



BOVIMUN LSD

TO PROTECT CATTLE WHEN IT MATTERS MOST



**LIVE ATTENUATED VACCINE
AGAINST LUMPY SKIN DISEASE
LSDV-NEETHLING STRAIN**

NEW PRODUCT



LUMPY SKIN DISEASE

Lumpy Skin Disease (LSD) is a disease of cattle characterized by fever, nodules on the skin, mucous membranes, and internal organs, emaciation, swollen lymph nodes, and swelling of the skin. Various strains of capripoxvirus are responsible for the disease. Lumpy Skin Disease virus (LSDV) belongs to the family Poxviridae, subfamily Chordopoxviridae, and genus *Capripoxvirus*.

The disease **is of economic importance** as it can cause a temporary decrease in milk production, temporary or permanent sterility of bulls, damage to the skin, and, occasionally, death.

The **morbidity rate** ranges between 10 and 20% although it has been reported to be as high as 45% in some places. **Mortality rates** of 1 to 5% are considered normal.

Transmission of the LSD virus is thought to occur predominantly by arthropods.

Successful control and eradication of LSD depend on early detection of the index case, followed by a rapid and large-scale vaccination campaign.

PRODUCTION LOSSES DUE TO LSD

On the example of Turkey in 2019*

DAIRY

US \$ 886.34
per cow

US \$ 568 144.50
for 641 cases

BEEF

US \$ 1 066.61
per cow

US \$ 683 695.13
for 641 cases

The prevalence of the LSD epidemic in Turkey in 2019 was 4.51%, the fatality rate was 24.10%, and mortality was 1.09%

Loss Type	Dairy		Beef	
	Loss per animal (US \$)	Ratio (%)	Loss per animal (US\$)	Ratio (%)
Loss of Milk	46.68	5.27	-	-
Body weight loss	53.18	6.00	63.21	5.93
Carcass meat loss	747.24	84.31	968.93	90.84
Spontaneous Abortion and Still Birth loss	13.40	1.51	-	-
Loss of skin	25.85	2.92	34.46	3.23
Total Loss	886.34	100.00	1,066.61	100.00

*Mat B., et al. Determination of production losses related to lumpy skin disease among cattle in Turkey and analysis using SEIR epidemic model. BMC Veterinary Research volume 17, Article number: 300 (2021)

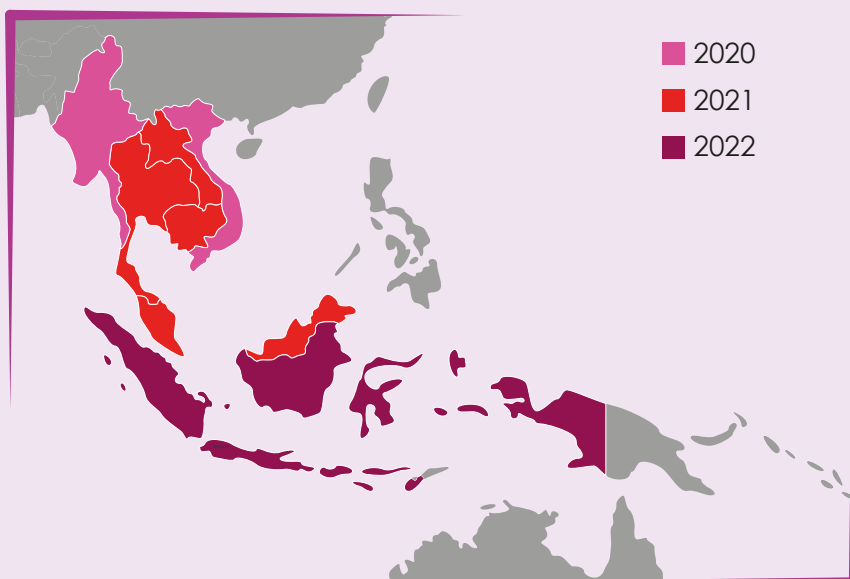


LSD
TECHNICAL
DISEASE
CARD

NEW DISEASE IN SOUTH-EAST ASIA REGION



LSD
GEOGRAPHICAL
DISTRIBUTION



BOVIMUN LSD

VACCINATION PROGRAM

NEETHLING VACCINE OR SPPV VACCINE

Efficiency comparison results of live attenuated Neethling LSDV vaccine and live attenuated Romanian SPPV Vaccine against a recent circulating LSDV field isolate in Egypt**.

The evaluation was carried out in calves, the main host of LSD, using three different batches for each type of vaccine. Experimental groups of calves were vaccinated with vaccine batches, and 21 days later serum samples were collected to assess the humoral immune response using SNT and a commercial ELISA method, then the vaccinated calves were challenged with a virulent field isolate of LSDV.

