

# FREQUENTLY ASKED QUESTIONS ON LSD VACCINATION

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## **What are the benefits of LSD vaccination?**

- The most effective tool for LSD control and potential eradication.
- Easier to implement and more effective than other measures such as stamping out) and vector control.
- Reduces the total number of susceptible animals within the population, thus preventing entry (in the case of preventive vaccination) and the spread of the disease.
- Protects the animals from getting infected with LSD and further vector transmission of LSD virus, thus preventing direct and indirect economic losses.

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## **What do you mean by homologous and heterologous LSD vaccines?**

In the context of Lumpy skin disease (LSD), homologous vaccines are the LSDV-based vaccines, and the sheep/goat pox virus-based vaccines are called heterologous vaccines. Heterologous means you are using a sheep pox/goat pox virus-based vaccine to protect cattle against LSDV.

For the purpose of LSD prevention and control, LSD vaccines are based on Neethling-type strains of LSD virus (homologous vaccine); Vaccines based on strains of either sheep pox virus (SPPV) or goat pox virus (GTPV) (heterologous vaccines) may be used as an alternative in those countries where both LSD and sheep and goat pox occur or for those countries that already have manufacturing capacity for these vaccines.

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## **Are there any DIVA (Differentiating Infected from Vaccinated Animals) vaccine?**

There is no DIVA vaccine available in the market or build marker in the vaccines. There are PCR technologies which can detect the specific part of viral genomes absent in the vaccine strains but present in field virus strains, thus able to differentiate the disease induced by either vaccine or field virus strains.

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## **When and how cattle should be vaccinated against LSD?**

The recommendations of the vaccine manufacturer should always be followed for those countries using LSD vaccination. For most of the vaccines:

- Annual vaccination of adult cattle will protect animals from LSD.
- Calves from unvaccinated dams can be vaccinated after attaining the age of 1 month.
- Newly purchased animals should be vaccinated 28 days before the introduction to the herd.
- Animals should be vaccinated 28 days before the transport or movement to another place.
- The same dosage and protocol should be applied to all domestic bovines.
- Pregnant, healthy cows/heifers can be safely vaccinated.

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## **How many doses of LSD vaccine provide full protection to susceptible animals, and how long does protection from LSD vaccine last?**

Most of the time, a single dose of live attenuated LSD vaccine should confer adequate protection to the vaccinated animals after three weeks of vaccination and for at least one year. Annual vaccination is recommended in affected countries, and harmonized vaccination campaigns across regions provide the best protection.

As an example: Once some Balkan Countries reached a vaccination coverage higher than 80 % they controlled LSD within one to three months.”

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## **Can we inject LSD and FMD vaccine at the same time in the same animal?**

There is limited scientific publication on this matter. However, the vaccination of two different vaccines at the same time in the same animal had been practiced for many years, for obvious practical and logistical reasons. The immune system of a healthy animal is capable of responding to two antigens at the same time. However, it is critical not to mix the vaccines (except specified otherwise by the manufacturer).

Israel has conducted combined LSD and FMD vaccination, following the rules below: LSD and FMD vaccines are not mixed at any stage; separate syringes and needles are used; vaccines are injected into the neck, but far from each other and preferably on different sides of the neck. From this practical experience, an OIE LSD Expert indicated that there was no report of vaccination failure that could be linked to this combined vaccination.

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## **How can you monitor the efficacy of LSD vaccination or herd immunity post-vaccination?**

Active clinical surveillance is a very effective tool to assess the efficacy of vaccination campaign. Due to the highly characteristic clinical manifestation of LSD, a thorough physical examination carried out by experienced veterinarians is considered as an effective tool for active clinical surveillance. Passive surveillance provides an additional support if LSD awareness level to identify typical LSD clinical signs are high, and the farmers, field vets and others who come into contact with cattle are willing to report any suspicious cases.

Antibody ELISA can be used for post-vaccination monitoring 2 to 3 months after vaccination taking into account that not all animals will seroconvert.

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## **Can live-attenuated vaccine be used safely on infected animals (with or without any clinical signs)?**

Clinically infected animals will be naturally immunized. Once these animals recover from disease it is recommended that they receive an annual vaccination booster as we do not know how long natural immunity lasts.

