Research Article

Epidemiology and Clinical Management of Lumpy Skin Disease in the Cattle of Dupchanchia Upazila, Bogura, Bangladesh

Md. Habibulla Shake[1] and Md. Kamruzzaman Akimul[2*]

[1]SS Feed Industries Ltd, Natore, Bangladesh; [2]Department of Microbiology and Public Health, Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Babuganj, Barishal-8210, Bangladesh.

Abstract | Lumpy Skin Disease (LSD) is a highly infectious arthropod-borne viral disease caused by a *Capripoxvirus* genus member of the *Poxviridae* family which threatens cattle health and severely affects livestock production alongside the leather industry. The study identified 95 cases of LSD among 184 examined cattle which led to a 51.63% prevalence rate in Dupchanchia Upazila of Bogura district. Infection rates were higher among calf (47.37%), female (63.16%) and crossbred cattle (70.53%) according to the study results. The observed case fatality rate measured 5.26%. The medical use of antibiotics aims to stop secondary bacterial infections and NSAIDs reduce inflammation while antihistamines prevent allergic responses. Clinical studies focused on supportive therapeutic nutrition supplements for reducing the life-threatening symptoms. The lack of specific antiviral treatments makes vector control specifically aimed at mosquitoes the main preventive measures. Future disease outbreaks together with economic losses can be minimized through effective disease management with proper control measures in place.

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***Correspondence** | Md. Kamruzzaman Akimul, Department of Microbiology and Public Health, Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Babuganj, Barishal-8210, Bangladesh; **Email:** akimul315512@gmail.com
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Introduction

Lumpy Skin Disease (LSD) is a highly contagious viral disease affecting cattle, caused by the Lumpy Skin Disease Virus (LSDV), an enveloped, linear, ovoid, double-stranded DNA virus under the genus Capripoxvirus within the Poxviridae family; is characterized by fever, nodular skin lesions, enlarged lymph nodes, and potential complications such as secondary bacterial infections, mastitis, and infertility (Tuppurainen and Oura, 2012). LSD transmission occurs mainly through the Neethling virus and three vectors which are biting flies, mosquitoes and ticks combined with direct exposure to sick animals (Beard, 2016). The disease imposes serious economic costs through milk production decreases along with weight reduction, poor leather quality and limitations on market access (Gari *et al.*, 2010).

LSD was first identified in Zambia in 1929, then

spread to Egypt in 1988, remaining largely confined to African territories until 2012 (WOAH). LSD was first reported on July 22, 2019, in Karnaphuli Upazila of Chattogram District and was confirmed through real-time PCR on August 27, 2019. Bangladesh officially reported the outbreak to the OIE on September 15, 2019. A similar pattern of clinical onset was later reported in different districts of Bangladesh (Ansari *et al.*, 2024; Pory *et al.*, 2021; Biswas *et al.*, 2020; Sarker *et al.*, 2020).

LSDV primarily spreads through arthropod blood-feeding vectors including hard ticks and biting flies and mosquitoes (Chihota *et al.*, 2001). The summer and rainy seasons create ideal breeding conditions for ticks, mites and mosquitoes that transmit Lumpy Skin Disease. The stronger vector activity during these seasons creates more difficulties in controlling diseases (Akther *et al.*, 2023).

Standard vaccination approaches for LSD include heterologous as well as homologous vaccination. The nationwide heterologous vaccination program uses live sheep or goatpox vaccines provided by the government but these immunizations do not provide strong or complete protection against LSD. Homologous vaccination through the Neethling strain delivers both robust and continuouos protective effects to the body. The Neethling strain vaccine stands as the most effective protection against Lumpy Skin Disease and different private companies sell it through the market (Tuppurainen *et al.*, 2021).

Objectives of the study

- To assess the prevalence of LSD in cattle in Dupchanchia Upazila, Bogura.
- To identify the risk factors associated with LSD prevalence in the cattle population.
- To evaluate the effectiveness of supportive treatments and clinical management for LSD-infected cattle.

