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Popular Article

## Lumpy Skin Disease: A threat to human consumers

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### Abstract

LSD is classified as a reportable illness by the World Animal Health Organisation, due to its severe spread and financial costs. Immune-compromised cattle are more vulnerable to the illness. The virus spreads by the motion of animals or the free range of stray animals. Cattle markets, where farmers buy and sell animals, are another risk element. The disease's symptoms include the formation of skin nodules, significant pain, limb swelling, lack of appetite, and fever, as well as bleeding from nodules. To reduce economic damage and limit LSD epidemics, animals should not be moved to or from infected areas or impacted states. All animals should be identified and registered, and high-risk areas like district and state borders should adopt preventive immunization programs with the available GPV. Vaccination with attenuated virus represents the most promising approach of control and has been effective in stopping the spread of the disease. Antibiotics are advised to control secondary illness, as is good nursing care. To control LSD in the state and throughout India, more research is required to comprehend the modalities and kinds of arthropod vectors connected to LSD, the mode of transmission, and the financial impact of LSD on dairy production.

**Keywords:** LSD, cattle, arthropod vectors, nodule

### Introduction

Cattle with lumpy skin disease (LSD) are susceptible to an infectious virus that causes high fever, inflamed superficial lymph nodes, and unusually large lumps or nodules on the surface of skin. Virus kills infected animals that have not earlier been covered by the virus or lack resistance. The disease can be spread by some species of blood-sucking insects, including ticks, flies, and mosquitoes. Lumpy skin disease is very specific to cattle, an illness that to a lesser extent buffalo. Cattle have a greater morbidity rate than buffalo, and calves and heifers are more susceptible than adults. Some virus strains may multiply in sheep and cattle, although there is currently no evidence of the involvement of small ruminants as a reservoir.

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Stray cattle are a high-risk problem due to their relative weakness and low immunity. Fatality from lumpy skin disease is more commonly reported in drought areas of Rajasthan and Gujarat. A minute buffaloes have been affected throughout India. High milk-producing animals and exotic cattle are more susceptible to the virus than native breeds. LSD was first detected in southern and eastern Africa, but it has ever since spread to the Asia of middle and east countries, and Eastern European countries. The most distinguishing clinical manifestation is a broad, firm, painful nodule on the mucosal surfaces and skin. Attenuated viral vaccines could help restrict the spread of infection (Gibbs, 2021).

### **Origin and historical background**

Prior to the discovery of LSD in Zambia in 1923, LSD was only found in Africa and a few places in West Asia. First, it was assumed to be an allergic response to a poisoning or insect bite. Several occurrences were documented in Botswana, South Africa, and Zimbabwe during the 1940s, affecting around 8.0 million cattle. The epidemic was initially detected in Israel in 1989, marking the first case recorded outside Africa. Recently, the infection has stretched to areas outside the endemic zone. Following its 2013 arrival in Turkey, lumpy skin disease then spread to Azerbaijan (2014), Armenia (2015), and Georgia (2016), causing chaos throughout the Balkans and Caucasus nations in addition to Russia. Before 2012, LSD was only found in African nations, but it quickly spread to Southeast Europe, the Middle East, Central Asia, and West Asia. However, LSD began in Bangladesh in July 2019 and has since swept throughout Asia like a wave. According to the FAO Risk Assessment Report, the virus had reached seven nations till end of 2020, China and India in August 2019, Taiwan in July 2020, Nepal in June 2020, Vietnam and Bhutan in October 2020, and Hong Kong in November 2020.

LSD is currently a threat to at least 23 countries in East, South, and South-East Asia. The first recorded cases of LSD were reported in the Odisha region of India in the same year (2019) (Sudhakar *et al.*, 2020). Out of 2,539 cattle, 182 had an overall infection rate of 7.1% apparent morbidity and zero fatalities. More than the next two years, rare instances were reported in Gujarat and Maharashtra. Previously in 2022, LSD was reported in northern and western states and the island of Andaman Nicobar. The initial report of disease came from Gujarat, and it spread to union territories and eight states. Later LSD outbreaks in India, and the infection has expanded to Gujarat, Uttar Pradesh, Himachal Pradesh, Punjab, Maharashtra, Uttarakhand, Haryana, Rajasthan, Jammu and Kashmir, Madhya Pradesh, and Delhi, with the most infections reported in Gujarat and Rajasthan. The final wave, which occurred in May and June of 2022, was remarkable for both mortality and morbidity, or how quickly animals were getting the sickness. In 2022, the illness had affected approximately 29.45 lakh cattle (Bhadauria *et al.*, 2023).