For non-clinical animals, there is no evidence that vaccination of latently infected or sub-clinically infected animals would lead to severe disease. Due to the risk of spread of the LSD virus via needles used on non-clinical animals, it is critical to only use single-use needles.

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## **Can live attenuated vaccine regain its virulence or lead to recombination with field virus?**

A study undertaken in Europe from 2016–2020 on three live attenuated LSD vaccines did not show the regaining of the LSD vaccine strain's virulence or recombination with the field virus. One Croatian study reported that after the passage of the vaccine virus in cattle, the genome of the vaccine virus remained totally attenuated with 100% similarity to the original vaccine virus (Lojkic et al., 2018). Recombination of vaccine and field viruses has been reported by Russian Scientists (Sprygin et al., 2018). There is still much we do not understand about how and when these events are occurring, therefore more detailed studies are required to investigate the importance of these findings.

The Neethling-type strain vaccine has been used for more than 60 years, vaccinating millions of animals, and there are NO reports of the vaccine virus regaining its virulence.

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## **Are there any recent LSD cases in sheep and goat?**

There were no reports of LSD in sheep and goats nor epidemiological involvement of sheep and goats, although, in many LSD-infected countries, they live together and are in proximity to cattle.

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## **Can vaccinated animals still get LSD infection?**

Development of full protection from the vaccine takes approximately three weeks. During this time, cattle may still get infected by the field virus, and may show clinical signs despite being vaccinated. Some animals may also be incubating the virus when vaccinated, and in such cases clinical signs are detected in less than ten days after vaccination.

In some exceptional cases, the vaccination may not provide adequate protection, resulting in a clinical disease. There may be number of reasons for the vaccination failure which may be associated with either the vaccine itself (the level of attenuation is too low or high, low titre of vaccine seed virus or contaminated vaccine batch), host response (vaccine may be administered correctly but the animal may fail to mount an appropriate immune response), and due to lapses in delivery of vaccines (route of administration or dosage, timing, and cold chain maintenance during the storage and transport of vaccines). Clinical signs may also be due to other diseases, such as bovine herpesvirus 2, also called pseudo LSD. Vaccination failure has therefore to be properly investigated to identify its source and cause.

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## **What are the common side effects of LSD vaccination?**

Live-attenuated LSD vaccines may cause mild adverse reactions in cattle. Local reaction at the vaccination site is common and acceptable. Common adverse reactions include temporary fever and a brief drop in milk yield. Some animals may show a mild generalized reaction called the Neethling response. This is rare and usually involves the appearance of superficial and smaller skin lesions, different from those caused by the fully virulent field strain. They disappear within 2-3 weeks without converting into necrotic scabs or ulcers. Side effects are seen only when animals are vaccinated with the LSD vaccine for the first time and are hardly seen after the revaccination. Adverse reactions and side effects of LSD vaccination should be well explained to farmers in advance to prevent their reticence to have their animals vaccinated and to prevent loss of trust if this happens.

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## **What are the means of mechanical transmission of LSD virus? Is vector control effective in LSD control?**

Mosquitos, flies, ticks and any blood-sucking arthropods may act as mechanical vectors to transmit LSD virus. Similarly, contaminated needles can transmit the virus mechanically. The saliva of infected cattle in joint water and feed troughs may lead to transmission too.

The use of insect repellents or insecticides has limited effectiveness or will have only a short effect as it can be washed by rain or when it comes in contact with water, and frequently biting insects will be active around the year. Their cost, toxicity, and residues in milk and meat, as well as their effects on other insects like honey bees, must also be considered.

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## **Do LSD-recovered animal become LSDV carrier?**

There is no known carrier state.

Once an animal has recovered, it is well protected and cannot be the source of infection to other animals. In infected animals that do not show clinical signs, the virus may remain in the blood for a few weeks and eventually disappear.

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## **What have been the control measures applied effectively in countries that succeeded in controlling/eradicating LSD?**

Vaccination of cattle plays a fundamental role in the control and eradication of LSD. To date, no country managed to control or eradicate LSD without vaccination. With a high vaccination coverage (>80%) in the Balkan, LSD outbreaks were controlled within a few weeks to several months, depending on how fast the vaccination campaigns were completed.