

## Lumpy Skin Diseases: Transmission, Clinical signs, Diagnosis, Prevention, Control measures, Treatment

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### ABSTRACT

The first description of the clinical signs of LSD was in 1929 in Zambia (Morris 1931). In the beginning, LSD signs were considered to be the consequence either of poisoning or a hypersensitivity to insect bites. Same clinical signs were occurred in Botswana, Zimbabwe and the Republic of South Africa between 1943 and 1945, where the infectious nature of the disease was recognized in these outbreaks. In South Africa, LSD occurred as a panzootic, which affected eight million cattle. The disease continuous until 1949, and generate massive economic losses (Thomas and Mare 1945). In 1957, LSD was identified in East Africa in Kenya. In 1972, the disease was reported in Sudan (Ali and Obeid 1977). Outbreaks occurred sporadically in this region until 2012 and the virus began to spread rapidly over long distances into new areas including Iran, Iraq, Jordan, Turkey, Russia and, in 2015. Since 2019, several outbreaks of LSD have been reported by Members in South and East Asia. Recently reported LSD outbreaks in our region include: Bangladesh (Jul 2019), India (Aug 2019), China (Aug 2019).

In India it was first reported from Mayurbhanj, Odisha in August 2019. Apart from Odisha, the disease has been reported from Karnataka, West Bengal, Chhattisgarh, Jharkhand, Assam, Maharashtra, Madhya Pradesh Kerala, Tamil Nadu, Telangana and Andhra Pradesh.

## INTRODUCTION

The Lumpy skin disease (LSD) is infectious disease in cattle and water buffalo caused by lumpy skin disease virus (LSDV), a virus from the family *Poxviridae*, genus *Capri poxvirus*. Sheep pox virus and Goat pox virus are from same genus. LSD also known as **Neethling virus**. The disease is characterized by fever, enlarged superficial lymph nodes and multiple nodules (measuring 2–5 cm in diameter) on the skin and mucous membranes (including those of the respiratory and gastrointestinal tracts). Infected cattle also may develop oedematous swelling in their limbs and exhibit lameness. The virus has important economic implications since affected animals tend to have permanent damage to their skin, lowering the commercial value of their hide. Additionally, the disease often results in chronic debility, reduced milk production, poor growth, infertility, abortion, and sometimes death. Onset of fever occurs almost one week after infection by the virus. This initial fever may exceed 41 °C and persist for one week. At this time, all of the superficial lymph nodes become enlarged. The nodules, in which the disease is characterized by, appear seven to nineteen days after virus inoculation. Coinciding with the appearance of the nodules, discharge from the eyes and nose becomes mucopurulent.

The principal means of transmission is believed to be by arthropod vector. Though no specific vector has been identified to date, mosquitoes, biting flies and male ticks could play a role in the transmission of the virus, (Kitching *et. al.*). Virus also transmitted through direct contact, contaminated feed, water and equipment's. The spread of disease controlled by using strict quarantine measures and vector control. Vaccine is unavailable but attenuated goat and sheep pox vaccine used in India.

### The causal organism

Lumpy skin disease (LSD) is a viral disease of cattle caused by lumpy skin disease virus (LSDV). The causative agent is a member of the *Capri poxvirus* genus in the *Poxviridae* family. It is antigenically and genetically closely related to sheep pox virus (SPPV) and goat pox virus (GTPV)



### Epidemiology

### Morbidity

Widely variable

3% to 85%

### **Mortality**

Usually, low

1% to 3% u 20% to 85% in some outbreaks

1. Morbidity rates varies between 3 to 85% and mortality rate usually remains below 10%. The first case is usually associated with cattle movements.
2. Particularly in Europe, the outbreaks are seasonal - more common (but not limited to) warm and wet seasons with abundance of blood-feeding arthropods. Severe cases are highly characteristic and easy to recognize.
3. At early stages and mild cases difficult to recognize even for the most experienced veterinarian.
4. In dairy cattle versus free-ranging beef cattle, By the time severe cases are detected in the free-ranging herds the virus has already been circulating for weeks.
5. After a quiet winter period outbreaks may start again in spring time when skin lesions are well hidden under a long winter coat difficult to detect without palpating the skin.

### **Host range**

Domestic cattle and Asian water buffalo are susceptible. There is no epidemiological evidence/reports on susceptibility of small ruminants for LSD. Wild ruminants as reservoir or susceptibility in India is not known. Some evidence from Africa (Springbok, impala and giraffe) can show clinical disease.

### **Transmission**



### **Animal transmission**

#### **Primary route**

1. Insect vector

2. Mosquito.
3. Biting flies.

#### Secondary route

1. Direct contact to the skin lesions.
2. Saliva
3. Nasal discharge.
4. Milk or semen of infected animals.

#### Virus can survive up to 35 days in dedicated crusts

#### Spread related to movement of cattle

1. The principal means of transmission is believed to be by arthropod vector. Though no specific vector has been identified to date, mosquitoes, biting flies and male ticks could play a role in the transmission of the virus, (Kitching *et. al.*).
2. the virus also transmitted through direct contact, contaminated feed, water and equipment's.
3. Suckling calves may get infected via milk or from skin lesions in the teats (rare due to maternal antibodies).
4. Latrogenic transmission by contaminated needles during veterinary treatments or vaccination campaigns.
5. Seminal transmission via natural mating or artificial insemination.

