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# Lumpy Disease A Developing Trans-Boundary Viral Skin Disease

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## Abstract

A novel neethling virus disease or similarly known as Lumpy skin disease, is an evolving bovine viral infection. This is widespread in most African countries as well as in some Middle East zone, Asian and European countries. The virus that causes lumpy skin disease (LSD) is called the Lumpy Skin Disease Virus (LSDV), and it belongs to the Capripoxvirus genus of the Poxviridae family. It is a transnational illness with serious economic implications that affects cattle and water buffaloes. High morbidity and low death are the results of the disease, which is spread by arthropod vectors. Lumpy skin disease has made its first appearance in India with a 7.1% morbidity rate among cattle. The disease typically manifests clinically as fever, anorexia, and distinctive nodules on the skin and mucous membranes of the mouth, nostrils, udder, genital, and rectum. Abortion, infertility, and occasionally death can also occur. The disease's epidemiological situation is still unclear in India. It may be possible to stop the disease from spreading by immunising people and enforcing rigorous quarantine rules and vector control measures .The present review focus on trans boundary dissemination, aetiology and transmission, clinical manifestations, diagnostics, and illness treatment, this study tries to summarise the most recent advancements in epidemiology.

## Introduction

Lumpy skin disease is an infectious viral illness transported on by the Lumpy skin disease virus (LSDV), which belongs to the family Poxviridae, Abundant terms use for Lumpy skin disease, including Pseudo-urticaria or Neethling virus disease or exanthema nodularisbovis, and also known as knopvelsiekte [1-2]. Lumpy Skin Disease (LSD) is a trans boundary; vector-borne, non-zoonotic infection. Lumpy skin disease (LSD) currently only affects ruminants, such as cattle and water buffaloes. Among the arthropods that transmit disease are biting flies, mosquitoes, and ticks [3] However, in neethling virus disease skin lesions have been detected following experimental infection in sheep, goat, giraffe, Giant gazelles, and impalas. In some studies natural infection of sheep and goat has not been reported even in close contact with sick cattle and buffaloes. High morbidity but low mortality is linked to LSD [4]. The Neethling virus infection is noticeable by a fever, inflamed lymph nodes, circumscribed nodules on the skin and the virus infection that causes decreased milk production, acute anorexia, and infertility. Overall, it lowers the economic value of animals since it reduces their ability to produce meat and milk, effect on reproductive efficiency (abortion and infertility). It is a disease that must be reported and has an appalling impact on international cattle trade as well [5]. It noted that the first Lumpy Skin Disease (LSD) case originated in Zambia and afterwards spread to southern and northern African nations. Israel, Kuwait, Oman, and Yemen later became affected by it [6]. According to Office International des Epizooties (OIE), this disease is currently widespread in a number of African, European, and Asian nations. Unknown

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factors may have contributed to the disease's spread to India, such as cattle crossing international borders or vectors travelling from nearby nations. Lumpy Skin Disease (LSD) use has recently been recorded in nations that border India, including Bangladesh and China. For appropriate planning of the efficient disease management, an understanding of the epidemiology of exotic illnesses becomes essential. The most recent Lumpy Skin Disease (LSD) developments are summarised in this outline.

### History and beginning of lumpy virus infection

Lumpy Skin Disease (LSD) was identified for the firstly in 1929 at Zambia after that some cases was observed in a number of areas of African nations [7]. Lumpy viral infection observed in all over countries like in Lebanon, Jordan, Saudi Arabia, Iraq, Turkey, and Israel, also some cases are reported in Iran [8-12]. Therefore, the raised up threat of the spread of disease into the rest of Europe and Asia should be measured. For case in point, the statistics of Lumpy Skin Disease (LSD) epidemics in some Middle Eastern states with wide-ranging boundaries given in Figure. 1 , were six cases in Iran, eight in Iraq, one thousand two hundred ninety-four in majorly in Turkey, one case in Kazakhstan, sixteen in Azerbaijan and three hundred thirty cases in observed in Russia and one case in Armenia respectively as per OIE WAHID, 2018 [13]. And in recent 18, 50,000 cases reported in India [14].

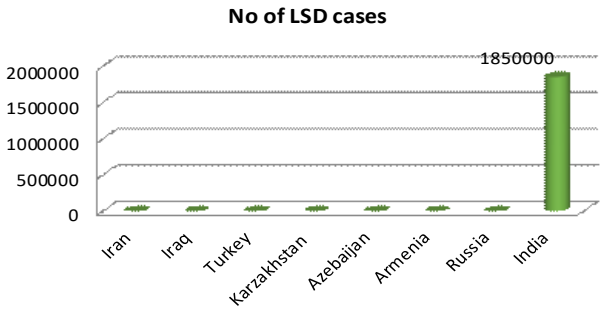


**Figure 1:** The number of Lumpy skin disease (LSD) cases in various countries in year 2014-2022.

### Microbiology and taxonomy

Lumpy virus is brick-shaped and oval profile double-stranded DNA virus with average size 320 nm by 260 nm as shown in **Figure 2** [12,15]. As per Taxonomy classification of viruses, the Lumpy virus is the member of capripoxvirus with family Poxviridae and subfamily Chordopoxvirus .Based on the various serological evidences, Lumpy skin disease virus together with the sheeppox virus, and goatpox virus. The taxonomical classification of lumpy skin disease virus given in **Figure 3**.

