11 days in milk and up to 22 days in semen. Nonetheless, there is no indication of LSDV in the meat of sick animals. LSD infection has traditionally been prevalent in southern and eastern Africa; but, since 2000, it has also been reported in the Middle East, the Balkans, Bangladesh, China, and Europe. The disease has not been documented in the Western Hemisphere, Australia, or New Zealand. In July 2025, Italy and France documented their initial instances of the disease, indicating a shift in the virus’s circulation and underscoring the necessity for enhanced global disease surveillance and collaboration.

Fig 2: Summary of transmission of LSD virus



Source: Gupta et al. (2020)

Field observations and photographic documentation of cattle from Ajmer district revealed typical clinical manifestations of Lumpy Skin Disease (LSD) (figure 3). The affected animals exhibited multiple, well-defined nodular lesions distributed over various parts of the body, including the neck, trunk, and hindquarters. In several cases, these nodules appeared raised and firm, with some progressing to scab formation and signs of secondary infection. The disease was observed in cattle of different coat colors, indicating that susceptibility was not restricted to a specific breed or type. Table 1 further highlight the extent of the outbreak in the Ajmer district. A total of 3186 epicentres were recorded, indicating widespread occurrence of the disease. The number of susceptible animals was 116,454, out of which 39,998 animals were affected. Among the affected population, 35,507 animals were treated, and 28,234 animals recovered. However, 4,491 animal deaths were reported, indicating notable mortality associated with the disease. Preventive and control measures were also documented. A total of 320,598 animals were vaccinated, and 4,303 animals were isolated, including stray animals. The availability/procurement status of vaccines was recorded as 58, reflecting the level of logistical support for disease control measures.

Fig 3: Lumpy Skin Disease Observed in Cattle at Ajmer, Rajasthan



Source: Author

Table 1: Reporting Status of Lumpy Skin Disease (LSD) in Ajmer District, Rajasthan

Parameter	Total (Upto 06-02-2023)
Number of Epicentre	3186
Animal Susceptible	116454
Animal Affected	39998
Animal Treated	35507
Animal Recovered	28234
Animal Died	4491
Animal Vaccinated	320598
Animal Isolated (Including Stray Animals)	4303
Availability/Procurement of Vaccine Status	58

Source: Regional Disease Diagnostic Center, Ajmer (2023)

Recent evidence from the LSD epidemic in Europe and Western Asia indicates that effective control and eradication of LSD depend on biosecurity measures, early discovery, movement regulation, and subsequent rapid and extensive immunization with high-quality vaccinations. Due to the transboundary nature of the disease, cross-border cooperation is crucial for its management and prevention.

Prevention and Control of LSD: -

The prevention and control of LSD fundamentally depend on a comprehensive strategy encompassing movement regulation (quarantine), immunization, culling or depopulation measures, and suitable management techniques. National control programs may differ among countries; thus, guidance from authoritative veterinary bodies and animal health experts is crucial. Vaccination is deemed the most effective management measure, with the administration of live homologous vaccines containing a Neethling-like strain of the LSD virus (LSDV) extensively advocated to ensure robust and enduring immunity in cattle populations. Management of LSD through quarantine and restrictions on animal movement is frequently inadequate, as the disease is mostly disseminated by biting insects and specific tick species. While total control of insect vectors has not been entirely effective in halting disease transmission, the application of insecticides alongside repellents can markedly diminish vector populations and assist in curtailing transmission.

Outbreaks of LSD can be controlled through stringent quarantine protocols, culling of diseased and exposed animals, secure disposal of carcasses, comprehensive sanitation and disinfection of contaminated facilities, and execution of pest management strategies. Sustainable management of LSD can be attained alone through immunization or immunoprophylaxis (Al-Salihi, 2014). To effectively manage and limit LSD outbreaks, it is crucial to identify clinico-hematological and biochemical changes in infected cattle, beside recognizing common clinical indications. Precise and prompt diagnosis is essential for executing suitable control measures. Annual vaccination with a similar LSDV strain is necessary in endemic areas, while vector management and limitations on animal movement during peak bug activity are also crucial. Additionally, breeding bulls must be regularly tested for LSDV to avert disease transmission via breeding techniques (Tuppurainen, 2017).

Vaccination efforts for LSD involve homologous live attenuated virus vaccines, especially those derived from the Neethling strain, which can provide immunity for up to three years. Heterologous live attenuated vaccines originating from sheep or goat pox viruses have been utilized; however, these vaccines can induce local and, at times, severe reactions and are not advised in countries free from sheep and goat pox, as they may endanger susceptible small ruminant populations. Currently, no commercially viable recombinant capripox vaccinations of the new generation exist. No specific antiviral treatment exists for LSD; so, vaccination is the most efficient method of disease control. The treatment mostly focuses on symptomatic relief and supportive care. Secondary bacterial infections of skin lesions can be treated with suitable antibiotics, either topical or injectable, in conjunction with non-steroidal anti-inflammatory drugs (NSAIDs) to alleviate pain, inflammation, and fever, thus enhancing feed consumption and overall animal comfort (Mulatu and Feyisa, 2018). Supportive therapy is essential for recovery and encompasses the application of antiseptic or herbal sprays on lesions, the administration of immunomodulatory agents like levamisole, antihistamines at a dosage of 10 ml daily for three days, and broad-spectrum antibiotics such as amoxicillin at a cumulative dose of 3–4 g or 10–12 mg per kg body weight, as necessary. While these treatments do not eradicate the virus, they mitigate consequences, enhance animal welfare, and diminish economic losses related to the disease (Chouhan et al., 2022).

III. CONCLUSION

Lumpy Skin Disease has emerged as a significant transboundary viral disease affecting cattle populations across multiple continents. Since its initial identification in Africa, the disease has expanded to several regions including the Middle East, Europe, and Asia, demonstrating its capacity for rapid geographical spread. The epidemiology of LSD is strongly influenced by vector-borne transmission through blood-feeding arthropods, while the movement of infected livestock also contributes to long-distance dissemination. Clinical manifestations such as skin nodules, fever, lymphadenopathy, and systemic complications lead to substantial economic losses in the livestock sector due to reduced productivity, treatment costs, and trade restrictions. Effective control of LSD requires a multifaceted approach that integrates vaccination, vector control, movement restrictions, and improved biosecurity measures. Among these strategies, vaccination with homologous live attenuated vaccines remains the most reliable and sustainable method for disease prevention. Early detection, rapid diagnosis, and coordinated surveillance programs are essential to limit outbreaks and prevent further spread. Additionally, international cooperation and cross-border monitoring are crucial due to the transboundary nature of the disease. Therefore, enhancing awareness among livestock owners can significantly reduce the impact of LSD and support the long-term protection of cattle health and livestock-based economies.

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