

Evaluation of the Stability of Reconstituted Lumpy Skin Disease Vaccine at 2–8°C for Field Applications

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Abstract

Background: Lumpy skin disease (LSD) caused by Lumpy skin disease virus, a member of the genus *Capripoxvirus* affects cattle and buffalo, leading to fever, weight loss, lethargy, lymphadenopathy and nodular skin lesions. Although mortality is low, LSD causes significant economic losses through reduced growth, milk production, reproductive performance and carcass quality. Vaccination with live attenuated lyophilized LSD vaccines is the primary control measure. However, after reconstitution, vaccine potency can be affected by temperature, light and contamination. In field conditions, maintaining recommended storage temperatures and using all doses within the specified timeframe can be challenging, particularly when vial sizes exceed the number of animals and vaccine sharing between farms is limited. This often results in wastage and increased costs. Therefore, evaluating the stability of reconstituted vaccines is essential to ensure their effectiveness under practical conditions.

Objectives: This study evaluated the stability of the reconstituted Lumpy Skin Disease (LSD) vaccine at 2–8°C under practical field-use conditions over various time periods

Methods: Three batches of lyophilized Lumpy Skin Disease vaccine were reconstituted according to the manufacturer's instructions. To simulate field conditions, the reconstituted vaccines were kept in an icebox at 2–8°C for 0–10 hours, then stored in a refrigerator at 2–8°C for testing at 24 hours. MDBK cells were seeded in 96-well plates to form monolayers. The vaccines were serially diluted from 10⁻¹ to 10⁻⁶ and 50 µL of each dilution was inoculated into five wells. Plates were incubated at 37°C with 5% CO₂ and cytopathic effects were monitored for 7 days. Virus titers were calculated using the Spearman-Kärber method at 0, 2, 4, 6, 8, 10 and 24 hours post-reconstitution.

Results: Virus titers of three vaccine batches at 0 hours post-reconstitution were 4.2, 4.2 and 3.8 log₁₀ TCID₅₀/dose, respectively and remained stable for up to 6 hours. At 8 and 10 hours, Sample 1 remained stable, whereas Samples 2 and 3 showed slight decreases to 4.0 and 3.6 log₁₀ TCID₅₀/dose, respectively. All samples remained within the acceptable range (3–4 log₁₀ TCID₅₀/dose) according to the guidelines of the World Organization for Animal Health at 24 hours.

Conclusion: The reconstituted LSD vaccine is stable for up to 6 hours at 2–8°C. Although titers remain within the acceptable range at 24 hours, factors such as contamination and light exposure may affect vaccine stability in practice. These findings provide important data for enhancing program efficiency and supporting reliable field use in controlling LSD outbreaks.

Keywords: Lyophilized Lumpy Skin Disease vaccine, Virus titer, Vaccine stability

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