Materials and Methods

Study area and study period

Bogura stands as a district which consists of twelve upazilas in northern Bangladesh. The research took place during August 7 to October 6 of 2022 within Dupchanchia Upazila which served as the study location (Figure 1). Cattle from every age group in both sex categories were part of the research independent of their rearing system intensity.

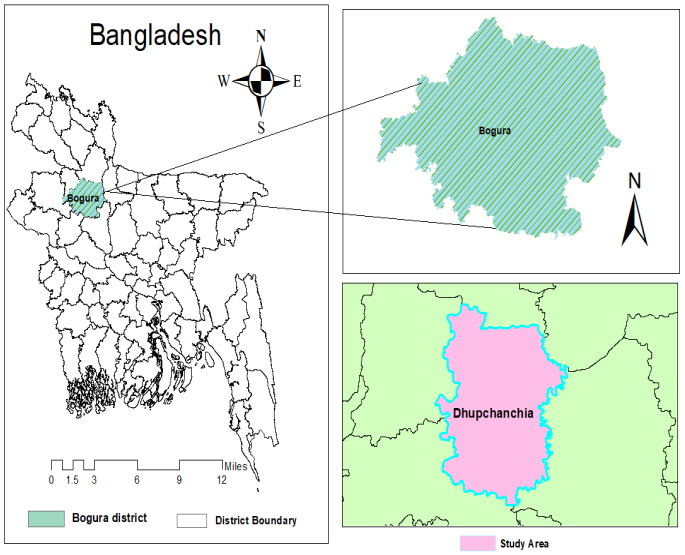

Figure 1: *Study area (Dupchanchia, Bogura).*

Investigation and data recording

This research utilized the patient data present in Upazila Livestock Office and Veterinary Hospital's register book together with on-site investigation conducted during research timelines. Each affected animal received documentation for age, sex and breed information. Physical examination included observation and manual assessment to evaluate sick cattle.

Epidemiological investigation

LSD occurs both endemically and occasionally in epidemic outbreaks. It spreads through cattle fairs, arthropod vectors, the movement of infected animals, contaminated syringes reused on affected cattle, and, most significantly, through the transportation of cattle from India to Bangladesh.

Tentative diagnosis

It is based on clinical history, animal examination and clinical findings.

Clinical signs for case identification

The following clinical signs were carefully observed to identify LSD cases:

- High fever (104–106°F)
- Cutaneous nodules covering the body (Like Figure 2)
- Enlargement of superficial lymph nodes
- Nasal discharge
- Excessive salivation
- Weakness and loss of appetite
- Rupture of cuteneous nodules (Like Figure 4)

- Sloughing od skin and muscle (Like Figure 3)
- Myiasis (infestation of nodules by fly larvae) (Figure 2, 3 and 4)

Figure 2: *Cutaneous nodule form all over calf body and nasal region.*

Figure 3: *Sloughing of skin and muscle.*

Figure 4: *Rupture of cutaneous nodule.*

Result and Discussion

Overall prevalence of LSD

A total of 184 disease cases of cattle were recorded at Upazila Livestock Office and Veterinary Hospital, Dupchanchia, Bogura district during 7th August to 6th October, 2022. Among them 95 cases were infected with LSD (Table 1).

Table 1: *Overall prevalence of LSD in cattle.*

Total no. of cases (N)	184
Total no. of LSD affected	95
Prevalence (%)	95×100/184= 51.630 %

This study revealed that the overall prevalence of LSD in Dupchanchia Upazila was 51.63%, which is comparable to the 63.33% reported in Monirampur and 52.38% in Avoynagor Upazila in the cattle of Jashore district (Biswas *et al.*, 2020) and slightly higher than the 41.06% reported in Dinajpur Sadar (Sarkar *et al.*, 2020). However, other studies have reported varying prevalence rates of LSD, including 4.13% in Barisal (Ansari *et al.*, 2024), 21% in Barishal (Khalil *et al.*, 2021), 13.65% in Sylhet Sadar Upazila (Pory *et al.*, 2021), and 8.7% in Uganda (Ochwo *et al.*, 2019). The prevalence of the disease may vary by region, influenced by several factors, with age, sex, and breed being the most common determinants at the herd level.

