

A Monthly e Magazine  
ISSN:2583-2212  
May 2024 Vol.4(5), 1887-1892

Popular Article

## Lumpy skin disease (LSD) – unveiling the emerging threat to livestock sector

Chandana M S<sup>1</sup>, Shyma K Latheef<sup>1</sup>, Ratnamrutha Nunna<sup>1</sup>, Gowtham A S<sup>1</sup>, Pronab Dhar<sup>1\*</sup>

<sup>1</sup>Division of Biological Standardization, ICAR- Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, 243122

<https://doi.org/10.5281/zenodo.11390696>

### Abstract

The livestock sector in India has been recently devastated by a highly contagious viral infection, known as Lumpy skin disease (LSD), affecting mainly cattle. It is also known as “Neethling virus disease” or “Pseudo urticaria”. The causative agent is Lumpy Skin Disease Virus (LSD Virus), classified within the genus *Capripoxvirus* under the Poxviridae family. This review aims to explain about the economic impact, virus transmission, clinical signs, diagnosis, prevention and control measures of LSD for a better understanding.

### Introduction

LSD is a viral infection that predominantly affects cattle, causing characteristic lumps or nodules on the skin along with fever and drop in milk production. It is categorized as a notifiable disease by World Organization of Animal Health (WOAH), since it causes production loss, economic loss and due to its potential for transboundary transmission. Till 1986, LSD remained endemic only in African countries, but recently WOAH stated that LSD is prevalent in almost all African, Asian and European countries. The first report of LSD dates back to 1929 in Zambia and subsequently spread to different parts of South Africa. During 1988-1989, the disease appeared in Egypt and Israel. During the subsequent years, disease hit in various Middle East countries and European countries. Very recently, in 2019, LSD emerged in India specifically in Odisha and later on vigorously spread to other south East Asian regions during 2020.

Generally, LSD virus produce disease in cattle and buffalo, but there are report of LSD in other wild animals such as giraffes, impala, wild beast etc. All the age groups are equally susceptible to LSD and thus far there have been no report of its zoonotic potential. Transmission of the LSD virus



primarily occurs by mechanical means, facilitated by blood sucking insects such as mosquitoes, ticks and flies. Additionally, susceptible animals can contract the disease through direct contact with contaminated secretions from infected animals as well as through fomite transmission. Affected animals exhibit clinical symptoms including high fever, nasal discharge, excessive salivation, lethargy, lacrimation, and decreased feed intake followed by the development of characteristic nodular lesions on the skin and mucus membranes. Subsequently, these nodular lesions can be progressed into wounds, further complicating the condition with secondary bacterial infection and other complications such as myiasis. The disease is associated with high morbidity (up to 90%) and low mortality rate (less than 10%). But the recent outbreaks of LSD in India have been associated with significant mortality rate also. Moreover, farmers residing in the LSD endemic area are encountering several economic challenges such as poor reproductive efficiency in affected animals, deteriorated quality of hides, reduced milk production and consistent emaciated appearance.

### **Economic impact of LSD**

The World Organization of Animal Health (WOAH) categorizes LSD as a notifiable disease by considering its high potential for transboundary transmission and economic impact. Since the mortality rate associated with LSD is relatively low, economic losses primarily stem from indirect factors associated with affected animals, especially severe emaciation and decline in production and quality of hides, resulting in substantial economic losses. The animal byproducts industry encompassing meat, milk and leather industry is severely affected by LSD due to the reduction in both quantity and quality of animal byproducts. Following the introduction of LSD in India, for two to three years, LSD cases were primarily reported from eastern regions that were characterized with low mortality rate. However, during 2022, western regions, especially Gujarat and Rajasthan, witnessed several LSD outbreaks characterized by high mortality rate. According to the Department of Animal Husbandry and Dairying, Government of India, as of September 2022, LSD had spread to 15 states and about 2 million animals got affected, of which 100,000 were died. In the affected states, milk production got reduced by 26%. And it was estimated that, an economic loss worth of \$1.46 billion was reported from Asian countries.

