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### Clinical study on lumpy skin disease in crossbred cattle in Bikaner, Rajasthan

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#### Abstract

Cattle with lumpy skin disease (LSD) have low mortality and high morbidity rates due to an acute viral infection that results in severe economic losses. In the Bikaner area of Rajasthan, the suggested study was conducted on adult cross cattle of similar age groups exhibiting the characteristic clinical indications of Lumpy skin disease at private dairy farms as well as on animals of individual holdings. A clinical examination was used to validate this, and PCR was the method that was used for LSDV confirmation in the investigation. Clinical evaluations were performed on the thirty-two animals that were chosen for this experiment. The main clinical signs of LSD-affected cattle included pyrexia, lacrimation, lethargy, enlargement of lymph nodes, skin nodules, and oedema. Clinical vital parameters showed that rectal temperature, heart rate, and respiration rate were significantly ( $p < 0.05$ ) greater, while significantly ( $p < 0.05$ ) decreased rumen motility.

**Keywords:** Clinical, lumpy, crossbred, cattle, Rajasthan

#### Introduction

Important livestock like cattle and buffaloes have a significant role in the global economy. LSD cause significant economic losses due to the drastic decrease in feed intake, weight conversion, and milk output, it results in high morbidity and low mortality in cattle. Additionally, it damages the skins of cattle and causes abortions and infertility. LSD is an illness that must be reported, and in places where it exists, there are severe limits on international trade (RGBE, 2014) [17]. Lumpy skin disease (LSD) is an acute viral disease, which is caused by lumpy skin disease virus, which belongs to the genus Capripoxvirus within the subfamily Chordopoxvirinae of the family Poxviridae (Al-Salihi, 2014 and Tuppurainen *et al.*, 2017) [6, 20]. The LSDV is transmitted through arthropods, particularly blood-sucking insects (Chihota *et al.*, 2003; MacLachlan & Dubovi, 2011) [8, 15], through contaminated feed and water and direct transmission in the later stages of the disease via saliva, nasal secretions and semen and by milk to nursing calves (Annandale *et al.*, 2013; Chihota *et al.*, 2003; Irons *et al.*, 2005; Tuppurainen *et al.*, 2017) [7, 8, 11, 20].

Capacity to spread of LSD from Africa to other regions of the world has led to the drug being seen as an agroterrorism agent (Abutarbush, 2017) [2]. Later, a considerable number of LSD cases has been reported subsequently in China, India, Nepal, Bhutan, Vietnam, Hong Kong and Myanmar (FAO/OIE, 2020) [10]. The virus replicates Intracellularly within fibroblasts, macrophages, pericytes and endothelial cells leads to vasculitis and lymphangitis in affected tissues (Coetzer, 2004) [9]. Skin lesions are thought to be the main sites of infection since the virus can survive for a long time

in lesions or scabs (Tuppurainen *et al.*, 2005) [21]. The disease begins with biphasic fever and then show clinical manifestations in mild form of infection appears as one or two lumps of nodules within 2 to 3 days of onset of fever, emaciation, ocular discharge, agalactia. Later on, nodular lesions, which are painful and hyperemic may be observed on the animal body especially in the skin of the muzzle, nares, back, legs, scrotum, perineum, eyelids, lower ear, nasal and oral mucosa, and tail (Salib and Osman, 2011) [18].

#### Materials and Methods

The proposed study was carried out in Bikaner district. Adult crossbred cattle were screened for LSD on the basis of clinical symptoms before getting selected for the current investigation after that the presence of the Lumpy skin disease virus was verified by PCR. Each animal was monitored during the day to recording of physiological parameter *i.e.*, body temperature, heart rate respiration rate and ruminal motility at the interval of a week.

Lumpy skin disease suspected cattle were later verified by PCR testing for the Lumpy skin disease virus. Tissue samples from all LSD affected cattle were collected in sterile tissue collection tubes containing PBS solution. Genomic DNA was isolated from whole blood using NucleoSpin® Tissue XS kit (LOT. 2106/004 MACHEREY-NAGEL Germany) as per protocol in manufacturers manual described. Using a pair of primers with the forward primer "ATGTCTGATAA AAAATTATCTCG" and the reverse primer "ATCCATACCATCGTCGATAG," a 570-bp amplicon of highly conserved nucleotide sequences from the ORF 103 gene was amplified.

**Results and Discussion**

On the basis of clinical examination, cattle affected with lumpy skin disease were selected for the experiment and verified by PCR. Isolation and identification of Lumpy Skin Disease Virus (LSDV) genome through 570-bp amplicon of highly conserved nucleotide sequences from the ORF 103 gene was amplified and 32 cattle were found positive for LSDV.