#### Clinical signs





Bovine, skin. Necrotic centers (sitfasts) of two of these papules have sloughed.



Bovine, muzzle. There are multiple sharply-demarcated slightly raised papules, often with eroded surfaces, that extend into the nares.

1. Incubation time varies form 4-7 days up to 5 weeks.
2. High fever (40-41°C), stop eating and giving milk start of viraemic stage.
3. Easily noticed in dairy cattle – not noticed in free-ranging beef cattle.
4. Markedly enlarged lymph nodes.
5. Skin lesions start to develop following days - often in many animals at the same time
6. Excessive salivation, eye and nasal discharge due to the ulcerative lesions inside the mouth, also in nasal and ocular mucous membranes.
7. Later swellings in the leg and lameness may be detected.
8. Not all affected animals show clinical signs although majority of them develop at least short-lasting viraemia.
9. Circular skin lesions of 1 to 5 cm in diameter (sometimes larger).
10. Mild cases may show only a few lesions or lesions may cover the entire body in severely infected animals.
11. Within one to two weeks the top of the lesion forms a scab which then sloughs off, leaving a raw ulcer, prone to fly strike.
12. In some cases, the lesions remain for long.

### Diagnosis

1. Field diagnosis of LSD is often based on characteristic clinical signs of the disease.
2. Mild and subclinical forms require rapid and reliable laboratory testing to confirm diagnosis.

3. Most commonly used methods of diagnosing LSD are detecting virus DNA using the polymerase chain reaction (PCR).
4. Different molecular tests are also the preferred diagnostic tools or by detecting antibodies to LSD virus using serology-based diagnostic tests.
5. Rapid diagnostic confirmation of the tentative field diagnosis is fundamental for the successful control and eradication of LSD in endemic and particularly in non-endemic countries.
6. In addition, Laboratory test of LSD can be made by identification of the agent, routine histopathological examination and immune histological staining.
7. Antigen testing can be done using direct immunofluorescent staining, virus neutralization, or ELISA.
8. Typical capri pox (genus) virions can be seen using transmission electron microscopy of biopsy samples or desiccated crusts.

### **Prevention**

1. A careful surveillance of the disease onset and spread is to be taken up at the farm level.
2. Purchase of new animals that are either incubating the disease or are viraemic without exhibiting any symptoms presents a major risk of introducing the disease into a herd. Introduction of new animals into herds should therefore be limited. Stock should be bought only from trusted sources. New animals should be examined and declared free of clinical signs prior to movement and on arrival, and should be kept separated/quarantined from the herd for at least 28 days
3. In affected villages, cattle herds should be kept separate from other herds by avoiding communal grazing.
4. Cattle should be treated regularly with insect repellents to minimize the risk of vector transmission of the disease. This measure cannot fully prevent transmission but may reduce the risk.
5. Limiting vector breeding sites such as standing water sources, slurry and manure, and improving drainage in holdings are sustainable, affordable and environmentally friendly ways of reducing the number of vectors on and around cattle.

6. If possible, separate the suspected case from the rest of the herd.
7. If possible, separate the rest of the animals from neighbouring herd by feeding them on the farm and avoiding communal grazing
8. Disinfect your hands, footwear, and outfit using any common disinfectant and when at home/farm wash the clothes at +60 °C.
9. Disinfect equipment and materials used in the affected holding.

### **Control measures**

1. Control of Lumpy skin disease by quarantine and movement control is not very effective because biting flies and certain tick species are probably the most important method of transmission of the disease.
2. The control of insects was not effective in preventing the spread of LSD, but use of insecticides together with repellents can be an aid in the prevention of the spread of LSD.
3. LSD outbreaks can be eradicated by quarantines, depopulation of infected and exposed animals, proper disposal of carcasses,
4. cleaning and disinfection of the premises and insect control
5. Prophylactic vaccination is recommended for the protection of cattle in endemic areas.
6. Vaccines are unavailable, but attenuated sheep-goat pox vaccine used in India.
7. If the disease occurs affected animals should be segregated in insect-proof buildings, and in-contact animals should be vaccinated
8. Vaccine available in other countries

1) LUMPYVAX

2) Lumpy skin disease virus (LSDV) Neethling vaccine

### **Treatment**

1. There are no specific antiviral drugs available for the treatment of lumpy skin disease.
2. The only treatment available is supportive care of cattle.
3. This can include treatment of skin lesions using wound care sprays and the use of antibiotics to prevent secondary skin infections and pneumonia.
4. Anti-inflammatory painkillers can be used to keep up the appetite of affected animals.

5. Intravenous fluid administration may be of benefit; however, this may not be practical in the field.
6. The lack of treatment options for lumpy skin disease virus emphasizes the need of using effective vaccination for preventing disease.

### CONCLUSION

Lumpy skin disease (LSD) is a generalized skin disease which is an infectious, eruptive, occasionally fatal disease of cattle caused by a virus associated with the Neethling poxvirus in the genus Capri poxvirus of the family Poxviridae. LSD was first described in Zambia and occurs in other most African countries and currently endemic in most Asian countries and has recently starting to spread in India. We have seen how LSD severe to population and need to take some measures to control LSD spread.

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