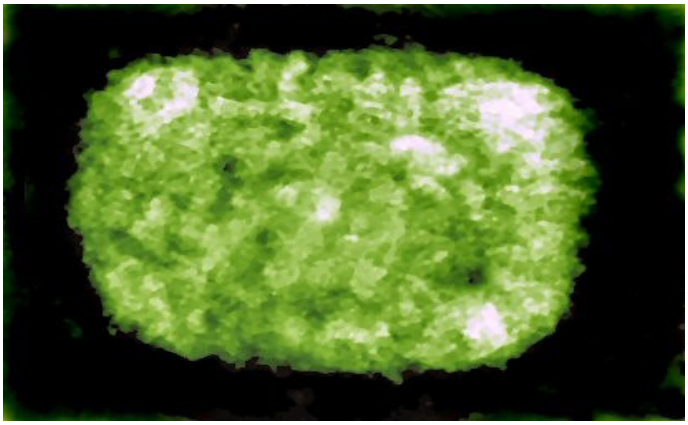

**Figure 2:** Microbiology of Lumpy virus.

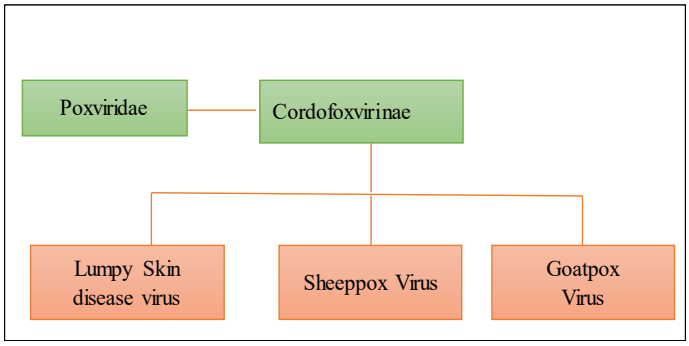


**Figure 3:** Lumpy skin disease virus taxonomical Classification.

## Epidemiology

### Morbidity and mortality

The death of Lumpy Skin Disease (LSD) epidemic varies enormously. The morbidity rate in cattle can differ from 3 to 85% reliant on the occurrence of insect vectors and host exposure. Death is low in most cases (1 to 3%), but can be as high as 20 to 85%. Remarkably high mortality rates in range 75 to 85% in some outbreaks [16].

### Host range

LSDV (Lumpy skin disease virus) principally affects cattle however also saw in domestic Asian water buffaloes [17] .The European Bos Taurus is commonly more susceptible than Sub-Saharan Bos indicus. Young calves are majorly prone to the infection and could grow the representative lesion in 24 to 48 hours, while overall group of age's animals are prone to lumpy virus. Furthermore, impala and giraffe has experimentally sick with Lumpy skin disease virus. Pet buffaloes are highly ill from Lumpy virus than wild buffaloes [18].

### Trasmission of lumpy virus

Transmission is assumed to occur mostly by arthropod vector. No exact vector has been recognized so far, definite type of mosquitoes, biting flies also the male ticks can play a role in the conduction of the virus. Direct contact with infected animal is playing a minor role in the spread of lumpy skin disease. The virus can be transmitted through blood, nasal discharge, lacrimal secretions, semen and saliva. The infection can moreover be spread through septic milk to suckling calves. In reported studies infected cattle, lumpy skin virus was observed in saliva 11 days later the increase in fever, virus is observed in semen later 22 days, and in skin nodules lumpy virus observed after 33 days. The infectious virus is not detected in faces. Lumpy Skin Disease Virus (LSDV) can stay feasible in infected matter for around 120 days [19-21]. **Figure 4** depicts a summary of virus transmission.

