

Survey on Socio-Economic Impact of Lumpy Skin Disease (LSD) on Livestock Farmers: A Review

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ABSTRACT: Livestock play a very significant role in the economy by Sustaining the livelihood of farm households across the world, especially in the developing countries like India. Many diseases can challenge cattle farming comprises Viral, bacterial & Parasitic Diseases. These diseases not only Impact on the health of the livestock but also the productivity of the farm, & livelihood of the livestock farmer. Among the diseases, Lumpy Skin disease (LSD), Causes a Tremendous economic losses in the Cattle farming. Lumpy skin disease (LSD) is caused by Lumpy skin disease virus (LSDV). Lumpy skin disease virus belongs to the family Poxviridae, Lumpy skin disease virus is a member of the *Capripoxvirus* genus, that encompasses Sheep pox virus & Goat pox virus. LSD is a fatal disease which is characterized by Nodules on the skin (Skin lesions) Skin lesions covers the whole body of the Cattle. Many cattle & water buffaloes may Affected by LSD. Other symptoms Includes loss of milk production, abortion in females. Sometimes the virus is Expel out Via different body secretions like semen. LSD is a very Spreadable Viral disease of Cattle. LSD is considered as endemic disease found in many countries as the death rate is higher among calves.

Keywords: Lumpy skin disease (LSD), Socio-economic, Endemic, Farm households, livestock.

INTRODUCTION

India has broad amenity of livestock that plays a vital role to upgrade the socio- economic growth of rural families. Livestock also faces various diseases that may affect the whole industry, cattle farmers & their source of income significantly. Among these diseases, Lumpy skin disease (LSD) is most fatal viral disease causes huge economic losses in the Cattle farming. This infection is caused by Lumpy skin disease virus (LSDV). Lumpy skin disease virus belongs to the family *Poxviridae*, subfamily *Chordopoxvirinae* & genus *Capripoxvirus*. Other names of this infection are “Pseudo urticaria”, “Neethling virus disease”, “exanthema nodularisbovis” & “knopvelsiekte” (Al-Salihi, 2014; Tuppurainen *et al.*, 2017). LSD is a non-zoonotic, hazardous and fatal disease of cattle identified by nodules on the skin, The vector responsible for this vector-borne disease includes the blood sucking arthropods *i.e.*, flies, mosquitos and ticks (Lubinga *et al.*, 2013). The assorted blood-feeding arthropods are responsible for the spread of LSD that includes biting flies, mosquitoes & ticks (Khan *et al.*, 2024). This infectious disease mainly affects the Cattle & buffaloes but also reported in wild ruminant spp. Like giraffes, bulls, and springboks (Davies, 1991; Das *et al.*, 2021; Roche *et al.*, 2021). Lumpy skin disease is accompanied with high morbidity but low mortality (Abutarbush *et al.*, 2015). The disease is marked by

Fever, Lymph node swelling, nodules on the skin causing severe skinniness, milk production lessen, infertility in female Cattles. In general, it affects the productive value of livestock as it affects the milk production and meat production, lessen the reproductive efficiency (abortion and. infertility in females) (Gupta *et al.*, 2020). Skin lesions are the major symptom of the infection; although the virus is also Expel out via body secretions such as in semen. Lumpy skin disease lesions may Triggered from 7 to 14 days post infection under experimental conditions (Mulatu and Feyisa 2018). The disease was endemic in African countries since it was first recognised in Rhodesia (Zambia) in 1929, and has spread to other regions of the world (Morris, 1931). The report of Food and Agriculture states that, the disease first identified in South Asia in July 2019, with outburst reported China and Bangladesh (Roche *et al.*, 2021). Due to Lumpy skin disease, deaths of cows in a large number have broken the backbone of dairy industry (Choudhary, 2023). A month later, it was first time identified in India in the states of Odisha and West Bengal, which designate that it is a cross-boundary disease. Periodical cases come into sight after 2019 up to 2021 such that in the middle of the year 2022, In India, the maximum number of cases from the states of Gujarat and Rajasthan followed by Himachal Pradesh, Punjab, Haryana, Maharashtra, Uttar Pradesh, Uttarakhand, Jammu and Kashmir (ICAR report, 2023). Lumpy skin