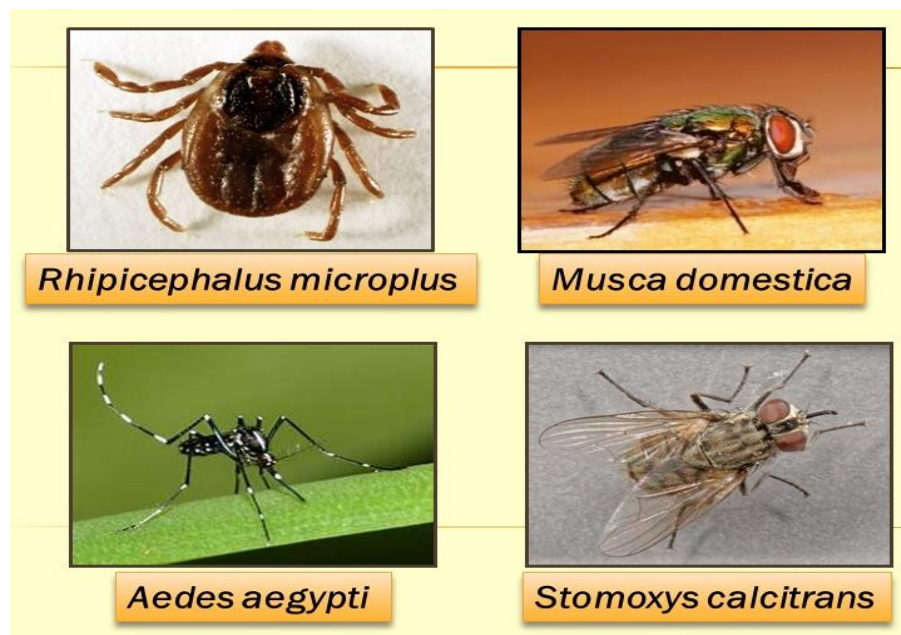


## Causative Agents

The lumpy skin disease virus of the Capri pox virus genus, which is a member of the pox viridae family, is the virus that causes LSD. While the goat pox virus (GPV) and sheep pox virus (SPV) are very closely related but they differ phylogenetically being comparable to the LSD virus. LSD virus is sometimes called Neethling virus.

## Transmission

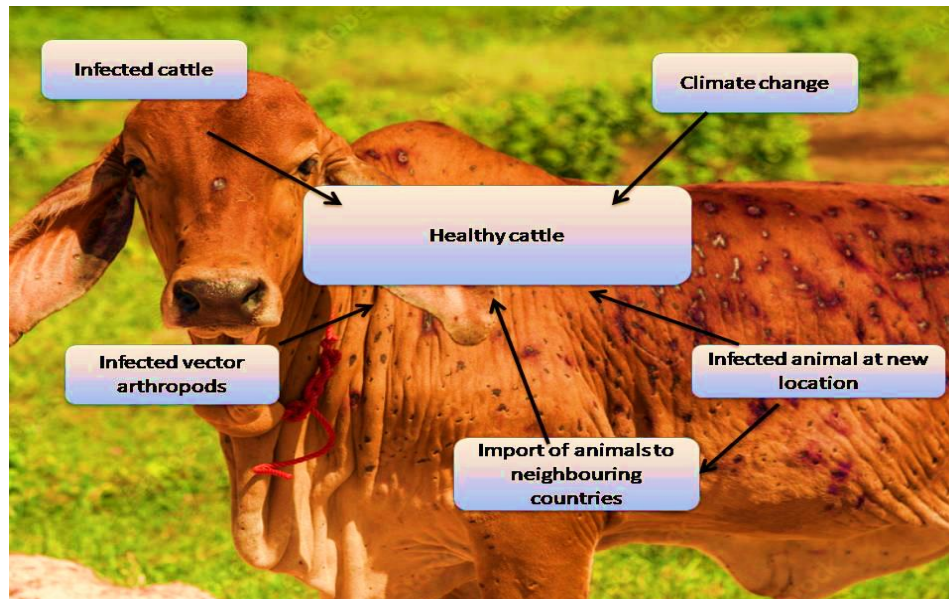
The virus spreads predominantly during arthropod vectors such as mosquitoes (*Aedes* and *Culex*), biting flies (*Stomoxys* and *Biomjje*), and ticks (*Ambylomma hebraem* and *Rhiphicephalus microplus*) (fig 1). During the monsoon season, vectors multiply rapidly, causing the disease to spread more quickly. The virus spreads by the motion of animals or the free range of stray animals. Affected animals emit viruses in their ocular secretions, saliva, and nasal discharges. Virus will be in saliva for up to 11 days (after fever onset). It can still be present in nodules of skin for about 33 days after contamination.