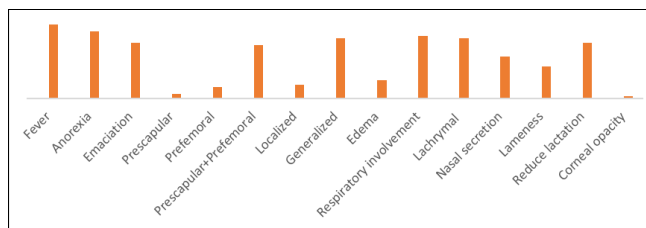
**Clinical signs**

Upon clinical inspection, it was discovered that animals of the affected with lumpy skin disease had been experiencing most common clinical signs are recorded (Table-1 and Fig.1).

**Table 1:** Clinical signs recorded in lumpy skin disease positive cattle (N=32)

S. No.	Clinical Signs	Percentage
1.	Fever	100
2.	Anorexia	90.63
3.	Emaciation	75
4.	Prescapular	6.25
	Prefemoral	15.62
	Prescapular+Prefemoral	71.88
5.	Localized	18.75
	Generalized	81.25
6.	Edema	25
7.	Respiratory involvement	84.38
8.	Lachrymal	81.25
9.	Nasal secretion	56.25
10.	Lameness	43.75
11.	Reduce lactation	75
12.	Corneal opacity	3.13

Note: N= Total number of animals



**Fig 1:** Bar diagram showing clinical manifestations in Lumpy skin disease positive cattle

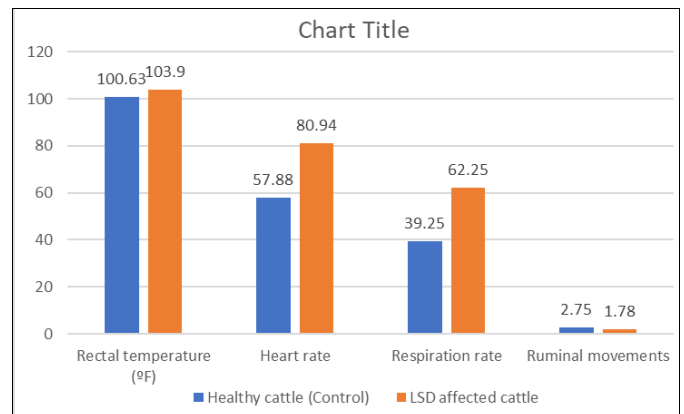
In the current investigation, swollen prescapular and prefemoral lymph nodes were found in 71.88 percent of patients. Prozesky and Barnard (1982) [16], Ali *et al.* (1990) [5], and Tuppurainen *et al.* (2017) [20] all reported findings that were quite comparable. Fever in cattle is the first observable clinical symptom in LSD patients. In the current investigation, all cattle were found to have elevated temperatures (>102°F). Similar conclusions were drawn by Al-Salihi (2014) [6], and Jalali *et al.* (2017) [13]. A considerable number of intradermal lumps (nodules) across the skin of the limbs caused 43.75% of the positive animals in our research to exhibit mild to severe lameness, and the affected animals were reluctant to take walks, in accordance with Agag *et al.* (1992) [3]. The 25.0 percent of cattle that were clinically impacted had brisket and forelimb oedema. Agag *et al.* (1989) [4] revealed findings that are very

comparable to ours. In just one animal (3.13%), bilateral corneal opacity later in the course of the illness. Shilpa *et al.* (2022) [19] made a similar observation and noted it. Fever, swollen lymph nodes, confined nodules on the skin that cause severe anorexia, decreased milk production, and infertility are the disease's hallmarks (RGE 2014) [17]. Following the first febrile state, viremia lasts for about 4 days. Following skin lesions, signs develop in certain locations as a result of the virus replicating in specific cells including fibroblasts, pericytes, and endothelial cells of lymphatic and blood arteries (Abdulqa *et al.*, 2016; Hailu *et al.*, 2014) [1, 10].

**Table 2:** Mean ± SE values clinical parameters in healthy and LSD affected cattle

Sr. No.	Clinical Parameters	Healthy cattle (Control)	LSD affected cattle	Statistical analysis (t-Test)
1.	Rectal temperature (°F)	100.63±0.1820	103.90±0.1180	**
2.	Heart rate (per minute)	57.88±0.4407	80.94±0.1848	**
3.	Respiration rate (per minute)	39.25±0.3660	62.25±0.3175	**
4.	Ruminal movements (per 2 minutes)	2.75±0.1637	1.78±0.1401	**

\*\*= $p < 0.01$  \*= $p < 0.05$  NS=non-significant ( $p > 0.05$ ) n= number of animals



**Fig 2:** Mean values of clinical parameters in healthy and LSD affected cattle

In the current investigation, the clinical vital parameters of healthy and LSD-affected cattle were recorded, Table 2 and Fig.2 show the mean±SE values of these parameters. In the present study, mean values of rectal temperature, heart rate, and respiration rate in LSD affected cattle affected were observed to be significantly higher while the ruminal movements were decreased in comparison with healthy group of cattle, Similar clinical findings were reported by Jafarsab *et al.*, (2022) [12] and Kamer *et al.*, (2022) [14].

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**Conflict of interest**

None of the authors of this article has a financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

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