disease (LSD) created destruction in the dairy industry of the northern states of India in the previous year (ICARATARI, 2023). In Himachal Pradesh. The outburst of Lumpy skin disease (LSD) reported in the year of 2022. This infectious disease affected thousands of the Himalayan Cattles and yaks (Sudhakar *et al.*, 2024). From the Himachal Pradesh, maximum number of cases Were from the district Kangra (the most affected district), Sirmaur, Solan, Una. The animal husbandry of Himachal Pradesh worked to prevent the outburst of lumpy skin disease by providing free vaccines, advised farmers not to buy or sell animals during endemic and many more guidelines issued by the government.



Fig. 1. Severe cases with Skin lesions covering the whole body.



Fig. 2. Lesions present over the head and neck regions of cattle.



Fig. 3. Lesions on the udder and teat.

This study aimed to explore and enumerate the socio-economic impact of LSD on the farm households and their awareness regarding the disease, its previous outburst, and control measures.

EPIDEMIOLOGY OF LUMPY SKIN DISEASE (LSD)

A. Epidemiology

Lumpy skin disease is a transboundary, vector-borne, seldom fatal disease that causes economic losses in cattle farming. Epidemiology of LSD consists its distribution, vector, risk factors, susceptible animals, control measures & preventions. Lumpy skin disease (LSD) is more chiefly occur in the summer & autumn months and in the low land areas (OIE, 2010).

(i) Geographical distribution of LSD. The first clinical signs of LSD Was found in 1929 in Zambia (Northern Rhodesia) (Morris, 1931). The infection of LSD outburst in Sub-Saharan, firstly reported in Egypt and then in Israel (Ali *et al.*, 2012; Tuppurainen & Oura 2012). It has been identified that the infection also marked in Saudi Arabia, Jordan, Iraq, and Turkey. After many years this infectious disease spread to Russia, Azerbaijan, Greece, Kosovo, and Serbia (Zeynalova *et al.*, 2016). In 2020, LSD was seen in Asian Continents as a major threat to livestock. Then outburst reported in Bangladesh in July month of 2019 (Hasib *et al.*, 2021; Parvin *et al.*, 2022). Many countries boarded with Southeast Asia so the infection can easily transmit from infected area to non-infected area. In Nepal, Sri Lanka, Bhutan, the outbreaks have been reported in 2020 (Gupta *et al.*, 2020; Tuppurainen & Oura 2012). The first case of the infection in India was reported in August 2019.