### **Virus transmission**

Exploring about the different methods of virus transmission is crucial for investigating the epidemiology of the virus, which in turn aids in the control and eradication of disease. LSD is an arboviral infection, where the virus is transmitted from infected animals to susceptible animals mainly via blood-sucking arthropods such as mosquitoes (*Aedes aegypti*, *Anopheles stephensi*, *Culex*



*quinquefasciatus*, and *Culicoides nubeculosus*), ticks, and flies. Additionally, the LSDV also excreted in secretions such as blood, nasal discharge, semen, saliva and also through milk which leads to transmission of infection to the suckling calves. LSDV is relatively resistant against high temperature and desiccation. However, it can be inactivated within two hours at 55 °C and within 30 minutes at 65 °C. The LSD virus can persist in the skin nodules for a period of one month and in the air dried hides up to three weeks. Most of the LSD outbreaks are reported in the summer season when these vectors are active. LSDV is very stable in the environment within a pH range of 6.3–8.3 and can survive in the dry scab up to three months. In addition, LSD virus is very sensitive to light, so it can survive in the dark areas of farm premises for many months. The possible methods of virus transmission is depicted in the figure 1.

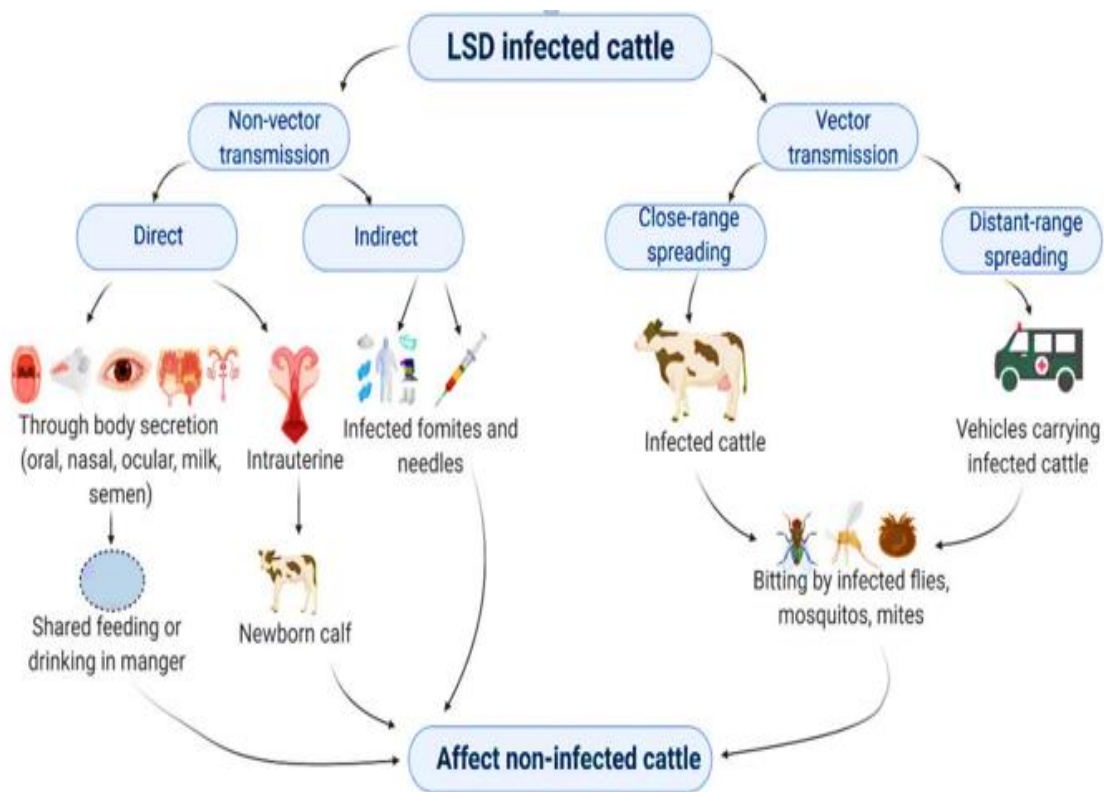


Figure 1: Various route of transmission of LSD virus

### Pathogenesis and clinical symptoms

In natural infections, incubation period is 28 days and in some cases, it prolong up to 35 days, whereas in experimental infections it is generally 4-7 days. Virus particles spread via blood and eventually result in lymphadenitis. During the acute phase of infection (phase 1), animal experience a high fever (41°C) for a period of 7-10 days characterized with other symptoms including anoxia, depression, dullness, excessive nasal discharge, lacrimation, decreased milk production, and



multinodular lesions in the skin and mucus membranes. Additionally, it can cause infertility and sometimes abortion in female bovines. During the second phase, there will be severe enlargement of subscapular and precrucial lymph nodes and increase in the number of nodular lesions in the head neck, limbs, genitalia, udder, mucous membrane, nasal and oral cavities. 1-2 days later, these nodules ruptures and results in the shedding of virus. During the third phase of infection, nodular lesions turn into ulcerations and become necrotic. In extreme cases, ulcerative lesions start to develop in the mucus membranes of eyes nasal cavity etc. During the last phase; almost one month after, ulcerative lesions start to heal and there is marked hyper pigmentation on the skin. LSD can be worsened by contracting other secondary bacterial and viral infections during the course of infection.



