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LETTER TO THE EDITOR

A Note on the Co-Infection Dynamics of Lumpy Skin Disease (LSD) and Bovine Haemoprotozoan Parasites

Vikrant SUDAN [1], Sunil PUNIA [1]

[1] College of Veterinary Science, Guru Angad Dev Veterinary and Animal Sciences University, Rampura Phul, Bathinda-151103, Punjab, INDIA

(*) **Corresponding author:**
Vikrant Sudan
Phone: +91 9045414200
E-mail: viks.sudan@gmail.com;
vikrantsudan@gadvasu.in

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Dear Editor,

Arthropod-borne diseases pose a serious threat to livestock health and significantly impact the economic stability of the livestock sector. Among these, Lumpy Skin Disease (LSD), caused by the Lumpy Skin Disease Virus (LSDV) from the family Poxviridae, is a significant concern. Primarily affecting cattle, LSD is widespread in Asia and results in substantial economic losses. The disease is mainly transmitted by hematophagous vectors like stable flies -*Stomoxys* spp., *Haematobia* spp.[1], mosquitoes [2], and ticks- particularly those of the *Hyalomma* spp.[3] and *Riphicephalus* spp. [1,4]. Likewise, ticks serve as vectors for several hemoprotozoan pathogens such as *Theileria* spp., *Babesia* spp., and *Anaplasma* spp., which cause theileriosis, babesiosis, and anaplasmosis, respectively. In recent years, reports of co-infections involving LSD and hemoprotozoan parasites from endemic areas have increased. The overlapping ecology and shared tick vector populations facilitate the simultaneous transmission of LSDV and hemoprotozoa. These co-infections exacerbate clinical signs, delay recovery, and complicate diagnosis, leading to additional economic losses in affected herds.

Previous research has shown that LSD often coexists with haemoprotozoan infections such as babesiosis [1] , theileriosis [1,4], and anaplasmosis [4]. Histopathological links between LSD and theileriosis have also been observed [5]. LSDV DNA in tick salivary glands reinforces the idea that ticks play a role in transmitting the virus [4]. The involvement of *Hyalomma anatolicum anatolicum* ticks in spreading LSD, theileriosis, and anaplasmosis is well established [4]. Likewise, the association of *Riphicephalus* spp. ticks, that is a common vector for bovine babesiosis, also spread LSD [1,4].

Breed susceptibility also plays a key role. Holstein Friesian cattle have been reported to develop more severe forms of LSD compared to indigenous breeds [6]. Similarly, exotic breeds are more prone to haemoprotozoan infections such as theileriosis. The higher prevalence of coinfections can be linked to the common vector -the tick- which transmits LSDV and haemoprotozoa [3]. Abas et al.[7] found a strong correlation between LSD outbreaks and haemoprotozoan infections, showing a significant difference ($P<0.05$) in parasitemia levels between LSD-positive and LSD-negative cattle. This difference was due to the immunosuppressive effect of LSDV.

In haemoprotozoan infections, parasitaemia levels are closely linked to the phagocytic activity of leukocytes, which becomes significantly impaired during LSD infection. Typically, parasite invasion triggers an innate immune response through chemokine release and recruitment of phagocytic cells [8-10]. This defence mechanism is particularly effective during acute infections with high parasitaemia, helping to control the infection [9]. However, during LSD infection, this immune response is disrupted, resulting in altered parasitaemia levels and more severe disease progression. Additionally, animals with tropical theileriosis experience dysfunction in key immune cells -macrophages, neutrophils, B cells, and T lymphocytes (CD4+ and CD8+)- which collectively maintain immune balance [11,12]. Any disturbance in their activity predisposes

animals to secondary viral infections, including LSDV [5]. Consequently, once coinfection occurs, both diseases worsen due to the host's weakened immune system.

Future investigations should focus on molecular and immunological methods to better understand the dynamics of these concurrent infections. The immunosuppressive effect of LSDV can make animals more vulnerable to secondary haemoprotozoan infections or trigger latent parasitic infections. Conversely, previous haemoprotozoan infections may weaken immune function, increasing susceptibility to LSDV. Real-time field and experimental studies are necessary to determine whether LSD predisposes animals to haemoprotozoan infections or the other way around. The possibility that carrier or sub clinically infected animals may become more susceptible to LSD also needs further study.