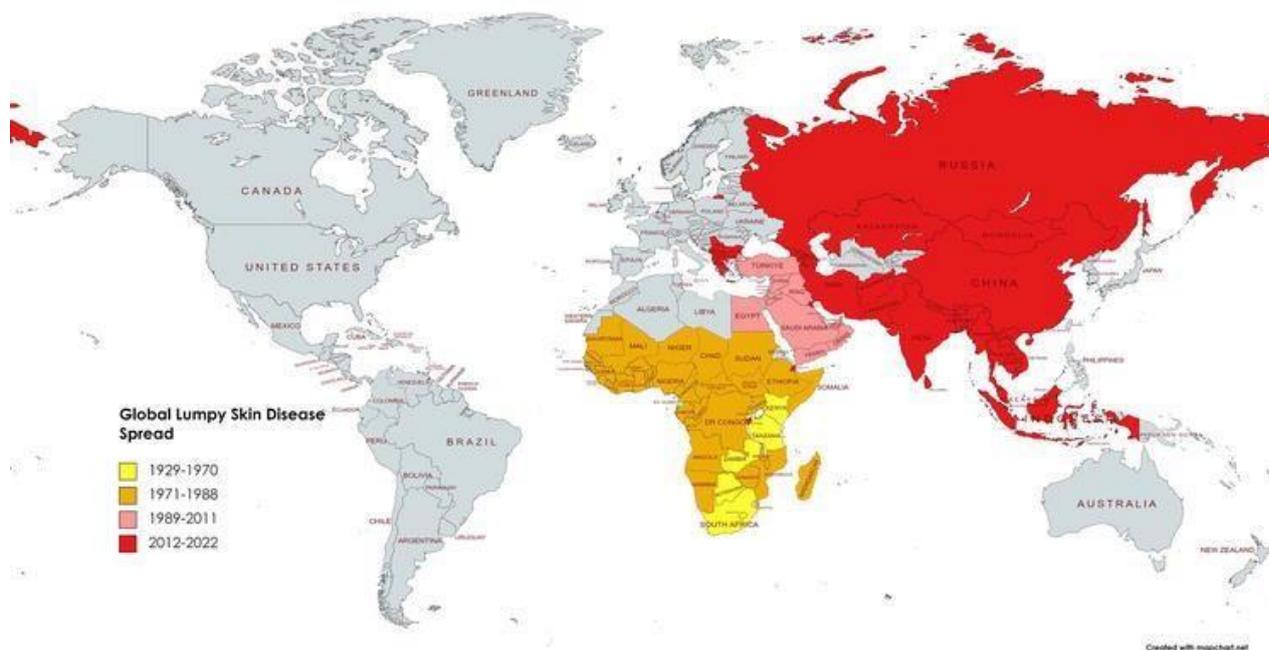


Fig. 4. Geographic distribution of Lumpy skin disease.

(ii) Susceptible Animals. Lumpy Skin Disease is primarily affected the Cattles & water buffaloes, especially European Skinniness breeds (More susceptible) (Brenner *et al.*, 2006). LSD has been identified in domestic Asian buffaloes & Arabian Oryx. Young calves are more prone to this infection and may develop the lesions within 24 to 48 hours (Al-Salihi, 2014).

(iii) Source of LSD infection. Lumpy skin disease is transmitted from clinically infected animals to non-infected animals. LSDV can be present in the blood, saliva, lesions & different fluid secretions of body for instance, nasal discharge, lachrymal secretions, milk, semen, which is the main source for transmission of LSD infection (Irons *et al.*, 2005; Babiuk *et al.*, 2008; Abera *et al.*, 2015).

(iv) Threats. LSD is a most fatal viral infection of cattle and causes many disorders. Though all the cattle are susceptible to this infection but *Bos Taurus* is predominantly more susceptible to LSD than other breeds of cattle (Radostits *et al.*, 2007). Milk producing Cattles also affected results intense drop in the milk production because of fever caused by this viral disease (Tuppurainen & Oura 2012). It is more widespread during wet & warmer conditions of summer and autumn months and occurs in low lying regions (OIE, 2010). Others reasons of cattle movement from one region to another, this may Transmitted the infection to all other non-infected areas.

B. Mode of transmission and Pathogenesis

(i) Direct transmission. Direct transmission can occur in Cattles via different routes when the cattle share the same fodder rack & drinking container that is infected by nasal, salivary discharges, semen, lacrimal secretions. It is also believed that arthropod vector is the main route of its transmission (Lefèvre and Gourreau 2010). Suckling calves may be infected through sucking the infected milk of mother. The virus is also Expel out Via different body secretions like semen. Through semen, the transmission of LSDV has been demonstrated experimentally (Annandale *et al.*, 2013). There is a postulation that, the virus is also secreted in vaginal secretions. The infection has been presumed to be transmitted from mother milk to calf (Tuppurainen *et al.*, 2017). Another route of spread of this virus when single needle used for vaccination again & again that can acquire the infection from the skin crusts (Mulatu & Feysia 2018).