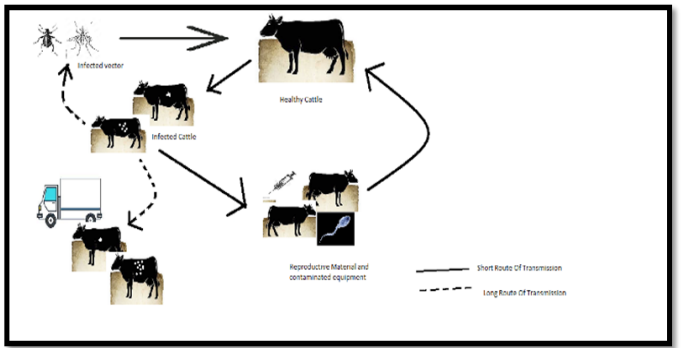


**Figure 4:** Summary of virus transmission.

### Clinical features

According to the healthcare veterinary specialized and study reported ,mostly Skin lumps having round shape with 5-50 mm size developed on skin ,Figure 5, and generally seem two days later the start of temperature , on the skin of the neck, head, genitalia, udder, perineum, also on limbs. The nodules can spread on the whole body, in several cases more than 100 nodules can appear on skin[22].The nodules can fade or may produce scars. In the more case the lesions then grow into papules, pustules with exudate, and lastly convert into scabs. The scratches recover gently. In observed cases after two to three weeks the skin wounds toughen and convert in form of necrotic, making the animals painful and making them hesitant to move. The representative scratch "sitfast" may slough, leaving holes that could invite bacterial invasion and screwworm fly invasion, both of which could result in septicaemia [23].

**Figure 5:** Skin lumps due to lumpy skin disease virus.

### Diagnosis

At present, tentative judgement can be made on the basis of skin nodules observed on face, eyelid, neck, muzzle, nostrils, udder, and limbs. Laboratory confirmation of lumpy disease is most rapid by an actual or conventional Polymerase Chain Reaction (PCR). The Virus Neutralisation Test (VNT) is the only validated serological test available for lumpy virus. Several antibody-detecting Enzyme-Linked Immunosorbent assays (ELISAs) have been described for detection of lumpy skin disease virus [24-25].

### Treatment

There is no specific antiviral treatment available for LSD infected cattle. Sick animals may be removed from the herd and given supportive treatment consisting of local wound dressing to discourage fly worry and prevent secondary infections bacterial infection [26]. Systemic antibiotics also given to sick animals.

### Prevention and control of lumpy VIRUS

There is currently no effective LSD treatment available. Anti-inflammatory and antibacterial medications are used to treat symptoms. Effective control and preventative measures must be adopted in order to control the disease, including [25,27].

**(A) Restrict movement:** In order to stop the spread of a transboundary disease, it is imperative to outright ban the movement of any animals that have been exposed to LSD. To stop the rapid spread of disease among nations, animals having these lesions should be isolated for inspection.

**(B) Reduce vector migration since it may spread disease:** Vectors may move according to prevailing winds. The disease can also be prevented by employing vector control techniques like the use of vector traps and pesticides.

**(C) Vaccination:** There is a live attenuated LSD vaccination on the market. Businesses created vaccinations based on various LSD virus strains. It is either based on the SIS Neethling type or the Neethling strain used in products like the Lumpy Skin Disease Vaccine for Cattle (Onderstepoort Biological Products; OBP, South Africa) and Bovivax (MCI SanteAnimale, Morocco) (Lumpyvax, MSD Animal Health-Intervet, South Africa). Since the virus that causes sheeppox and goatpox is closely related to LSD, the vaccine for those diseases can be used to treat LSD [28].According to the OIE, many viral strains are utilised as vaccine strains. Three years of protection are provided by the South African homologous Neethling strain of the Lumpy Skin Disease virus after passages of 60 times in lamb kidney cells and 20 times on the chorioallantoic membrane of embryonated chicken eggs. Kenyan sheep pox virus passaged 18 times in lamb testis (LT) cells or foetal calf muscle cells, Yugoslavian RM 65 sheep pox strain, and Romanian sheep pox strain are among the sheep pox strains utilised as vaccinations against LSD. Local responses are brought on by the strains of the heterologous vaccination. As these vaccines could act as a source of infection for a susceptible population of sheep, they are not recommended in locations where sheep pox and goat pox are prevalent. goat, too. Live attenuated Gorgangoatpox strain offers effective side-effect-free protection for cattle [29]. Since the LSD virus is stable and lasts a long time in the environment, long-term immunisation with 100% coverage should be made mandatory for disease control and prevention. It is advisable to immunise new animals before bringing them to the impacted farm. At the age of 3 to 4 months, calves that have been nursed by moms who have received vaccinations or are infected naturally should be inoculated. Each year, pregnant cows and breeding bulls might receive vaccinations [30].

## Conclusion

The current feast of the infection into disease-free regions specifies its epidemiological and financial importance. In view of the broad boundaries of Middle East nations, animal activities between these nations should be thoughtfully measured by veterinary experts. Additionally, remunerating close attention to the various aspects of the infection, like conduction and epidemiology, and the implementation of actual precautionary processes such as immunization, could outcome in recovering disease regulation. Therefore, precise and appropriate identification in endemic zones, vaccination with the similar strain of the Lumpy skin disease virus, animal movement restriction ,vector controller, and Lumpy skin disease virus, testing of bulls selected for breeding are extremely optional as tools to regulate more spread.

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### Conflict of interest

The authors declare that there was no conflict of interest.

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