From a diagnostic standpoint, coinfection can mask typical clinical signs, resulting in underdiagnosis or misdiagnosis. Thus, a thorough diagnostic strategy that includes clinical evaluation, blood smear analysis, and molecular testing is vital for precise identification. Prompt diagnosis and immediate treatment are key to lowering morbidity, avoiding economic costs, and enhancing recovery in cases of coinfection.

References

1. **Manjunatha Reddy GB, Bijalwan S, Jacob SS, Tadakod S, Maharana SM, Nagaraj S, Pabbineedi SM, Uma CR, Balappa VP, Harlipura Basavarajappa CK, Sengupta PP, Patil SS, Gulati BR:** Investigation of comorbidity and risk factors analysis during lumpy skin disease outbreaks in India. *Microorganisms*, 13 (3):472, 2025. DOI: 10.3390/microorganisms13030472
2. **Paslaru AI, Maurer LM, Vögtlin A, Hoffmann B, Torgerson PR, Mathis A, Veronesi E:** Putative roles of mosquitoes (Culicidae) and biting midges *(Culicoides* spp.*)* as mechanical or biological vectors of lumpy skin disease virus. *Med Vet Entomol*, 36 (3): 381-389, 2022. DOI: 10.1111/mve.12576
3. **Ali S, Ahmad AS, Ashraf K, Khan JA, Rashid MI:** Insights into the involvement of male *Hyalomma anatolicum* ticks in transmitting *Anaplasma marginale*, lumpy skin disease virus and *Theileria annulata*. *Trop Anim Health Prod*, 56 (5):167, 2024. DOI: 10.1007/s11250-024-04022-x
4. **Tuppurainen ES, Lubinga JC, Stoltsz WH, Troskie M, Carpenter ST, Coetzer JA, Venter EH, Oura CA:** Mechanical transmission of lumpy skin disease virus by *Rhipicephalus appendiculatus* male ticks. *Epidemiol Infect*, 141 (2): 425-430, 2013. DOI: 10.1017/S0950268812000805
5. **Zaitoun AMA, Ali FAZ, Maximous MR, Khalifa FA, Abdel-Rady A:** Diagnostic investigations of lumpy skin disease in crossbred-cattle infected with *Theileria annulata* infection. *Comp Clin Pathol,* 32, 83-90, 2023. DOI: 10.1007/s00580-022-03415-4
6. **Abera Z, Degefu H, Gari G, Kidane M:** Sero-prevalence of lumpy skin disease in selected districts of West Wollega zone, Ethiopia. *BMC Vet Res*, 11, 135-144, 2015. DOI: 10.1186/s12917-015-0432-7
7. **Abas O, Abd-Elrahman A, Saleh A, Bessat M:** Prevalence of tick-borne haemoparasites and their perceived co-occurrences with viral outbreaks of FMD and LSD and their associated factors. *Heliyon*, 7 (3):e06479, 2021. DOI: 10.1016/j.heliyon.2021.e06479
8. **Pandey V, Nigam R, Bachan R, Sudan V, Jaiswal A K, Shankar D, Kumar R, Mandil R, Yadav B:** Oxidative and haemato-biochemical alterations in theileriosis affected cattle from semi-arid endemic areas of India. *Indian J Anim Sci,* 87 (7): 846-850, 2017.
9. **Sudan V, Paliwal S:** The interplay of cytokines in bovine tropical theileriosis: A mini review. *Trop Anim Health Prod,* 56 (5):174, 2024. DOI: 10.1007/s11250-024-04021-y
10. **Sudan V, Paliwal S:** Advances in piroplasmosis research and control in domestic animals. *Trop Anim Health Prod,* 57:425, 2025. DOI: 10.1007/S11250-025-04658-3
11. **Ram PK, Singh SK, Sudan V:** The phenotypic and haemato-biochemical appraisal of tropical theileriosis in newborn calves. *Trop Anim Health Prod*, 53 (5):477, 2021. DOI: 10.1007/s11250-021-02889-8
12. **Ram PK, Singh SK, Kumari P, Srivastava M, Sudan V, Pandey RP, Garg SK:** Role of cytokines in the clinical manifestation of exophthalmia in newborn calves with tropical theileriosis. *Parasite Immunol,* 42 (10):e12761, 2020. DOI: 10.1111/pim.12761