Evaluation of the humoral immune response against LSDV in the blood sera of vaccinated calves using SNT

Batch Vaccine	SNT Antibody titer ($\log_{10}$)	
	LSDV vaccine	SPPV vaccine
Batch 1	1.2	1.05
Batch 2	1.6	1.05
Batch 3	1.5	1.5

Antibody titer ≥ 1.10 is considered positive

Evaluation of the humoral immune response in the blood sera of vaccinated calves using the Capripox ELISA Kit

Batch Vaccine	ELISA S/P %	
	LSDV vaccine	SPPV vaccine
Batch 1	40	35
Batch 2	45	37
Batch 3	42	40

S/P percentage (S/P %) $\geq 30\%$ are considered positive

The challenge of vaccinated calves with LSDV

Batch Vaccine	Challenge titer ($\log_{10}$)	
	LSDV vaccine	SPPV vaccine
Batch 1	4.2	2.6
Batch 2	4.5	2
Batch 3	3.8	2.65

Difference in titre ($>\log_{10} 2.5$ is taken as evidence of protection)

**Shafik NG., et al. Comparative study between lumpy skin disease virus and sheep pox virus vaccines against recent field isolate of lumpy skin disease virus. *Revista Bionatura* 6(3):1955-1959. DOI:10.21931/RB/2021.01.03.12

NEETHLING STRAIN: A BRIEF OVERVIEW

- Currently, most commercially available vaccines against LSD are live attenuated vaccines based on the Neethling strain. The protection provided by a vaccine depends on the level of attenuation, dose volume, and the titer of the attenuated vaccine virus in the final product. Vaccines must be produced in accordance with GMP¹
- Mass vaccination of cattle against LSD using live homologous vaccines is considered the most effective control measure in the EU and many Asian countries (Thailand, Malaysia, etc.)²
- Vaccines from the Neethling strain show a high-efficiency ratio, which can reach 97%³ but may cause mild adverse effects⁵
- Heterologous vaccines sometimes failed due to the appearance of LSD symptoms in some vaccinated animals, raising doubts about their effectiveness in the field⁴

• The minimum recommended field dose of the Neethling strain vaccines is $\log_{10} 3.5$ median tissue culture infectious dose (TCID)₅₀, although the minimum protective dose is $\log_{10} 2.0$ TCID₅₀¹

WOAH recommendations

• **Medical prevention of LSD: LSDV live attenuated vaccine, strain Neethling LSD. The Neethling-type strain vaccine has been used for over 60 years to vaccinate millions of animals, and there are NO reports of the vaccine virus regaining virulence.**

- Sheeppox or goatpox vaccines can be used as an alternative vaccine in countries where both LSD and sheep pox and goat pox are prevalent, or in countries that already have the capacity to produce these vaccines. However, if a sheeppox/goatpox virus vaccine is chosen for use in cattle, the vaccine product must be well characterized and the dose adjusted for cattle.



World Organisation
for Animal Health
Founded as OIE

NEETHLING STRAIN

NEW LIVE ATTENUATED VACCINE AGAINST LUMPY SKIN DISEASE

One dose of the vaccine (1 ml):

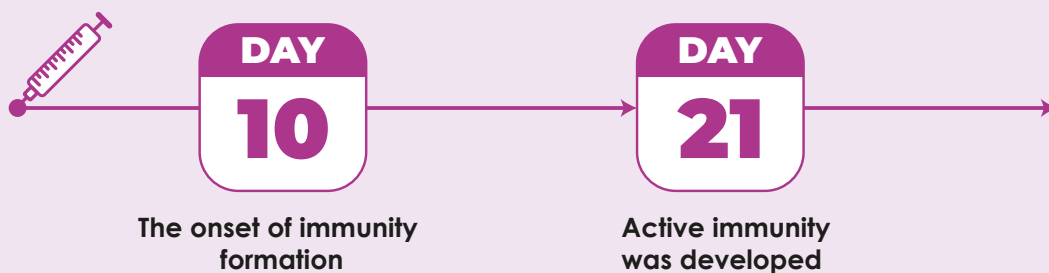
Lumpy Skin Disease virus of cattle,
strain Neethling > $10^{3.8}$ TCD₅₀

Producer:

 **BioTestLab®**



Available in doses:
5, 10, 25, 50, 100



VACCINATION SCHEME

in a dose of **1.0 ml** subcutaneously



Bulls, cows:
once regardless of age



Calves from vaccinated cows:
once at the age of 4-6 months
Calves from non-vaccinated cows:
once at any age

Revaccination is carried out annually

References: ¹Tuppurainen E., et al. Review: Vaccines and Vaccination against Lumpy Skin Disease. *Vaccines*, 06 Oct 2021, 9(10):1136. ²Report of the Second Lumpy skin disease (LSD) Coordination meeting for South-East Asia. Virtual meeting on 16 December 2021. <https://rr-asia.woah.org/>. ³Klement E., et al. Neethling vaccine proved highly effective in controlling lumpy skin disease epidemics in the Balkans. *Prevent Vet Med.* 2020;181:104595 doi: 10.1016/j.prevetmed.2018.12.001 ⁴Abutarbush SM., et al. Lumpy Skin Disease in Jordan: Disease Emergence, Clinical Signs, Complications and Preliminary-associated Economic Losses. *Transbound Emerg Dis.* 2015;62(5):549–554. doi: 10.1111/tbed.12177 ⁵Ben-Gera J., et al. Comparison of the efficacy of Neethling lumpy skin disease virus and x10RM65 sheep-pox live attenuated vaccines for the prevention of lumpy skin disease – The results of a randomized controlled field study. *Vaccine. Volume 33, Issue 38, 11 September 2015, Pages 4837-4842*