LSD in cattle of different ages

Calf animals showed the greatest vulnerability to LSD infections at 47.37% while the infection rates in adult herds stood at 37.89% and older cattle populations maintained the lowest rate of 14.74%. Our results parallel Azam *et al.* (2024) who detected LSD infections at 41.2% in calves together with 36.4% in adults and 35.2% in older cattle herds. According to Sarkar *et al.* (2020) older cattle at 11.2% exhibited less susceptibility compared to calves who were at 68%. High calf sensitivity contrasted with lower infection rates in older cattle due to inadequate care practices and poor health defense in both cattle types. Since the p-value is much lower than the common significance level (0.05), we can reject the null hypothesis, meaning that the disease does not affect all age groups equally (Table 2, Figure 5).

Table 2: *LSD in cattle of different ages.*

Stage	No. of affected animal	Percentage (%)	Chi-square test	p-value
Calf (<1Y)	45	47.37%	16.06	0.00033*
Adult (1 Y-3Y)	36	37.89%		
Old (>3Y)	14	14.74%		
Total	95	100%		

**p < 0.05 (Add this below the table).*

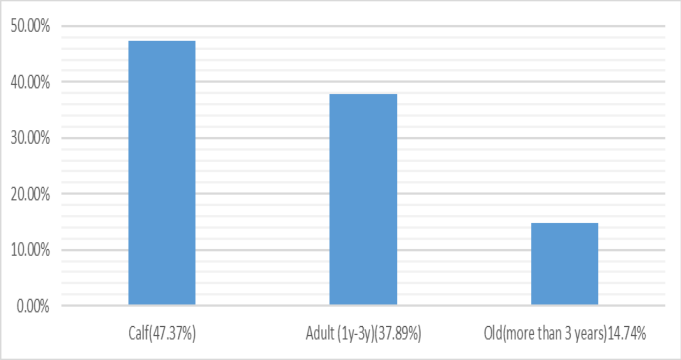

Figure 5: *LSD of different ages.*

LSD in different sex group

In the study, the LSD-infections was higher in female cattle (63.16%) than in male cattle (36.84%). These results differ from the findings of Sarkar *et al.* (2020), where the occurrence was higher in males (44%) than in females (38.5%). Since the p-value is less than 0.05, we reject the null hypothesis, indicating that the disease does not affect males and females equally. There is a statistically significant difference in infection rates between sexes (Table 3, Figure 6).

Table 3: *LSD in different sex group.*

Sex	Number	Percentage (%)	Chi-square test	p value
Female	60	63.16%	6.58	0.0103*
Male	35	36.84%		
Total	95	100%		

**p < 0.05 (Add this below the table).*

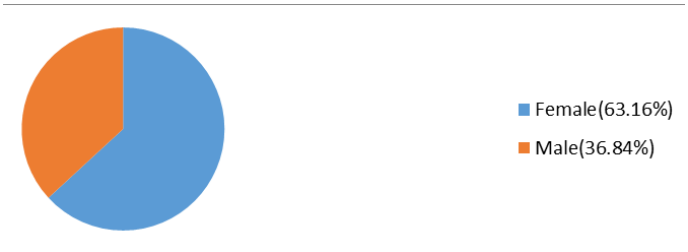

Figure 6: *LSD in different sex group.*

LSD in different breeds

Crossbred cattle showed higher susceptibility to LSD infection with an infection rate of 70.53% while indigenous cattle remained at 29.47% infection rate. Similar to the findings of Azam *et al.* (2024), the study demonstrated that crossbred cattle presented a 41.2% infection rate compared to indigenous cattle at 31.8%. The findings of Sarkar *et al.* (2020) showed indigenous cattle had 50% infections but crossbred cattle showed 26.9% infections. Weak immune systems along with inadequate management practices resulted in universal susceptibility across all animal breeds. Since the p-value is much smaller than 0.05, we reject the null hypothesis, indicating a significant association between breed type and disease occurrence (Table 4, Figure 7).