**Figure 1: Arthropod vectors involved in transmission of LSD virus**

The organism also survives in sperm of sick bull, so both artificial and natural mating insemination can develop the disease. So, bulls should be used for mating after 22 days at intervals. Additionally, skin nodules can spread infection from mother to child, and teat-related skin lesions of cattle can infect calves through suckling (fig 2). The organism can live in the nodules for 33 days. The virus survives for about 120 days in affected animal tissue, 35 days in dried crust, and 18 days in farm-raised hides.





**Figure 2: Sources of infection for transmission of LSD**

### Risk factors

Warm and humid climates encourage an abundance of arthropod vector populations, which are threat factors for spreading of Lumpy skin disease. Open pasturing fields and poorly ventilated sheds in urban dairies and towns next to homes for animal rearing provide the perfect environment for the growth of a variety of bloodsucking arthropod vectors. Other risk variables that could enhance disease prevalence include vector populations, herd size, distance to water bodies, transportation of diseased animals into disease-free areas, herd migration, and pasture. Moreover, the speed of wind and direction help to multiply the infection. Cattle markets, where farmers buy and sell animals, are another risk element. Since there are no reliable bio-security controls in place, animals mix freely at these markets, and purchasing livestock leads to the regular and ongoing introduction of new animals into villages. LSD affects all animal types, ages, and genders. Buffalo has a substantially lower morbidity rate than cattle. Moreover, young animals show higher susceptibility and severity than adult cattle. Other elements that aid in the transmission of illness include the cattle's age and sex, sharing water supplies, management practices, and surroundings (Das *et al.*, 2021).

### Symptoms of LSD in cattle:

Affected cattle exhibit fever, nasal discharge, hypersalivation, and lacrimation followed by skin and body eruptions in around half of susceptible cattle. The incubation period is about 4-14 days. Morbidity is 5% to 50%, while death is usually minimal. Maximum loss is due to lowering of milk yield, loss of condition, and thus decreased value of the animal.



The disease's symptoms extend beyond the formation of skin nodules. Most afflicted animals report significant pain, limb swelling, lack of appetite, and fever, as well as bleeding from nodules. At first, there is excessive salivation, nasal and ocular discharge, and lacrimation. Visible palpable swelling lymph nodes saw primarily in the pre-femoral and sub-scapular regions. The sickness mostly affects cow legs, resulting in swelling and a high fever ( $>104^{\circ}\text{F}$ ) that lasts for a week. Significant decline in milk output. Skin lesions or nodular skin are a very typical feature of this condition. After 48 hours of fever, soft blisters that resemble nodules appear on the body. The lesion's diameter ranges from 10 to 50mm. Lesions can range in number from a few in moderate cases to numerous in severe ones. The skin of the head, limbs, genitalia, udder, neck, and perineum are among the locations of predilection (fig 3). Certain nodules progressively become visible, much like a deep skin wound. Once the condition is properly treated, the sick animal recovers in about a week; the healing process begins when scabs form in the center of the nodules and lasts for a month. Ulcerative lesions seen in the worst instance, result in blindness in one or both eyes. In severe cases, lameness, pneumonia, and mastitis are caused by secondary bacterial infections of the legs and joints. Subclinical infection is primarily encountered in agricultural settings.

Following a postmortem inspection, pock lesions can be observed on all internal organs, as well as throughout the respiratory and digestive systems. Pregnant cows may give birth and then stay anestrus for a few months.



**Figure 3: Showing clinical signs of lumpy skin disease**

### Zoonotic importance of LSD

As of right now, science has not produced any proof that LSD is a zoonotic disease that may infect humans or animals and vice versa. The LSD virus can infect nursing calves during the infectious phase through contaminated milk or teat skin sores. But there's no evidence that milk can spread the LSD virus to humans. However, to prevent numerous other food-borne illnesses, it is advised to adhere to basic food hygiene standards, such as thoroughly boiling milk.



### **Quarantine measures for the prevention of disease**

To reduce economic damage and limit LSD epidemics, animals should not be moved to or from infected areas or impacted states. This will assess the transmission and distribution of LSD. Restrict movement of affected animals and their handlers to and from impacted areas. It is important to advise anyone handling animals and tending to affected animals to avoid contact with healthy animals. It is consequently critical to implement these safety precautions.