(ii) Role of vectors. The virus predominantly transmitted by arthropod vectors, for instance common biting flies (*Stomoxys* and *Biomjje*), mosquitoes (*Aedes* and *Culex*) and some ticks (*Rhiphicephalus appendiculatus* and *Ambylom mahebraem*) are chiefly responsible for its widespread.

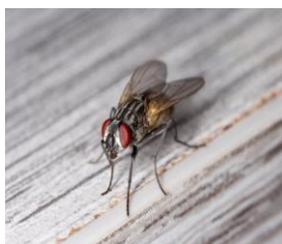


Fig. 5. Common fly.

Fig. 6. Mosquito.



Fig. 7. Ticks.

The multiplication of vectors during the monsoon months causes faster spread of the infection.

Glossina spp. Like tsetse fly, other arthropod vector that play a significant role in the transmission of the virus.

C. Pathogenesis

Lumpy skin disease virus enters the host's body through the cutaneous membrane or the mucosa of the gastrointestinal tract. The virus then Enlarge the lymph node, resulting in lymphadenitis. The virus then causes the skin lesions due to its rapid replication in Lymphatic endothelial cells resulting in the formation of nodules on the skin, that are of grey-pink. (Vorster, 2008).

D. Clinical symptoms

The signs & symptoms are following:

Nasal discharge & Lachrymal secretion are generally the first sign of infection, High fever which may be last for a week, Milk production lessen, Nodular skin lesion with size 10 to 50mm found in head, neck, genitalia, udder, teat, in few severe cases, painful ulcer lesions formed over the corneas of one or both eyes, Pregnant cows may abort or leads to infertility (Al-Sahili, 2014).

E. Diagnosis

Diagnosis can be done by two ways:

1. Field Diagnosis: field diagnosis of LSD can be based upon the: contagious disease with skin lesions, conical necrosis of skin nodules, enlargement of lymph nodes, chronic fever, low mortality, pox may be present in the testicles (Al-Sahili, 2014).

2. Laboratory Diagnosis: A confirmative diagnosis of lumpy skin disease can be based on laboratory investigation. this involves various methods such as isolation of the virus, electron microscopy, agar gel immunodiffusion, ELISA, PCR, Fluorescent antibody tests (Al-Sahili, 2014; Carn *et al.*, 1994).

F. Treatment

There is no particular treatment for lumpy skin disease, Infected cattle may be quarantine & isolated from the others, and given the general treatment like wound dressing to eliminate flies around the infected cattle and prevent the infection. various combination of antimicrobials, antibiotics & sulfonamides is recommended as preventive measures (Tuppurainen & Oura 2012).

G. Preventions & Controls

- Movement of infected cattle with LSD should be restricted to prevent the further infection to other non-infected animals
- Restrict the vectors, various vector control methods are present such as Insecticides, vector traps etc can be used to prevent the infection.
- Vaccination is the most effective preventive measure of LSD, live attenuated is available for lumpy skin disease.
- Calves should be immunized at the age of 3 to 4 months (Tuppurainen *et al.*, 2012).

H. Economic impacts of LSD

Lumpy skin disease is one of the most economically significant viral disease in the world, that causes the severe losses in the cattle industry. The economic importance of this disease is due to the fact that it has high morbidity rate rather than mortality. Direct losses of LSD include animal death, infertility in females, reduced milk productivity, which ultimately causes the huge damage to whole cattle industry & the livelihood of the farmers.

CONCLUSIONS AND RECOMMENDATIONS

Lumpy skin disease is a vector borne viral disease that predominantly affects the economic health of cattle. Clinically this infectious disease is characterized by various symptoms such as nodular skin lesions on the whole body, lessen the milk production, abortion in female cattle, weight loss. These may affect the livelihood of the rural farmers, which are entirely dependent on cattle. Therefore, to control the further spread of the virus these are few recommendations;

- Vaccination of LSD should be given to the calves within 3 to 4 months.
- Vector control methods should be applied.
- Restrict the movement of infected animals.
- Bulls that are used for breeding need to be diagnosed for lumpy skin disease virus.

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