Rate of case-fatality

Case fatality Rate = Number of Cases of Death × 100 / Total Number of Incident Cases

Case fatality Rate = (5×100)/95 = 5.263%

Table 4: *LSD in different breeds.*

Breed	No. of affected animal	Percentage (%)	Chi-square test	P value
Indigenous	28	29.47%	16.01	0.000063*
Cross	67	70.53%		
Total	95	100%		

**p < 0.05 (Add this below the table).*

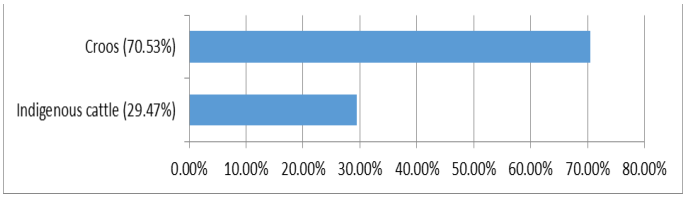

Figure 7: *LSD in different breeds.*

In the study, the mortality rate of LSD was recorded at 5.263%, which is similar to the 7.6% reported in Joypurhat and 7.5% in Naogaon (Azam *et al.*, 2024). It is also slightly higher than the 1.59% reported in Abhaynagar and 3.33% in Monirampur of Jashore district (Biswas *et al.*, 2020).

Treatment, prevention and control

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.

- Symptomatic treatment of affected animals may be carried out.
- Administration of antibiotics for 5-7 days to check secondary infection.
- Administration of anti-inflammatory and anti-histamine preparations may also be considered (Table 5).
- In case of pyrexia, paracetamol can be given.
- Application of antiseptic ointment with fly-repellent property over the eroded skin is recommended.

Table 5: *Evaluation of antibacterial drugs against secondary bacterial infection.*

Group number	Name of the drugs	No. of animals used	Healing result using this drug
1	Ceftiofur sodium + flunixin meglumine + Pheniramine Maleate	40	Response of drug is very good especially for calf.
2	Benzathine Penicillin + Procaine Penicillin G + flunixin meglumine + Pheniramine Maleate	50	Response of drug is good.
3	Oxytetracycline + flunixin meglumine + Pheniramine Maleate	5	Response of drug is good for complication infection.
Dose and route of administration	Ceftiofur sodium=1.1-2.2mg/kg body weight IM once daily for 3 to 5 days Benzathine Penicillin=44000-66000 IU/Kg IM daily for 3 to 5 days Procaine Penicillin G=10000-60000 IU/Kg IM daily for 3 to 5 days Oxytetracycline=20 mg/kg body weight IM once daily for 3 to 5 days flunixin meglumine= 1.1-2.2mg/kg body weight IM once daily for 5-7 days Pheniramine Maleate=0.5-1mg/kg body weight IM		

- Parenteral / oral multivitamins are advised.
- Feeding of liquid food, soft feed and fodder and succulent pasture is recommended for the infected animals.
- Dressing the ruptured area with Povidone-iodine, 0.01% potassium permanganate, or sodium bicarbonate helps prevent microbial growth and activity.