Figure 2: Calf infected with LSD virus showing characteristic nodules on the skin

### **Diagnosis**

The diagnosis of LSDV mainly relies on the monitoring of specific clinical symptoms along with other laboratory techniques. A confirmatory diagnosis can be achieved in the nodular lesions appearing stage of disease via laboratory techniques. Even though, methods like virus isolation and electron microscopy are available, they are quite expensive, labor intensive and time consuming. Immunological methods like ELISA, indirect immunofluorescence method, virus neutralization test are available for detecting LSDV antibodies. However, there is a risk of false positive results arising from the nonspecific binding of Parapox virus. Presence of viral DNA in the suspected specimens can be detected by molecular methods such as PCR and real time PCR. Samples from the nodular skin lesions yield more positive result compared to blood since a huge load of virus particles is excreted in the nodules.

Due to the similarity in lesions, LSD should be differential diagnosed from other infections such as Pseudo lumpy skin disease, Pseudo cowpox, bovine popular stomatitis, urticaria, dermatophilosis, vesicular stomatitis, ringworm, etc.



## Prevention and control

The prevention and control measures for LSD typically involve a combination of strategies aimed at minimizing the chances of disease spread and reducing the overall impact of the disease on affected animals. Some important measures are;

- **Vaccination** -The use of effective vaccines against LSD is highly recommended for preventing the transmission of disease. Prophylactic vaccination with either homologous strain or heterologous live attenuated vaccine (goat pox/sheep pox) can be adopted for the control of LSD spread. Recently, India introduced an LSD vaccine known as Lumpi-ProVac<sup>Ind</sup>, which is a homologous live attenuated vaccine. Based on the experimental results, this vaccine was found to be safe and could induce both humoral and cell mediated immune response.
- **Vector control**- Since LSD transmission is facilitated by blood sucking insects such as mosquitoes, ticks and flies, controlling these vectors can limit the spread of disease. This involve the destroyal of the breeding grounds of vectors and the timely removal of aggregated manures, use of insecticide etc.
- **Quarantine and restriction in animal movements**- Disease transmission is facilitated by the presence of infected animals. So, implementation of strict quarantine practices is needed to prevent the further spread of the diseases to a new herd or area.
- **Biosecurity measures**- The LSDV is able to survive in the ambient atmosphere for a prolonged period. So, proper biosecurity measures have to be followed in farm which includes sanitation on the surroundings and other inanimate objects associated with the farm premises. Since it is an enveloped virus, LSDV can be easily destroyed by commonly used disinfectants such as iodine compounds, formalin, phenol, sodium hypochlorite, chloroform, ether etc.
- **Awareness among farmers**- Farmers require adequate awareness for promptly recognizing the LSD infection enabling effective control of its spread. If there is an outbreak of lumpy skin disease among cattle population, farmers need to act swiftly to control the further virus spread. They should immediately isolate the affected animals from healthy population and notify the animal husbandry authorities about the outbreak.
- **Treatment**- There is no effective treatment against LSD besides symptomatic treatment. Providing supportive care including fluid therapy, pain management etc will over all improve animal welfare.

Additional measures such as restricted grazing, stamping out of infected animals, proper disposal of the carcass, use of pest repellents etc. can be advocated.



**Conclusion**

Bovine species stand out as the most important domesticated livestock animal contributing a significant portion to the nation's economy. Lumpy skin disease (LSD) is a contagious viral infection affecting mainly cattle and buffalo which can result in severe economic losses due to the disease consequences. Previously the disease was restricted only in African countries, but recently spread to other European and Asian countries. Due to its ability for transboundary transmission, utmost care should be taken in order to control and prevent its further spread. For the same, measures such as monitoring and surveillance programme, implementation of good biosecurity practices, measures for vector control, restrictions in animal movement, quarantine practices, vaccination programmes, sanitation etc can be advocated.