### **Vaccination**

Contaminated communities are identified for preventative measures and vaccination in a 5-kilometer radius. Buffaloes and cattle can be immunized with the available GPV. GPV in cattle and buffalo at 4 months of age can be administered subcutaneously for prophylactic/ring vaccination. However, immunization against affected animals is not advised. All animals should be identified and registered, and high-risk areas like district and state borders should adopt preventive immunization programs. Vaccination drive training, which covers vaccine production and storage, dose and administration, and animal identification, should be provided to staff members and vaccinators.

### **Implementing biosecurity measures**

- As soon as possible, separate sick animals from healthy ones.
- Animals that are affected can receive symptomatic treatment while adhering to all required safety and bio-security protocols.
- It is advised to use fodder, soft feed, and liquid feed.
- Increase LSD clinical surveillance in affected areas and neighboring communities.

If buffaloes are grown together, they should be maintained separately until the affected animals fully recover.

- Regularly disinfect the premises.
- Administering ectoparasiticides to healthy animals on affected and nearby farms is also recommended.
- Wear gloves and a face mask when working with afflicted animals, and adhere to hygienic and disinfectant protocols.

Inform the nearby veterinarian clinic or pharmacy about any strange illness that affects other animals.

- Keep the farm and the locations where the sick animals are kept clean.



- Field veterinary doctors should visit suffering farms frequently until the animals are fully recovered. To prevent sickness from spreading to other farms/households, veterinary workers should take all necessary hygienic precautions.
- To dispose of a deceased animal, use a deep burial procedure with proper hygiene precautions.
- Cattle markets within a 10-kilometer radius of the infection's core should close. Immediately ban live cattle trade, fairs, and displays in affected areas as the disease is confirmed.
- Do not collect and treat sperm from LSD-affected animals for production or distribution.

### **Vector control**

Insecticides, repellents, and other chemical agents should be used to control vector populations (mosquitoes, fleas, ticks, flies, and midges) on the buildings and in the body of the animal.

### **Disinfection and cleaning procedures**

The following chemicals/disinfectants can be applied to the affected areas and vehicles that pass through the affected animal holdings: quaternary ammonium compounds (0.5%), chloroform, ether (20%), formalin (1%), phenol (2%), iodine compounds (1:33 dilution, sodium hypochlorite (2–3%).

### **Diagnosis and therapeutic measures**

Histopathology, viral isolation, and polymerase chain reaction (PCR) are the most used diagnostic methods. Electron microscopy can reveal the poxvirus that causes lumpy skin disease in the early skin lesions. The two disorders can be differentiated by PCR. For LSD, there is no prescription drug available. On the other hand, bacterial infections can be avoided by treating sick animals symptomatically. Vetalgin, meloxicam, ketoprofen, and other commercially available antipyretics can be used to control or cure affected animals. However, medicines such as dicrysticin, enrofloxacin, ceftiofur and sulphonamides, can be administered to stop secondary infections if the animal's fever does not go down or if it has nasal discharge. In extreme situations, anti-inflammatory and antihistamine medications may be prescribed.

Veterinary-recommended antiseptic, anti-allergic creams with fly-repelling effects can also be used on nodules. Infected animals can be treated on the farm; however, they can't be taken to polyclinics or hospitals since severe hyperthermia is frequently seen in these animals owing to the severe environmental humidity and temperature. It is advised that sick animals be fed liquid feed, soft feed, fodder, and succulent pasture. Neem leaf feeding and creating smoke when neem leaves are



burned to stop an outbreak on farms can be recommended.

### **Awareness programme:**

To inform the public about the illness and motivate them to report any suspicious instances to the veterinary authority as soon as possible, a widespread awareness campaign will be started. This will enhance the prevention and control of LSD. Enhancements should be made to routine veterinarian training and sensitization, as well as educating animal owners and other stakeholders on the disease's clinical presentation, surveillance plan, stoppage of the cattle trade, and control measures. When necessary, the Animal Husbandry Department will continue to work closely with law enforcement and border agencies to stop the illegal importation of cattle from neighboring nations (Kayesh *et al.*, 2020).

### **Conclusion**

The growing global spread of lumpy skin disease has raised international concerns. Vaccination with attenuated virus represents the most promising approach of control and has been effective in stopping the spread of the disease.

Antibiotics are advised to control secondary illness, as is good nursing care, however, treatment may be impossible because of the sheer number of afflicted animals in a herd. To control LSD in the state and throughout India, more research is required to comprehend the modalities and kinds of arthropod vectors connected to LSD, the mode of transmission, and the financial impact of LSD on dairy production.

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