Ivermectin at the dosage rate of 0.2 mg/kg proved most successful for Lumpy Skin Disease (LSD) treatment according to veterinary experts. The antiviral properties of Ivermectin lead to 99.82% LSDV replication suppression and 99.87% sheeppox virus replication blockage in laboratory settings. the administration of 2.5 μM ivermectin successfully reduced infectious LSDV virion numbers by targeting the viral attachment and penetration phases, as well as inhibiting viral replication (Toker et al., 2022).

Zinc functions as an important trace element that supports development and helps people grow while maintaining vital immune function (Read *et al.*, 2019). Zinc supplements prove valuable for skin health because they possess anti-inflammatory effects according to Gupta *et al.* (2014). Immunodeficient patients receive zinc prescriptions to manage their immune system functions and protect them from opportunistic pathogens (Goswami *et al.*, 2005). Therefore, Animals which consume diets containing adequate zinc can heal their lesions better while also enhancing their immune response.

Adequate dietary vitamins together with essential minerals play a vital role in supporting cattle nutrition levels because good nutrition boosts immunity (Kegley *et al.*, 2016). The health of epithelium requires Vitamin A whereas Vitamin E and selenium assist in muscle development and prevent pathogen infection. Besides multivitamins and minerals there exist other important components for sustaining proper nutrition which facilitates LSD recovery in cattle. Vitamin E and selenium are essential for skin health.

The combination of 0.3% permethrin and 99.6% deodorized kerosene oil (FINIS® liquid spray from Standard Finis Oil Co. in Gazipur, Bangladesh) should be sprayed on cattle legs and tails two times each day to prevent additional mosquito and fly attacks (Paul, 2020).

LSD is arthropod-borne, so prevention is the best way to control it. Animals should be kept under mosquito nets to prevent mosquitoes, flies, and other arthropods from reaching them. Affected animals should be separated from healthy ones and treated properly. Vaccination should be administered correctly to prevent the disease.

Control of vectors by following integrated management practices such as physical, biological, cultural and chemical control. The practices such as change in grazing timings by avoiding bright sunshine hours; use of biocontrol agents against flies and ticks are also recommended. Use of herbal pesticides as repellants and last resort as spray of chemical insecticides are the options available.

- Vaccination in endemic areas.
- Quarantine of new arrived and infected animals.
- Disinfection of animal houses and premises with phenol 2%, sodium hypochlorite (2-3%), etc.
- Avoid movement/transport of infected animals and avoid.

Limitations of this study

- The time was too short to conduct this study.
- Laboratory facilities were not good enough.
- There was no facility for bacteriological and virological test in laboratory.

Conclusion

The LSD-infection spread to 51.63% of cattle in the Dupchanchia Upazila of Bogura district. Young calves and female as well as crossbred cattle showed higher infection rates than adult, male and indigenous cattle. LSD causes significant economic losses in livestock by reducing milk production and weight gain, damaging hides, abortions and deaths. The high prevalence combined with a 5.263% case fatality rate requires an immediate start of effective vector control programs which should focus on mosquito control.

Acknowledgement

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Novelty Statement

This study presents the first comprehensive analysis of the epidemiology and clinical management of Lumpy Skin Disease (LSD) in cattle in Dupchanchia Upazila of Bogura district. It uniquely integrates clinical case data, prevalence estimation, and risk factor analysis (age, sex, and breed) with a detailed evaluation of treatment responses to various drug regimens. The identification of a 51.63% prevalence rate and a 5.26% case fatality rate, along with statistically significant associations with age, sex, and breed, provides critical localized insights. Furthermore, the therapeutic outcomes offer practical guidance for field-level veterinary management in endemic areas. These findings contribute valuable new data to the national understanding of LSD epidemiology and support the development of more effective, region-specific control strategies in Bangladesh.

Author's Contribution

Conceptualization: MHS, MKA.
Data curation: MHS, MKA.
Data analysis: MHS, MKA.
Wrote the original draft: MHS, MKA.
Review and editing: MKA.
Both authors read and approved the final manuscript.

Conflict of interest

The authors have declared no conflict of interest.

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